Study Report

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DARWIN EU® - Eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen

30/09/2025

Version 4.0

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Public

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Study title	DARWIN EU® - Eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen
Study report version	V4.0
Date	30/09/2025
EUPAS number	EUPAS1000000599
Active substance	Drug classes of interest were identified based on WHO ATC codes and included: anastrozole (L02BG03), letrozole (L02BG04), and tamoxifen (L02BA01).
Medicinal product	N/A
Research question and objectives	To calculate the incidence of eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen. The specific objectives were: 1. To calculate incidence rates and cumulative incidence of eye disorders, overall and by eye disorder (cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment, vitreomacular traction syndrome, and all visual system disorders combined), age category, and type of therapy (anastrozole, letrozole, or tamoxifen), among pre- and postmenopausal women with breast cancer 2. To characterise postmenopausal women with breast cancer treated with anastrozole, letrozole, or tamoxifen at the start of treatment in terms of demographics and potential risk factors for eye disorders. 3. To estimate the time from initiation of anastrozole, letrozole, or tamoxifen to first eye disorder (overall) among postmenopausal women with breast cancer.
Countries of study	Croatia, Finland, Germany, Spain, UK
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LIST OF ABBREVIATIONS

Acronyms/term	Description
AI	Aromatase Inhibitor
ATC	Anatomical Therapeutic Chemical
BIFAP	Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público
CDM	Common Data Model
CI	Confidence Interval
CIPH	Croatian Institute of Public Health
CPRD	Clinical Practice Research Datalink
DARWIN EU®	Data Analysis and Real-World Interrogation Network
DUS	Drug Utilisation Study
EHR	Electronic Health Record
EMA	European Medicines Agency
EU	European Union
FinOMOP-THL	Finnish Care Register for Health Care
FDA	Food and Drug Administration
GDPR	General Data Protection Regulation
GP	General Practitioner
HER-2	Human Epidermal Growth Factor Receptor 2
ICD-O-3	International Classification of Diseases for Oncology, 3rd edition
IQVIA DA Germany	IQVIA Disease Analyzer
IQR	Interquartile Range
IR	Incidence Rate
NAJS	Croatian National Public Health Information System
OHDSI	Observational Health Data Sciences and Informatics
OMOP	Observational Medical Outcomes Partnership
SNOMED	Systematised Nomenclature of Medicine
SD	Standard Deviation
UK	United Kingdom
WHO	World Health Organisation

1. TITLE

DARWIN EU® - Eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen

2. DESCRIPTION OF THE STUDY TEAM

Study team roles	Names	Organisation
Principal Investigator	Anton Barchuk Talita Duarte-Salles	Erasmus MC
Data Scientist	Ger Inberg Ioanna Nika Maarten van Kessel Ross Williams	Erasmus MC
Epidemiologist	Julieta Politi Anton Barchuk Berta Raventós	Erasmus MC
Clinical Domain Expert	Anton Barchuk Julieta Politi	Erasmus MC
Study Manager	Natasha Yefimenko	Erasmus MC
Data partner*	**Names**	**Organisation**
NAJS	Mario Šekerija, Anamaria Jurčević Jakov Vuković Ivan Pristaš Antea Jezidžić Marko Čavlina Karlo Pintarić	Croatian Institute of Public Health
FinOMOP-THL	Anna Hammais Tiina Wahlfors Toni Lehnoten	Finnish Institute for Health and Welfare
IQVIA DA Germany	Gargi Jadhav Isabella Kaczmarczyk Akram Mendez Dina Vojinovic Ellen Gerritsen	IQVIA, Germany
BIFAP	Miguel Ángel Maciá Martínez Ana Llorente-Garcia Miguel Jesus Gil Garcia Hermenegildo Carlos Martínez-Alcalá García	Spanish Agency of Medicines and Medical Products
CPRD GOLD	Antonella Delmestri Marta Pineda Moncusí	University of Oxford

*Data partners do not have an investigator role. Data partners execute code at their data source, review and approve their results.

3. ABSTRACT

Title

DARWIN EU® - Eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen

Rationale and background

Breast cancer is the most common malignancy in women, with over 2.3 million new cases and 685,000 deaths in 2020 worldwide. The majority of postmenopausal women with breast cancer have oestrogen-receptor-positive tumours. Third-line aromatase inhibitors (AI), such as anastrozole and letrozole, became one of the primary options for the endocrine treatment of breast cancer in the early 2000s, along with the previously established use of a selective oestrogen receptor modulator (tamoxifen). Common side effects of aromatase inhibitors include menopausal symptoms, hot flashes, masculinisation, acne, musculoskeletal complaints, fatigue, dyslipidaemia, and altered liver function tests. Studies have also suggested an increased risk of cardiovascular events and bone fractures. Adverse effects of AIs were considered to be related to the fact that oestrogen receptors have multiple physiologic roles. Several studies and case reports observed an association between anastrozole use and eye conditions, including hemi-central retinal artery occlusion and dry eye syndrome. The most frequent signs were minor to moderate ocular surface diseases. Among the reported events were Sjögren syndrome, retinal and optic nerve side effects ranging from mild impairment to severely decreased vision, hemi-central retinal artery occlusion, bilateral optic neuritis, and uveitis with bilateral macular oedema.

Research question and objectives

The overall aim of the study was to calculate incidence rates of eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen.

The specific objectives were:

1. To calculate incidence rates and cumulative incidence of eye disorders, overall and by eye disorder (cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment, vitreomacular traction syndrome, and all visual system disorders combined), age category, and type of therapy (anastrozole, letrozole, or tamoxifen), among pre- and postmenopausal women with breast cancer (primary objective).
2. To characterise postmenopausal women with breast cancer treated with anastrozole, letrozole, or tamoxifen at the start of treatment in terms of demographics and potential risk factors for eye disorders (secondary objective 1).
3. To estimate the time from initiation of anastrozole, letrozole, or tamoxifen to the first eye disorder (overall) among postmenopausal women with breast cancer (secondary objective 2).

Study design

Cohort study (new drug user cohort).

Population

The source population included women aged 18 years and above with a primary diagnosis of breast cancer in the period between 01/01/2010 and 31/12/2022. All patients had at least 365 days of observation time prior to the diagnosis date. For patient-level analysis in the cohort of breast cancer patients, new users of anastrozole, letrozole, or tamoxifen were selected. Only patients who started first treatment with anastrozole, letrozole, or tamoxifen (only one medication which was prescribed first) within 365 days of initial breast cancer diagnosis were included, to ensure treatment was related to a particular breast cancer diagnosis.

Patients with prior records of any anti-oestrogens (tamoxifen, toremifene, fulvestrant, elacestrant) and any AIs (aminoglutethimide, formestane, anastrozole, letrozole, vorozole, exemestane) were excluded. For the secondary objective 1, only postmenopausal women were selected. For the secondary objective 2, only a subset of patients with a record of the exposure (prescription record of anastrozole, letrozole, or tamoxifen) and the outcome (any of the pre-specified eye disorder, based on SNOMED codes) were included.

Variables

Anastrozole, letrozole, or tamoxifen exposure consisted of a prescription record of anastrozole, letrozole, or tamoxifen, accounting for the first prescription in the study period with no prior prescription for other indications before the cancer diagnosis. Treatment episodes of sequential prescriptions for the same medicine were generated based on actual drug exposure recorded in different databases, accounting for various packaging, stockpiling, and long duration of drug use.

Outcomes included specific eye disorders: cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment, vitreomacular traction syndrome, and all visual system disorders combined.

The age at the time of first prescription of anastrozole, letrozole, or tamoxifen was described using the following age groups: 18–54 (premenopausal), ≥55 (postmenopausal), 55–64, 65–74, 75–84, and 85 and above.

Prevalence of the following co-morbidities any time prior up to the time of first prescription of the drug was reported: diabetes mellitus, hypertension, hyperlipidaemia, obesity, psoriasis, and autoimmune disorders.

Data sources

This study was conducted using routinely collected data from 5 databases in 5 European countries selected from the DARWIN EU® Database Catalogue:

1. Croatian National Public Health Information System (NAJS), Croatia
2. Finnish Care Register for Health Care (FinOMOP-THL), Finland
3. IQVIA Disease Analyzer Germany (IQVIA DA Germany), Germany
4. Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público (BIFAP), Spain
5. Clinical Practice Research Datalink GOLD (CPRD GOLD), United Kingdom

Statistical analysis

Analyses were conducted separately for each database and carried out in a federated manner, allowing analyses to be run locally without sharing patient-level data.

The incidence rates of eye disorders (primary objective) for the entire study period and the cumulative incidence every 6 months up to 60 months (5 years) were estimated for the period during the drug era (continuous exposure) of each of the three medicines of interest: anastrozole, letrozole, or tamoxifen.

The numerator for incidence rates included all newly diagnosed cases of eye disorders, and the denominator included the person-years contributed by the study participants from the date of first prescription of anastrozole, letrozole, or tamoxifen until the end of the drug era or end of the follow-up period (whichever came first). For cumulative incidence, a cohort of patients was formed from the date of first prescription of anastrozole, letrozole, or tamoxifen and followed up until the occurrence of the outcomes, the end of the drug era or end of the follow-up period.

Patient-level characterisation (secondary objective 1) was conducted as follows: age was described at the time of first prescription. The prevalence of pre-specified comorbidities was assessed any time prior to the prescription date.

The median time to the onset of outcomes (secondary objective 2) was estimated in the cohort of patients exposed to the drugs of interest who experienced the outcome (eye disorders).

Results

The incidence (primary objective) and timing (secondary objective 2) of visual system disorders in women with breast cancer varied by age and data source, but not by type of treatment within the same data source and age groups.

Within the databases, incidence rates (IRs) among users of the three drug user groups were similar. In postmenopausal women (aged ≥55 years) in NAJS, IRs for all visual system disorders were 12,827 (95% CI: 11,706–14,026) for anastrozole users, 12,237 (10,843–13,760) for letrozole users, and 11,061 (8,005–14,899) for tamoxifen users. In BIFAP, IRs were 9,292 (8,647–9,972) for anastrozole users, 8,408 (8,117–8,706) for letrozole users, and 7,451 (6,704–8,258) for tamoxifen users. In CPRD GOLD, rates were 4,403 (3,942–4,903) for anastrozole, 3,836 (3,590–4,093) for letrozole, and 3,455 (3,067–3,878) for tamoxifen. In FinOMOP-THL, IRs were 6,180 (3,663–9,767) for anastrozole users, 7,496 (6,562–8,525) for letrozole users, and 6,246 (3,638–10,000) for tamoxifen users. In IQVIA DA Germany, the rates were also similar for the three drug users: 951 (637–1,366) for anastrozole, 980 (720–1,303) for letrozole, and 933 (705–1,211) for tamoxifen.

Postmenopausal women consistently showed higher IRs than premenopausal women across all outcomes, except for inflammatory conditions such as keratitis and uveitis, which were similarly frequent in both groups. Depending on the type of eye disorder, the number of observed events ranged from zero in smaller cohorts, especially among premenopausal women and in IQVIA DA Germany and FinOMOP-THL, to over 3,000 patients in large cohorts, such as those of letrozole users in BIFAP. NAJS reported the highest IRs. At the same time, IQVIA DA Germany had the lowest estimates.

Among individual disorders, cataract was the most frequent outcome in postmenopausal women, with IRs surpassing 3,000 per 100,000 person-years in BIFAP and NAJS. Most other outcomes, including retinal detachment, macular hole, and vascular complications, were rare and often not estimable due to low event counts.

The cumulative incidence analysis confirmed these findings, with substantial variation across databases: NAJS, BIFAP, and CPRD GOLD showed a steady increase over five years, while IQVIA DA Germany and FinOMOP-THL had limited follow-up and lower cumulative probabilities.

The median age of postmenopausal women with breast cancer ranged from 65 to 70 years. Letrozole was the most commonly prescribed drug across all data sources. Comorbidity profiles varied slightly by treatment group, with letrozole and anastrozole users generally showing higher rates of hypertension, hyperlipidaemia, and diabetes. Tamoxifen users had lower rates of metabolic disorders but a higher prevalence of autoimmune diseases.

Median time to onset data revealed that tamoxifen had a shorter latency for several outcomes, and anastrozole and letrozole showed later onset for conditions such as cataract, keratitis, and retinal vascular disorders.

Sensitivity analyses revealed that extending the follow-up window and the gap between two drug indications to build a continuous exposure period from 30 to 90 days increased follow-up time, particularly in FinOMOP-THL and IQVIA DA Germany. However, incidence rates remained essentially unchanged in data sources with longer follow-up, such as CPRD GOLD and BIFAP, suggesting robust estimates in those settings.

Discussion

This multinational cohort study examined the incidence of eye disorders in 150,000 women with breast cancer treated with anastrozole, letrozole, or tamoxifen. The study identified over 5,000 events of selected eye disorders and provided incidence rate estimates for all outcomes. While some disorders, such as macular hole or retinal tear, remained rare and incidence could not be consistently estimated, cataract was one of the most common conditions, particularly among postmenopausal women. Incidence and cumulative risk varied substantially across data sources, with the highest rates observed in NAJS, BIFAP, and CPRD GOLD, and lower estimates in IQVIA DA Germany and FinOMOP-THL, likely due to differences in follow-up duration and data completeness. Substantial differences between the three drugs (anastrozole, letrozole, and tamoxifen) within the databases were not observed; however, additional information on indications, patient, and tumour characteristics is important for future comparisons. Overall, this study suggests that databases from primary healthcare settings linked to hospital data could be used to capture the effects of long hormonal treatment on incidence of eye disorders.

4. AMENDMENTS AND UPDATES

None.

5. MILESTONES

Study deliverable	Timelines (planned)	Timelines (actual)
Draft Study Protocol	May 2025	May 2025
Final Study Protocol	May 2025	May 2025
Creation of Analytical code	June 2025	June 2025
Execution of Analytical Code on the data	June 2025	July 2025
Draft Study Report	July 2025	August 2025
Final Study Report	August 2025	To be confirmed by EMA

6. RATIONALE AND BACKGROUND

Breast cancer is the most common malignancy in women, with over 2.3 million new cases and 685,000 deaths occurring in 2020 worldwide (1). The majority of postmenopausal women with breast cancer have oestrogen-receptor-positive tumours (2). Third-line aromatase inhibitors (AIs) became one of the primary options for the endocrine treatment of breast cancer, along with the previously established use of a selective oestrogen receptor modulator (tamoxifen) (3). Oestrogen is the primary hormone involved in the growth of breast tumours, and AIs suppress plasma oestrogen in postmenopausal women by inhibiting or inactivating aromatase.

Initially, AIs were used for the treatment of advanced breast cancer in postmenopausal women whose disease had recurred or progressed after tamoxifen treatment. Based on the results of several trials, it was established as the first-line therapy for postmenopausal women with advanced breast cancer (4) and as a preferred option in the adjuvant treatment of postmenopausal women with localised breast cancer (5). A systematic review of randomised trials of AIs (anastrozole and letrozole) showed that they produce significantly lower recurrence rates than tamoxifen when used in initial monotherapy or as adjuvant therapy after tamoxifen (6).

Anastrozole was first approved in the United Kingdom (UK) in 1995 and later in Austria, Germany, Italy, Portugal, and Spain. Afterwards, in other European countries, approval has been granted through national procedures. The first registration of letrozole for breast cancer was in France in 1996, and it was later approved for the treatment of advanced breast cancer in other European countries. The comparison of the patterns of use of endocrine therapies for breast cancer in women in nine developed countries conducted between 2001 and 2012 showed the shift in the use of endocrine therapy from tamoxifen to AIs (7). Common side effects of AIs include menopausal symptoms, hot flashes, masculinisation, acne, musculoskeletal complaints, fatigue, dyslipidaemia, and altered liver function tests (8). Several studies have suggested an increased risk of cardiovascular events and bone fractures in patients receiving AIs (9,10), while also showing a decreased risk of venous thrombosis and endometrial carcinoma compared to tamoxifen. Adverse effects of AIs were considered to be related to the fact that oestrogen receptors have multiple physiologic roles (11).

The first study to hypothesise that AIs may cause eye conditions was published in 2008 (12). This study compared three groups: breast cancer patients receiving adjuvant anastrozole therapy, those receiving tamoxifen therapy, and individuals without breast cancer who were not receiving any therapy. It found an association between anastrozole use and vitreoretinal traction. Other studies and case reports linked anastrozole use to several eye conditions, including hemi-central retinal artery occlusion and dry eye

syndrome. A hemi-central retinal artery occlusion in a breast cancer patient using anastrozole was reported in 2009 (13). Ocular surface disease signs (dry eye syndrome) were reported in AIs (anastrozole, letrozole, and exemestane) in 2013 (14). In 2022, a systematic review identified 14 clinical studies and 5 case reports, published between 2008 and 2021, that were related to the ocular side effects of treatment AIs in patients with breast cancer (15). The most frequent signs were minor to moderate ocular surface diseases. Among events reported were also: Sjogren syndrome, retinal and optic nerve side effects from mild impairment to severely decreased vision, hemi-central retinal artery occlusion, bilateral optic neuritis, and uveitis with bilateral macular oedema. The review concluded that visual disturbances during AI treatment may be underestimated. The retrospective analysis of Food and Drug Administration (FDA) Adverse Event Reporting System data suggested an increased risk of macular degeneration in women older than 55 treated with AI and tamoxifen (16). Retrospective analysis of the FDA's Adverse Events Reporting System data from 2004 to 2022 revealed an increased risk of ocular adverse events with each of the AIs (17). Anastrozole had the most ocular adverse events and was found to have strong associations with vitreomacular traction, macular oedema, retinal deposits, and uveitis.

This study aimed to describe the incidence of ocular adverse during the use of anastrozole, letrozole, or tamoxifen treatments in pre- and postmenopausal women with breast cancer across several European countries.

7. RESEARCH QUESTION AND OBJECTIVES

The overall aim of the study was to calculate incidence rates of eye disorders in women with breast cancer treated with anastrozole, letrozole, or tamoxifen.

The specific objectives were:

1. To calculate incidence rates and cumulative incidence of eye disorders, overall and by eye disorder (cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment, vitreomacular traction syndrome, and all visual system disorders combined), age category, and type of therapy (anastrozole, letrozole, or tamoxifen), among pre- and postmenopausal women with breast cancer (primary objective).
2. To characterise postmenopausal women with breast cancer treated with anastrozole, letrozole, or tamoxifen at the start of treatment in terms of demographics and potential risk factors for eye disorders (secondary objective 1).
3. To estimate the time from initiation of anastrozole, letrozole, or tamoxifen to first eye disorder (overall) among postmenopausal women with breast cancer (secondary objective 2).

The objectives are described in **Table 1**. All objectives were assessed separately for three drugs (anastrozole, letrozole, tamoxifen).

Table 1. Primary and secondary research questions and objectives.

A. Primary research question and objective.

Objective:	To calculate incidence rates and cumulative incidence of eye disorders, overall and by eye disorder, age category, and type of therapy (anastrozole, letrozole, or tamoxifen), among pre- and postmenopausal women with breast cancer.
Hypothesis:	None, descriptive objective.
Population:	Pre-menopausal (younger than 55 years old) and postmenopausal (55 years and older) women with breast cancer who initiated treatment with anastrozole, letrozole, or tamoxifen after cancer diagnosis.
Exposure:	Anastrozole, letrozole, or tamoxifen.

Comparator:	None.
Outcome:	Specific eye disorders: Cataract, Degeneration of retina, Keratitis, Macular hole, Retinal artery occlusion, Retinal haemorrhage, Retinal detachment, Retinal tear, Retinal vascular disorder, Uveitis, Visual impairment, Vitreomacular traction syndrome. Selected eye disorders combined: combination category consisting of any of the specific eye disorders as mentioned above. All visual system disorders.
Time:	01/01/2010 to end of available data in each of the data sources.
Setting:	Routinely collected data from 5 databases in 5 European countries.
Main measure of effect:	Descriptive study (counts and incidence rates and cumulative incidence).

B. Secondary research question 1 and objective.

Objective:	To characterise postmenopausal women with breast cancer treated with anastrozole, letrozole, or tamoxifen at the start of treatment in terms of demographics and potential risk factors for eye disorders.
Hypothesis:	None, descriptive objective.
Population:	Postmenopausal (55 years and older) women with breast cancer who initiated the following therapy after breast cancer diagnosis: anastrozole, letrozole, or tamoxifen.
Exposure:	Anastrozole, letrozole, or tamoxifen.
Comparator:	None.
Outcome:	None.
Time:	01/01/2010 to end of available data in each of the data sources.
Setting:	Routinely collected data from 5 databases in 5 European countries.
Main measure of effect:	Descriptive study (counts and prevalence at the time of treatment initiation).

C. Secondary research question 2 and objective.

Objective:	To estimate the time from initiation of anastrozole, letrozole, or tamoxifen to first eye disorder (overall) among postmenopausal women with breast cancer.
Hypothesis:	None, descriptive objective.
Population:	Postmenopausal (55 years and older) women with breast cancer who initiated the following therapy after breast cancer diagnosis: anastrozole, letrozole, or tamoxifen, and have specific eye disorders (see below).
Exposure:	Anastrozole, letrozole, or tamoxifen.
Comparator:	None.
Outcome:	Time to specific eye disorders: Cataract, Degeneration of retina, Keratitis, Macular hole, Retinal artery occlusion, Retinal detachment, Retinal haemorrhage, Retinal tear, Retinal vascular disorder, Uveitis, Visual impairment, Vitreomacular traction syndrome. Time to selected eye disorders combined: combination category consisting of any of the specific eye disorders as mentioned above. Time to all visual system disorders.

Time:	01/01/2010 to end of available data in each of the data sources.
Setting:	Routinely collected data from 5 databases in 5 European countries.
Main measure of effect:	Descriptive study (median time to onset of the outcome).

8. RESEARCH METHODS

8.1. Study type and study design

A new drugs user cohort study was conducted to assess the incidence rates and cumulative incidence of eye disorders (primary objective), pre-specified patient-level characteristics (secondary objective 1), and median time to onset of the outcome (secondary objective 2).

8.2. Study setting and data sources

This study was conducted using routinely collected data from 5 databases in 5 European countries selected from the DARWIN EU® Database Catalogue (**Table 2, Annex I**). All databases were previously mapped to the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM).

The selection process was based on the size of the databases, the number of individuals with condition of interest (breast cancer patients, visual system disorder), the number of individuals exposed to the drugs of interest (anastrozole, letrozole, or tamoxifen), geographical spread, and availability of follow-up data.

Based on the feasibility assessment performed, the selected databases were considered fit for purpose:

1. Croatia: Croatian National Public Health Information System (NAJS)
2. Finland: Finnish Care Register for Health Care (FinOMOP-THL)
3. Germany: IQVIA Disease Analyzer Germany (IQVIA DA Germany)
4. Spain: Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público (BIFAP)
5. United Kingdom: Clinical Practice Research Datalink GOLD (CPRD GOLD)

Table 2. Description of the selected data sources.

Country	Name of Database	Justification for Inclusion	Health Care setting	Type of Data	Number of subjects	Feasibility counts of exposure*	Feasibility counts of disease*	Data lock for the last update
Croatia	NAJS	Relevant counts for exposures and conditions of interest, geographical diversity, suitable healthcare settings.	Outpatient General Practitioner and Hospital Care	Registry data	5,448,900	Anastrozole – 17.1k Letrozole – 14.3k Tamoxifen – 11k	Breast cancer – 94.5k Visual system disorder – 2.81M	17/11/2023
Finland	FinOMOP-THL	Relevant counts for exposures and conditions of interest, geographical diversity, suitable healthcare settings.	Outpatient General Practitioner Care and Hospital Care	Registry data	6,618,800	Anastrozole – 10.5k Letrozole – 75.1k Tamoxifen – 25.3k	Breast cancer – 109k Visual system disorder – 2.82M	01/10/2024
Germany	IQVIA DA Germany	Relevant counts for exposures and conditions of interest, geographical diversity, suitable healthcare settings.	Outpatient General Practitioner Care	Claims	45,156,600	Anastrozole – 14.4k Letrozole – 22.6k Tamoxifen – 35.4k	Breast cancer – 337k Visual system disorder – 2.49M	30/09/2024
Spain	BIFAP	Relevant counts for exposures and conditions of interest, geographical diversity, suitable healthcare settings.	Outpatient General Practitioner and Hospital care	EHR	22,580,100	Anastrozole – 34.4k Letrozole – 93.4k Tamoxifen – NA	Breast cancer – 184k Visual system disorder – 8.49M	31/12/2023
United Kingdom	CPRD GOLD	Relevant counts for exposures and conditions of interest, geographical diversity, suitable healthcare settings.	Outpatient General Practitioner Care	EHR	17,521,600	Anastrozole – 35.3K Letrozole – 41.6k Tamoxifen – 85.8k	Breast cancer – 119k Visual system disorder – 3.49M	01/07/2024

EHR=electronic health records; NAJS=Croatian National Public Health Information System; THL=Finnish Care Register for Health Care; IQVIA DA Germany=IQVIA Disease Analyzer Germany; BIFAP=Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD=Clinical Practice Research Datalink GOLD.
* Counts correspond to the whole database, without restrictions on age, sex, or study period. All counts are rounded to the nearest multiple of 100. Darwin EU portal was assessed on 12/03/2025.

8.3. Study period

Study period was from 01/01/2010 to the end of available data in each of the data sources. Breast cancer patients diagnosed between 01/01/2010 and 31/12/2022 were included, ensuring at least one year of potential observation for all breast cancer patients.

8.4. Follow-up

For the new-user cohort analysis (primary objective), the index date (**Table 3**) was the date of the first prescription of anastrozole, letrozole, or tamoxifen. Patients were followed until the end of the drug era plus 30 days (or 90 days in the sensitivity analysis), death, occurrence of the outcome (i.e., eye disorders), end of patient observation, or end date of data availability. For the secondary objective 1, breast cancer patients were characterised at the index date. For the secondary objective 2, the time from the index date to the occurrence of the outcome was assessed to estimate the median time to onset.

Table 3. Operational definition of index date and other primary time anchors.

Study population name(s)	Time Anchor Description (e.g., index date)	Number of entries	Type of entry	Washout window	Care Setting[1]	Code Type[2]	Incident with respect to
Cohort of breast cancer patients treated with anastrozole	Prescription of anastrozole	Single	Incident	[-inf, -1]	IP, OP	RxNorm	Exposure
Cohort of breast cancer patients treated with letrozole	Prescription of letrozole	Single	Incident	[-inf, -1]	IP, OP	RxNorm	Exposure
Cohort of breast cancer patients treated with tamoxifen	Prescription of tamoxifen	Single	Incident	[-inf, -1]	IP, OP	RxNorm	Exposure

[1] IP = inpatient, OP = outpatient.

8.5. Study population

The source population included women aged 18 years and above with a primary diagnosis of breast cancer in the period between 01/01/2010 and 31/12/2022. All patients were required to have at least 365 days of observation in the database prior to the date of diagnosis of breast cancer. Cancer cases were identified based on the Systematised Nomenclature of Medicine (SNOMED) and the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3) diagnosis codes, where available. Among breast cancer patients only new users of anastrozole, letrozole, or tamoxifen were selected who started treatment within one year after diagnosis.

For the Secondary Objective 1 and 2, only postmenopausal women were included in the analysis.

For the patient-level analysis, new users of anastrozole, letrozole, or tamoxifen were selected. To ensure that treatment was related to a specific breast cancer diagnosis, only patients who initiated their first treatment within 365 days of the initial diagnosis were included. Although indication (adjuvant therapy or treatment of advanced tumours) was not available across databases, clinical guidelines recommend initiating endocrine therapy within 12 months of diagnosis as a standard for high-quality breast cancer care, and the majority of patients receive it within that timeframe (18).

Patients with records of any anti-oestrogens (tamoxifen, toremifene, fulvestrant, elacestrant) or any aromatase inhibitors (aminoglutethimide, formestane, anastrozole, letrozole, vorozole, exemestane) prior to their breast cancer diagnosis were excluded.

For Secondary Objective 2 (time to the onset of outcome), only patients with a record of both the exposure and the outcome (eye disorder, based on SNOMED codes) were included.

The operational definition of criteria for selection of the population are available in **Table 4.**

Table 4. Operational definitions of population criteria.

Criterion	Details	Order of application	Assessment window	Care Settings[1]	Code Type
Patients with primary breast cancer	Primary breast cancer	N/A	N/A	IP, OP	SNOMED, ICD-O-3
Sex	Women only	N/A	N/A	IP, OP	N/A
Age	Participants aged 18 or above	N/A	N/A	IP, OP	N/A
Minimum prior observation period of 365 days	Only participants with a minimum observation period of 365 days prior to diagnosis of breast cancer	Before	365	IP, OP	N/A
Anastrozole, letrozole, or tamoxifen prescription	Prescription record of anastrozole, letrozole, or tamoxifen	After	From study period start and up to 365 days after breast cancer diagnosis	IP, OP	RxNorm
No prior use of anti-oestrogens and aromatase inhibitors	Individuals with prior prescriptions of anti-oestrogens and aromatase inhibitors were excluded	Before	[-Inf, -1]	OP, IP	RxNorm
Eye disorder[3]	Patients with eyes disorders before the treatment were excluded	Before	Any time prior the start of follow-up	IP, OP	SNOMED
Eye disorder[3]	Patients with outcome identified during analyses for primary objective were included in the assessment of secondary objective 2	After	Study period start until the end of follow-up	IP, OP	SNOMED

[1] IP = inpatient, OP = outpatient, n/a = not applicable
[2] Specify whether a diagnosis code is required to be in the primary position (main reason for encounter)
[3] Cataract, Degeneration of retina, Keratitis, Macular hole, Retinal artery occlusion, Retinal detachment, Retinal haemorrhage, Retinal tear, Retinal vascular disorder, Uveitis, Visual impairment, Vitreomacular traction syndrome, and All Visual system disorders.

8.6. Variables

Concept and code lists used for the identification of exposure/s and outcomes are included in **Annex II**.

8.6.1. Exposure/s

Anastrozole, letrozole, or tamoxifen exposure is defined by the first prescription of anastrozole, letrozole, or tamoxifen within the study period and the patient having no prior prescription record of these treatments. Treatment episodes of sequential prescriptions were combined into a drug era. 30 days and 90

days gaps between drug exposures were defined based on the results of drug exposure diagnostics to account for different packaging, stockpiling, and long duration of drug use. Therefore, the exposed risk window took into account all periods during which the patient was likely to use the drug. The operational definitions of exposures are described in **Table 5**.

Table 5. Operational definitions of exposure.

Exposure group name(s)	Details	Washout window	Assessment Window	Care Setting[1]	Code Type	Diagnosis position[2]	Applied to study populations	Incident with respect to…
Anastrozole	Prescription record of anastrozole	[-inf,-1]	Study period	IP, OP	RxNorm	N/A	All	Anastrozole
Letrozole	Prescription record of letrozole	[-inf,-1]	Study period	IP, OP	RxNorm	N/A	All	Letrozole
Tamoxifen	Prescription record of tamoxifen	[-inf,-1]	Study period	IP, OP	RxNorm	N/A	All	Tamoxifen

[1] IP = inpatient, OP = outpatient, n/a = not applicable
[2] Specify whether a diagnosis code is required to be in the primary position (main reason for encounter).

8.6.2. Outcome/s

The outcomes of interest were new events of selected eye disorders, their combination, and all visual system eye disorders:

- Cataract,
- Degeneration of retina
- Keratitis
- Macular hole
- Retinal artery occlusion
- Retinal detachment
- Retinal haemorrhage
- Retinal tear
- Retinal vascular disorder
- Uveitis
- Visual impairment
- Vitreomacular traction syndrome
- All visual system disorders

A preliminary list of concepts based on SNOMED codes is provided in the **Annex II**. The operational definition of the outcomes is presented in the **Table 6**.

Table 6. Operational definitions of outcome.

Outcome name	Details	Primary outcome?	Type of outcome	Washout window	Care Settings[1]	Code Type	Diagnosis Position[2]	Applied to study populations
Cataract	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Degeneration of retina	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Keratitis	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Macular hole	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Retinal artery occlusion	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Retinal detachment	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Retinal haemorrhage	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Retinal tear	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Retinal vascular disorder	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Uveitis	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Visual impairment	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
Vitreomacular traction syndrome	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All
All visual system disorders	See Annex I	Yes	Binary	[-inf, -1]	IP, OP	SNOMED	Any	All

[1] IP = inpatient, OP = outpatient, n/a = not applicable
[2] Specify whether a diagnosis code is required to be in the primary position (main reason for encounter)

8.6.3. Other covariates, including confounders, effect modifiers, and other variables

The study assessed incidence of eye disorder both in pre- and postmenopausal women defined by age: women younger than 55 years (18-54) were considered premenopausal, and women 55 years and older were considered postmenopausal. Additionally, postmenopausal breast cancer patients were further stratified by age. Therefore, the following age-groups were used: 18–54 (premenopausal), >55 (postmenopausal), 55–64, 65–74, 75–84, and 85 and above.

New drug users were also described in terms of age and comorbidities any time prior to index date. Comorbidities which were associated with eye disorders in the literature were considered: diabetes mellitus, hypertension, hyperlipidaemia, obesity, psoriasis, and autoimmune disorders (see **Annex II**).

The operational definitions of the covariates are described in the **Table 7**.

Table 7. Operational definitions of covariates.

Characteristic	Details	Type of variable	Assessment window	Care Settings[1]	Code Type	Diagnosis Position[2]	Applied to study populations
Co-morbidities[3]	Patient-level characterisation with regard to underlying comorbidities	Binary	[-Inf, 0]	IP, OP	SNOMED	N/A	All
Age	Age at the time of prescription	Binary and categorical	[0,0]	IP, OP	N/A	N/A	All

[1] IP = inpatient, OP = outpatient, n/a = not applicable
[2] Specify whether a diagnosis code is required to be in the primary position (main reason for encounter)
[3] Diabetes mellitus, Hypertension, Hyperlipidaemia, Obesity, Psoriasis, Autoimmune disorders

8.7. Study size

No sample size was calculated, as this was a descriptive study.

8.8. Data transformation

Analyses were conducted separately for each database and carried out in a federated manner, allowing analyses to be run locally without sharing patient-level data. Before study initiation, the analytics were tested on a subset of the data sources or on a simulated set of patients, and quality control checks were performed. Once all tests were passed, the final study code was released in the version-controlled Study Repository for execution against all participating data sources.

The data partners locally executed the analytics against the OMOP CDM in R Studio and reviewed and approved the by default aggregated results before returning them to the Coordination Centre. In some cases, multiple execution iterations were performed, and additional fine-tuning of the code base was required. A service desk was available for support during the study execution.

The study results from all data sources were checked after which the Study Dissemination Phase began. All results were locked and timestamped to ensure reproducibility and transparency.

Cell suppression was applied as required by databases to protect people's privacy. Cell counts <5 were reported as '<5', except for zero counts, which were reported.

8.9. Statistical methods

8.9.1. Main summary measures

We used incidence rates and cumulative incidence proportions for the primary objective; counts, proportions, median, and mean were used for the secondary objectives.

8.9.2. Main statistical methods

The incidence rates and cumulative incidence of eye disorders for the entire study period (Primary Objective) were estimated after the first prescription until the end of the first drug era of each of the three medicines of interest: anastrozole, letrozole, or tamoxifen.

The denominator of the incidence rate included the person-years contributed by the breast cancer patients from the date of prescription until the end of the drug era plus 30 days (90 days in the sensitivity analysis), or until the end of the follow-up period, whichever came first. The numerator included the number of newly diagnosed cases with the outcomes of interest (i.e. eye disorders) which occurred during the same

follow-up period. Incidence rates were presented as cases per 100,000 person-years with 95% confidence intervals derived using the exact method.

Cumulative incidence was calculated using the Kaplan-Meier method and reported at 6-month intervals from the initiation of treatment up to 60 months (5 years). Additionally, cumulative incidence plots were produced for each outcome-drug combination.

Figure 1 illustrates several scenarios considered in the analysis. The blue line represents the period from the start of observation to the breast cancer diagnosis, which had to be at least 365 days in accordance with the inclusion criteria. The red line denotes the time from breast cancer diagnosis to treatment initiation, which could not exceed 365 days. The green line indicates the person-time at risk, which included the duration of treatment plus an additional grace period (as described in the sensitivity analysis). The dotted grey line marks the point beyond which time was no longer included in the denominator for person-time at risk. In the Kaplan-Meier analysis, censoring occurred either at the start of the grey dotted line or at the end of observation, whichever came first. Key events are labelled: "B" for breast cancer diagnosis, "A" for drug initiation, and "E" for the onset of an eye disorder.

Scenario A depicts a patient with a breast cancer diagnosis and a minimum of 365 days of prior observation, who initiated anastrozole within 365 days after diagnosis and did not experience an eye disorder. The person-time at risk included the period of anastrozole use plus the grace period (30 or 90 days), all of which was included in the denominator.

Scenario B illustrates a patient who developed an eye disorder during anastrozole treatment. After the event, the patient was no longer at risk for a first occurrence, so their follow-up time beyond the event was excluded from the denominator (hence the grey dotted line). The eye disorder contributed to the numerator, and the time from treatment initiation to the event was included in the denominator.

Scenario C shows a patient who developed an eye disorder after completing anastrozole treatment. Because the event occurred outside the defined risk window, it was not counted in the numerator. However, the time during which the patient was on anastrozole was included in the denominator.

Scenario D resembles Scenario A, but the patient was observed only briefly after treatment initiation. This short period still contributed to the denominator as person-time at risk.

The following R packages were used:

- *CohortDiagnostics* (https://github.com/OHDSI/CohortDiagnostics/) – to evaluate the phenotype algorithms developed for the study.
- *DrugExposureDiagnostics* (https://github.com/darwin-eu/DrugExposureDiagnostics/) – to evaluate drug exposure durations.
- *CohortCharacteristics* (https://darwin-eu-dev.github.io/CohortCharacteristics) –to estimate the median time to the outcome.to estimate the median time to the outcome.
- *IncidencePrevalence* (https://github.com/darwin-eu/IncidencePrevalence) – to estimate incidence rates by dividing the number of events by the person-time. Incidence rates were calculated using the function *estimateIncidence()* with the denominator person-time specified by *generateTargetDenominatorCohortSet()*.
- *CohortSurvival* (https://github.com/darwin-eu/CohortSurvival) – to estimate cumulative incidence of adverse events.to estimate cumulative incidence of adverse events.
- *PatientProfiles* (https://github.com/darwin-eu-dev/PatientProfiles) and *CohortCharacteristics* (https://github.com/darwin-eu-dev/CohortCharacteristics) – for summarising characteristics of patients.

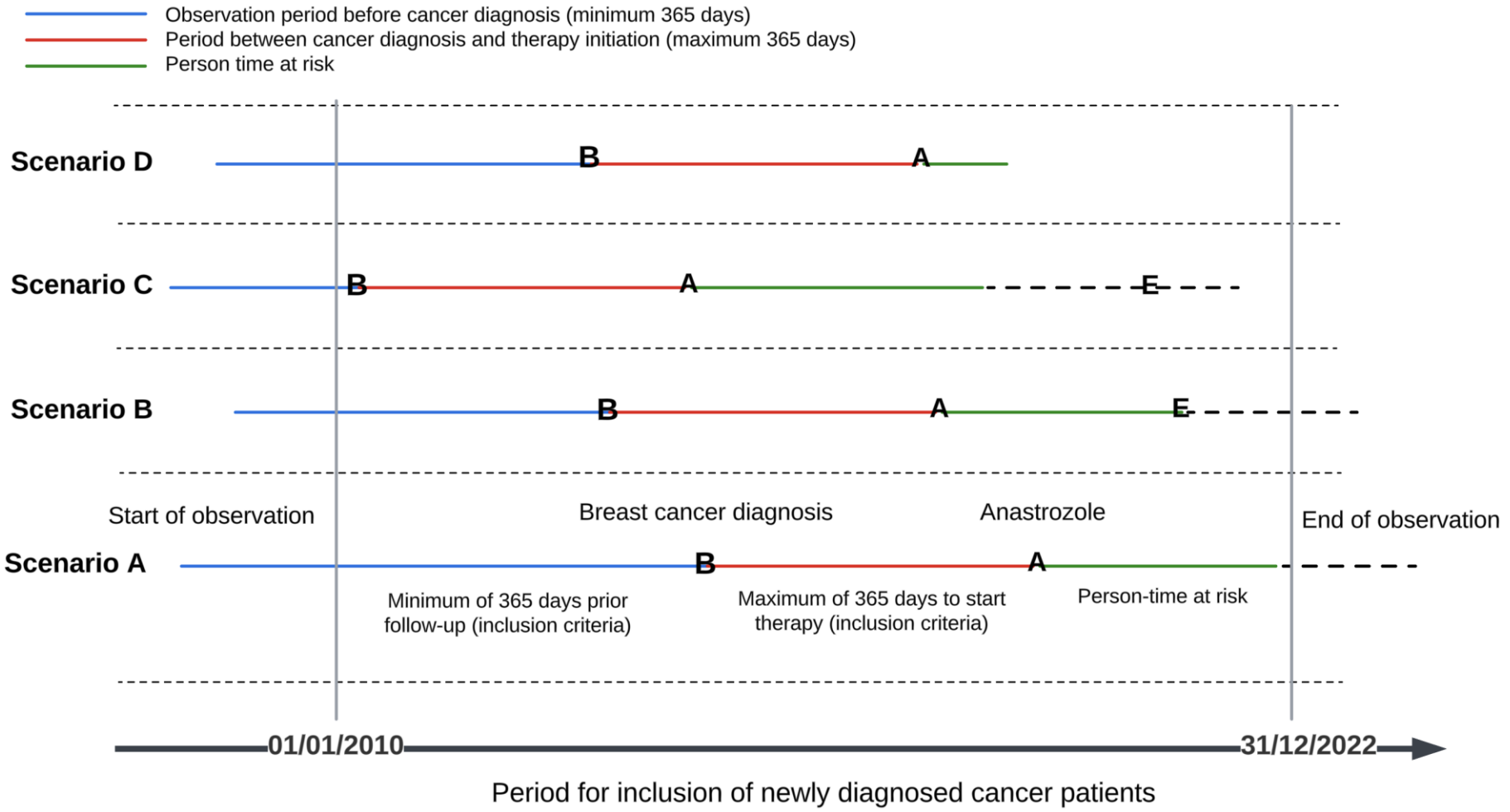

Figure 1. Schematic representation of incidence rate of eye disorders among anastrozole users.

8.9.3. Sensitivity analysis

The main analyses for Primary Objective 1 (incidence of eye disorders) and Secondary Objective 2 (time to onset of adverse events) used a follow-up definition that incorporated a 30-day grace period following the end of each first drug era. This period was designed to capture potential early-onset effects that may have occurred shortly after the last recorded prescription of the first drug era. To explore the possibility of delayed adverse effects and to address uncertainty around the timing of outcome onset, a 90-day period was applied in sensitivity analyses. These sensitivity analyses aimed to assess the robustness of the findings under alternative assumptions about exposure-outcome timing.

9. RESULTS

All the results are available in a web application ("Shiny App") at: https://data.darwin-eu.org/EUPAS1000000599/

9.1. Participants

Patient attrition for women with breast cancer treated with anastrozole, letrozole, or tamoxifen across five data sources, showing the sequential restriction of cohorts based on breast cancer diagnosis, age, and prior treatment history, is presented in **Table 8**.

Overall, in this study, 165,438 breast cancer patients who were exposed to anastrozole (n=25,188), letrozole (n=86,613), and tamoxifen (n=53,637) were included.

Table 8. Patient attrition.

		NAJS	FinOMOP-THL	IQVIA DA Germany	BIFAP	CPRD GOLD
Anastrozole	Qualifying initial records[1]	19,124	10,411	14,576	43,435	35,300
	Female breast cancer patients, diagnosed between 2010 and 2022, within 1 year prior to first prescription of anastrozole, age ≥18	8,305	3,040	2,593	7,833	6,110
	No prior anti-oestrogen use	7,936	2,329	2,330	6,885	5,708
Letrozole	Qualifying initial records[1]	15,708	75,006	23,386	139,922	42,325
	Female breast cancer patients, diagnosed between 2010 and 2022, within 1 year prior to first prescription of letrozole, age ≥18	5,360	29,382	4,469	34,778	16,299
	No prior anti-oestrogen use	5,009	28,948	4,189	32,807	15,660
Tamoxifen	Qualifying initial records[1]	11,388	25,286	35,815	99,100	85,684
	Female breast cancer patients, diagnosed between 2010 and 2022, within 1 year prior to first prescription of tamoxifen, age ≥18	4,323	9,594	7,936	22,882	12,554
	No prior anti-oestrogen use	3,988	8,071	7,661	21,363	12,554

[1]Refers to patients who have records of anastrozole, letrozole, or tamoxifen.
NAJS=Croatian National Public Health Information System; THL=Finnish Care Register for Health Care; IQVIA DA Germany=IQVIA Disease Analyzer Germany; BIFAP=Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD=Clinical Practice Research Datalink GOLD.

9.2. Incidence rates of eye disorders

9.2.1. Incidence rates of visual system disorders

Incidence rates (IRs) of all visual system disorders varied across data sources, age groups (pre- and postmenopausal women), and treatments (**Table 9**). Overall, IRs were the highest for NAJS and lowest in IQVIA DA Germany.

Within the databases, IRs among users of the three drug user groups were similar. In postmenopausal women (aged 18 to 54 years) in NAJS, IRs were 12,827 (95% CI: 11,706–14,026) for anastrozole users, 12,237 (10,843–13,760) for letrozole users, and 11,061 (8,005–14,899) for tamoxifen users. In BIFAP, IRs were 9,292 (8,647–9,972) for anastrozole users, 8,408 (8,117–8,706) for letrozole users, and 7,451 (6,704–8,258) for tamoxifen users. In CPRD GOLD, rates were 4,403 (3,942–4,903) for anastrozole, 3,836 (3,590–4,093) for letrozole, and 3,455 (3,067–3,878) for tamoxifen. In FinOMOP-THL, IRs were 6,180 (3,663–9,767) for anastrozole users, 7,496 (6,562–8,525) for letrozole users, and 6,246 (3,638–10,000) for tamoxifen users. In IQVIA DA Germany, the rates were also similar for the three drug users: 951 (637–1,366) for anastrozole, 980 (720–1,303) for letrozole, and 933 (705–1,211) for tamoxifen.

In premenopausal women (aged ≥55 years), IRs estimates were less precise but were similar across users of three drugs within databases. Similar to postmenopausal women, the rates were highest for NAJS and lowest in IQVIA DA Germany.

Table 9. Incidence rates of all visual system disorders per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	62	258	476	13,025 (9,986–16,698)
		Letrozole	66	366	603	10,944 (8,464–13,923)
		Tamoxifen	246	1,224	1,968	12,499 (10,986–14,163)
	≥55	Anastrozole	481	1,983	3,750	12,827 (11,706–14,026)
		Letrozole	279	1,301	2,280	12,237 (10,843–13,760)
		Tamoxifen	43	270	389	11,061 (8,005–14,899)
FinOMOP-THL	18 to 54	Anastrozole	<5	104	18	Not applicable
		Letrozole	15	1,668	286	5,247 (2,937–8,654)
		Tamoxifen	47	4,837	826	5,693 (4,183–7,571)
	≥55	Anastrozole	18	1,575	291	6,180 (3,663–9,767)
		Letrozole	232	17,541	3,095	7,496 (6,562–8,525)
		Tamoxifen	17	1,548	272	6,246 (3,638–10,000)
IQVIA DA Germany	18 to 54	Anastrozole	<5	223	359	Not applicable
		Letrozole	<5	388	596	Not applicable
		Tamoxifen	32	3,204	5,876	545 (372–769)
	≥55	Anastrozole	29	1,853	3,050	951 (637–1,366)
		Letrozole	47	3,295	4,795	980 (720–1,303)
		Tamoxifen	56	3,898	6,004	933 (705–1,211)
BIFAP	18 to 54	Anastrozole	95	556	1,621	5,860 (4,741–7,163)
		Letrozole	460	3,282	7,668	5,999 (5,463–6,573)

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		Tamoxifen	1,371	11,708	28,279	4,848 (4,595–5,112)
	≥55	Anastrozole	770	3,099	8,287	9,292 (8,647–9,972)
		Letrozole	3,160	14,464	37,585	8,408 (8,117–8,706)
		Tamoxifen	363	2,252	4,872	7,451 (6,704–8,258)
CPRD GOLD	18 to 54	Anastrozole	21	373	789	2,661 (1,647–4,067)
		Letrozole	67	1,033	2,508	2,672 (2,071–3,393)
		Tamoxifen	256	5,756	16,116	1,588 (1,400–1,795)
	≥55	Anastrozole	332	3,112	7,540	4,403 (3,942–4,903)
		Letrozole	909	8,915	23,699	3,836 (3,590–4,093)
		Tamoxifen	288	3,425	8,336	3,455 (3,067–3,878)

CI= Confidence interval; py= person-years; NAJS=Croatian National Public Health Information System; THL=Finnish Care Register for Health Care; IQVIA DA Germany=IQVIA Disease Analyzer Germany; BIFAP=Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD=Clinical Practice Research Datalink GOLD.

9.2.2. Incidence rates of selected eye disorders combined

IRs of selected eye disorders per 100,000 person-years were generally lower for premenopausal women compared to postmenopausal women across all databases (**Table 10**).

Among postmenopausal women, the highest IRs were observed for tamoxifen in FinOMOP-THL (4,201 (95% CI: 2,296–7,048)) and anastrozole in NAJS (4,082 (3,698–4,495)). In BIFAP, among postmenopausal women, IRs were 3,487 (3,196–3,797) for anastrozole, 3,108 (2,975–3,244) for letrozole, and 2,640 (2,308–3,005) for tamoxifen users. Several subgroups, particularly those with very low event numbers, had zero or non-estimable IRs (below five cases). For premenopausal women, IRs ranged from 0 (FinOMOP-THL and IQVIA DA Germany) up to 917 (440–1,686) in NAJS for anastrozole, and 721 (290–1,485) for tamoxifen in FinOMOP-THL.

Table 10. Incidence rates of selected eye disorders combined per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	10	483	1,091	917 (440–1,686)
		Letrozole	8	730	1,454	550 (238–1,084)
		Tamoxifen	28	2,414	4,631	605 (402–874)
	≥55	Anastrozole	413	4,521	10,117	4,082 (3,698–4,495)
		Letrozole	223	2,986	6,056	3,682 (3,215–4,199)
		Tamoxifen	37	659	1,061	3,488 (2,456–4,807)
FinOMOP-THL	18 to 54	Anastrozole	0	114	19	0
		Letrozole	<5	2,045	352	Not applicable
		Tamoxifen	7	5,663	971	721 (290–1,485)
	≥55	Anastrozole	10	1,883	349	2,869 (1,376–5,277)
		Letrozole	136	22,185	3,925	3,465 (2,907–4,099)
		Tamoxifen	14	1,884	333	4,201 (2,296–7,048)
	18 to 54	Anastrozole	0	229	368	0

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
IQVIA DA Germany		Letrozole	<5	409	612	Not applicable
		Tamoxifen	8	3,327	6,059	132 (57–260)
	≥55	Anastrozole	13	1,992	3,215	404 (215–691)
		Letrozole	13	3,571	5,095	255 (136–436)
		Tamoxifen	28	4,139	6,305	444 (295–642)
BIFAP	18 to 54	Anastrozole	13	813	2,620	496 (264–849)
		Letrozole	86	4,733	12,440	691 (553–854)
		Tamoxifen	180	16,832	44,528	404 (347–468)
	≥55	Anastrozole	528	4,963	15,143	3,487 (3,196–3,797)
		Letrozole	2,068	22,995	66,547	3,108 (2,975–3,244)
		Tamoxifen	228	3,627	8,637	2,640 (2,308–3,005)
CPRD GOLD	18 to 54	Anastrozole	<5	499	1,133	Not applicable
		Letrozole	10	1,278	3,186	314 (151–577)
		Tamoxifen	34	7,244	20,680	164 (114–230)
	≥55	Anastrozole	203	4,576	11,602	1,750 (1,517–2,008)
		Letrozole	641	12,467	34,427	1,862 (1,721–2,012)
		Tamoxifen	179	4,677	11,505	1,556 (1,336–1,801)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System. Selected eye disorders: cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment, vitreomacular traction syndrome.

9.2.3. Incidence rates of specific eye disorders

When assessing IRs for specific eye disorders by treatment group and data source, cataract consistently exhibited the highest rates among postmenopausal women (**Figure 3**), followed by degeneration of retina. Keratitis and cataract appeared more frequently that other selected eye disorders in premenopausal women (**Figure 2**). Other eye disorders demonstrated relatively low incidence rates in both age groups.

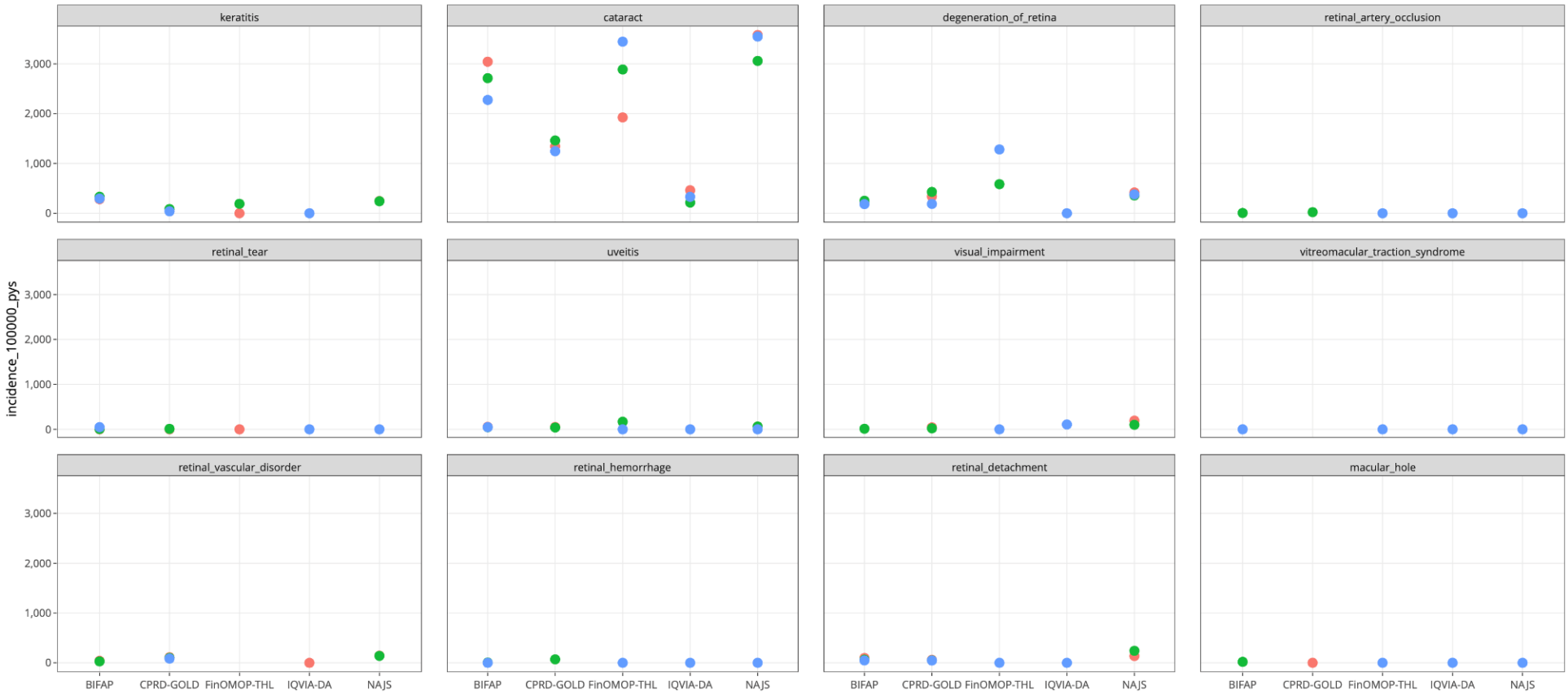

Figure 2. Incidence of eye disorders in postmenopausal women by treatment and databases.

Anastrozole – red dots, letrozole – green dots, tamoxifen – blue dots.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

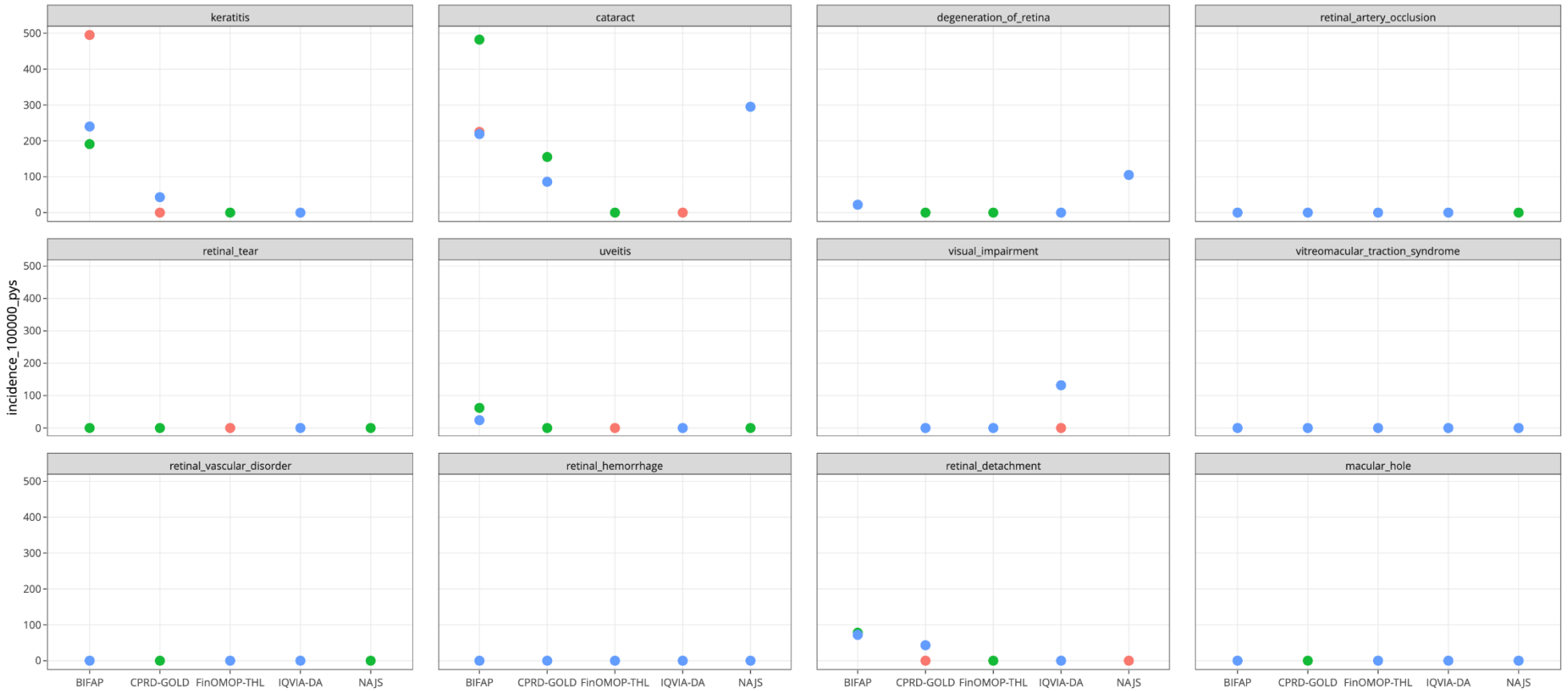

Figure 3. Incidence of eye disorders in premenopausal women by treatment and databases.

Anastrozole – red dots, letrozole – green dots, tamoxifen – blue dots.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

In postmenopausal women, IRs of ***cataract*** ranged from 3,579 (3,229–3,956) for anastrozole users in NAJS, 3,060 (2,645–3,522) for letrozole, and 3,549 (2,524–4,852) for tamoxifen to 214 (107–382) for letrozole users in IQVIA DA Germany, but within data sources IRs were similar across three groups of drug users (**Table 11**). Among premenopausal women, IR of ***cataract*** were mainly low compared to postmenopausal women (**Table 11**).

Table 11. Incidence rates of cataract per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	<5	491	1,126	Not applicable
		Letrozole	<5	745	1,489	Not applicable
		Tamoxifen	14	2,467	4,741	295 (161–495)
	≥55	Anastrozole	383	4,717	10,702	3,579 (3,229–3,956)
		Letrozole	194	3,100	6,340	3,060 (2,645–3,522)
		Tamoxifen	39	683	1,099	3,549 (2,524–4,852)
FinOMOP-THL	18 to 54	Anastrozole	0	119	20	0
		Letrozole	0	2,093	360	0
		Tamoxifen	<5	5,781	991	NA
	≥55	Anastrozole	7	1,963	364	1,925 (774–3,967)
		Letrozole	119	23,260	4,120	2,888 (2,393–3,456)
		Tamoxifen	12	1,964	348	3,446 (1,781–6,020)
IQVIA DA Germany	18 to 54	Anastrozole	0	229	368	0
		Letrozole	<5	411	621	Not applicable
		Tamoxifen	<5	3,347	6,082	Not applicable
	≥55	Anastrozole	15	2,032	3,248	462 (259–762)
		Letrozole	11	3,633	5,151	214 (107–382)
		Tamoxifen	21	4,196	6,357	330 (204–505)
BIFAP	18 to 54	Anastrozole	6	819	2,662	225 (83–491)
		Letrozole	61	4,795	12,654	482 (369–619)
		Tamoxifen	99	17,041	45,197	219 (178–267)
	≥55	Anastrozole	479	5,122	15,740	3,043 (2,777–3,328)
		Letrozole	1878	23,762	69,225	2,713 (2,592–2,838)
		Tamoxifen	203	3,723	8,917	2,276 (1,974–2,612)
CPRD GOLD	18 to 54	Anastrozole	<5	502	1,141	Not applicable
		Letrozole	5	1,288	3,236	155 (50–361)
		Tamoxifen	18	7,330	20,919	86 (51–136)
	≥55	Anastrozole	164	4,775	12,199	1,344 (1,147–1,567)
		Letrozole	525	12,962	35,914	1,462 (1,339–1,592)
		Tamoxifen	148	4,828	11,880	1,246 (1,053–1,463)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

For the ***degeneration of retina,*** in postmenopausal women, IRs were generally below 600 per 100,000 person-years, except tamoxifen users in FinOMOP-THL (**Table 12**). In NAJS, rates were 418 (317–541) for anastrozole, 357 (237–516) for letrozole, and 378 (123–883) for tamoxifen users. In BIFAP, the rates were

217 (156–293) for anastrozole, 252 (219–289) for letrozole, and 184 (111–288) for tamoxifen users. In CPRD GOLD, IR were 339 (248–454) for anastrozole, 429 (367–499) for letrozole, and 188 (121–280) for tamoxifen users. In FinOMOP-THL, IRs for letrozole users reached 584 (385–849) and for tamoxifen users was 1,282 (416–2,992) per 100,000 person-years. In IQVIA DA Germany, degeneration of retina events were not identified. In premenopausal women, IRs of ***degeneration of retina*** were non-estimable or very low incidence rates (**Table 12**).

Table 12. Incidence rates of degeneration of retina per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	<5	500	1,150	Not applicable
		Letrozole	<5	744	1,487	Not applicable
		Tamoxifen	5	2,482	4,774	105 (34–244)
	≥55	Anastrozole	57	5,691	13,638	418 (317–541)
		Letrozole	28	3,673	7,838	357 (237–516)
		Tamoxifen	5	804	1,321	378 (123–883)
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,103	362	0
		Tamoxifen	<5	5,805	995	Not applicable
	≥55	Anastrozole	<5	2,141	398	Not applicable
		Letrozole	27	25,997	4,627	584 (385–849)
		Tamoxifen	5	2,185	390	1,282 (416–2,992)
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,097	3,312	0
		Letrozole	0	3,778	5,322	0
		Tamoxifen	0	4,310	6,502	0
BIFAP	18 to 54	Anastrozole	<5	827	2,696	Not applicable
		Letrozole	<5	4,836	12,895	Not applicable
		Tamoxifen	10	17,126	45,621	22 (11–40)
	≥55	Anastrozole	42	5,969	19,373	217 (156–293)
		Letrozole	211	27,564	83,671	252 (219–289)
		Tamoxifen	19	4,178	10,304	184 (111–288)
CPRD GOLD	18 to 54	Anastrozole	<5	500	1,133	Not applicable
		Letrozole	0	1,289	3,243	0
		Tamoxifen	<5	7,340	20,979	Not applicable
	≥55	Anastrozole	45	5,090	13,260	339 (248–454)
		Letrozole	168	13,975	39,164	429 (367–499)
		Tamoxifen	24	5,101	12,761	188 (121–280)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Among postmenopausal women, IRs for ***keratitis*** in NAJS were 245 (170–343) for anastrozole and 242 (146–377) for letrozole users (**Table 13**). In BIFAP, rates were 283 (213–369) for anastrozole, 331 (293–373) for letrozole, and 295 (199–420) for tamoxifen users. In FinOMOP-THL, the letrozole group had a rate of 190 (87–361), with other subgroups having zero or non-estimable rates. In CPRD GOLD, rates were 44 (16–

97) for anastrozole, 85 (59–119) for letrozole, and 39 (13–90) for tamoxifen users. All subgroups in IQVIA DA Germany had zero events. Incidence rates of ***keratitis*** per 100,000 person-years among premenopausal women in most subgroups had non-estimable or zero incidence rates due to low event counts.

Table 13. Incidence rates of keratitis per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	<5	498	1,145	Not applicable
		Letrozole	<5	748	1,495	Not applicable
		Tamoxifen	<5	2,464	4,757	Not applicable
	≥55	Anastrozole	34	5,753	13,869	245 (170–343)
		Letrozole	19	3,688	7,860	242 (146–377)
		Tamoxifen	<5	815	1,347	Not applicable
FinOMOP-THL	18 to 54	Anastrozole	0	119	20	0
		Letrozole	0	2,088	359	0
		Tamoxifen	<5	5,752	987	Not applicable
	≥55	Anastrozole	0	2,195	409	0
		Letrozole	9	26,572	4,739	190 (87–361)
		Tamoxifen	<5	2,237	401	Not applicable
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,349	6,090	0
	≥55	Anastrozole	0	2,099	3,315	0
		Letrozole	0	3,774	5,316	0
		Tamoxifen	0	4,308	6,500	0
BIFAP	18 to 54	Anastrozole	13	811	2,624	495 (264–847)
		Letrozole	24	4,742	12,591	191 (122–284)
		Tamoxifen	107	16,781	44,546	240 (197–290)
	≥55	Anastrozole	54	5,892	19,082	283 (213–369)
		Letrozole	273	27,226	82,449	331 (293–373)
		Tamoxifen	30	4,130	10,185	295 (199–420)
CPRD GOLD	18 to 54	Anastrozole	0	501	1,141	0
		Letrozole	<5	1,283	3,244	Not applicable
		Tamoxifen	9	7,304	20,884	43 (20–82)
	≥55	Anastrozole	6	5,153	13,491	44 (16–97)
		Letrozole	34	14,256	39,984	85 (59–119)
		Tamoxifen	5	5,164	12,930	39 (13–90)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

IRs of ***macular hole*** per 100,000 person-years (**Table 14**) were only estimable among postmenopausal women in BIFAP, which were 20 (95% CI: 12–32) per 100,000 person-years in letrozole users. All other subgroups had either zero or non-estimable rates due to fewer than five events.

Table 14. Incidence rates of macular hole per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	501	1,156	0
		Letrozole	0	752	1,507	0
		Tamoxifen	0	2,488	4,797	0
	≥55	Anastrozole	0	5,822	14,077	0
		Letrozole	0	3,738	8,006	0
		Tamoxifen	0	826	1,358	0
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,107	363	0
		Tamoxifen	0	5,809	996	0
	≥55	Anastrozole	0	2,203	411	0
		Letrozole	<5	26,710	4,763	Not applicable
		Tamoxifen	0	2,250	404	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,100	3,316	0
		Letrozole	0	3,778	5,322	0
		Tamoxifen	0	4,311	6,503	0
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	<5	4,841	12,914	Not applicable
		Tamoxifen	0	17,139	45,661	0
	≥55	Anastrozole	<5	6,051	19,688	Not applicable
		Letrozole	17	27,952	85,128	20 (12–32)
		Tamoxifen	<5	4,223	10,456	Not applicable
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	<5	7,350	21,001	Not applicable
	≥55	Anastrozole	0	5,202	13,639	0
		Letrozole	<5	14,362	40,360	Not applicable
		Tamoxifen	<5	5,203	13,000	Not applicable

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

IRs for **retinal artery occlusion** (Table 15) were estimated only in BIFAP and CPRD GOLD among postmenopausal women (letrozole group BIFAP 6 (95% CI: 2–14) per 100,000 person-years; letrozole group CPRD GOLD 22 (10–42) per 100,000 person-years).

Table 15. Incidence rates of retinal artery occlusion per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	501	1,156	0
		Letrozole	0	752	1,507	0
		Tamoxifen	<5	2,488	4,797	Not applicable
	≥55	Anastrozole	0	5,821	14,076	0
		Letrozole	<5	3,738	8,004	Not applicable
		Tamoxifen	0	826	1,358	0
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,105	363	0
		Tamoxifen	0	5,811	996	0
	≥55	Anastrozole	0	2,207	412	0
		Letrozole	<5	26,810	4,780	Not applicable
		Tamoxifen	0	2,257	405	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,098	3,316	0
		Letrozole	0	3,776	5,321	0
		Tamoxifen	0	4,310	6,500	0
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	0	4,841	12,912	0
		Tamoxifen	0	17,139	45,661	0
	≥55	Anastrozole	<5	6,051	19,692	Not applicable
		Letrozole	5	27,945	85,150	6 (2–14)
		Tamoxifen	<5	4,223	10,447	Not applicable
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	0	7,350	21,002	0
	≥55	Anastrozole	<5	5,201	13,634	Not applicable
		Letrozole	9	14,356	40,324	22 (10–42)
		Tamoxifen	<5	5,202	13,001	Not applicable

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

IRs of ***retinal detachment*** among postmenopausal women in NAJS were 137 (82–214) for anastrozole and 241 (145–376) for letrozole users (**Table 16**). In BIFAP, IRs were 97 (59–152) for anastrozole, 63 (47–82) for letrozole, and 48 (16–112) for tamoxifen users. In CPRD GOLD, IRs were 59 (25–116) for anastrozole, 50 (30–77) for letrozole, and 46 (17–101) for tamoxifen users. The remaining databases had either zero or less than 5 events to estimate incidence.

IRs of ***retinal detachment*** in premenopausal women were only estimable in BIFAP and CPRD (in letrozole group in BIFAP IR was 78 (37–143); in tamoxifen users IR was 72 (50–102) and in CPRD GOLD in tamoxifen users IR was 43 (20–81)). (**Table 16**).

Table 16. Incidence rates of retinal detachment per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	501	1,156	0
		Letrozole	<5	749	1,498	Not applicable
		Tamoxifen	<5	2,482	4,780	Not applicable
	≥55	Anastrozole	19	5,757	13,890	137 (82–214)
		Letrozole	19	3,702	7,894	241 (145–376)
		Tamoxifen	<5	821	1,356	Not applicable
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,099	362	0
		Tamoxifen	<5	5,798	994	Not applicable
	≥55	Anastrozole	0	2,194	409	0
		Letrozole	<5	26,637	4,751	Not applicable
		Tamoxifen	0	2,246	403	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,347	6,085	0
	≥55	Anastrozole	0	2,099	3,316	0
		Letrozole	0	3,773	5,314	0
		Tamoxifen	0	4,305	6,501	0
BIFAP	18 to 54	Anastrozole	<5	828	2,697	Not applicable
		Letrozole	10	4,827	12,844	78 (37–143)
		Tamoxifen	33	17,110	45,525	72 (50–102)
	≥55	Anastrozole	19	6,025	19,543	97 (59–152)
		Letrozole	53	27,782	84,524	63 (47–82)
		Tamoxifen	5	4,197	10,380	48 (16–112)
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	<5	1,290	3,246	Not applicable
		Tamoxifen	9	7,342	20,971	43 (20–81)
	≥55	Anastrozole	8	5,178	13,555	59 (25–116)

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		Letrozole	20	14,294	40,103	50 (30–77)
		Tamoxifen	6	5,182	12,938	46 (17–101)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Retinal haemorrhage (Table 17), ***retinal tear*** (Table 18), and ***retinal vascular disorders*** (Table 19) were rare events in this study. IRs of retinal haemorrhage and retinal tear per 100,000 person-years could only be estimated among postmenopausal women. Incidence rates of retinal haemorrhage were observed for letrozole users in BIFAP as 6 (2–14), and for letrozole users in CPRD GOLD, 70 (46–101).

IRs of ***retinal tear*** were estimated for letrozole users in BIFAP and it was 7 (3–15); in tamoxifen users in BIFAP IR was 48 (16–112); and in letrozole users in CPRD GOLD IR was 12 (4–29).

Incidence rates of ***retinal vascular disorder*** per 100,000 among postmenopausal women in NAJS were 144 (88–222) for anastrozole users and 139 (69–248) for letrozole users. In BIFAP, IRs were 41 (18–80) for anastrozole and 29 (19–43) for letrozole users. In CPRD GOLD, IRs were 111 (62–183) for anastrozole, 98 (69–133) for letrozole, and 85 (42–152) for tamoxifen users.

Table 17. Incidence rates of retinal haemorrhage per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	500	1,155	0
		Letrozole	0	752	1,507	0
		Tamoxifen	0	2,486	4,788	0
	≥55	Anastrozole	<5	5,813	14,046	Not applicable
		Letrozole	<5	3,733	7,995	Not applicable
		Tamoxifen	0	825	1,358	0
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,107	363	0
		Tamoxifen	0	5,810	996	0
	≥55	Anastrozole	0	2,209	412	0
		Letrozole	<5	26,815	4,781	Not applicable
		Tamoxifen	0	2,259	405	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,100	3,316	0
		Letrozole	0	3,777	5,318	0
		Tamoxifen	0	4,310	6,501	0
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	<5	4,841	12,909	Not applicable

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		Tamoxifen	0	17,139	45,661	0
	≥55	Anastrozole	<5	6,055	19,697	Not applicable
		Letrozole	5	27,957	85,171	6 (2–14)
		Tamoxifen	0	4,223	10,457	0
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	<5	1,290	3,247	Not applicable
		Tamoxifen	0	7,347	21,000	0
	≥55	Anastrozole	<5	5,188	13,611	Not applicable
		Letrozole	28	14,323	40,209	70 (46–101)
		Tamoxifen	<5	5,192	12,981	Not applicable

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Table 18. Incidence rates of retinal tear per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	501	1,156	0
		Letrozole	0	752	1,507	0
		Tamoxifen	<5	2,486	4,793	Not applicable
	≥55	Anastrozole	<5	5,806	14,043	Not applicable
		Letrozole	<5	3,726	7,983	Not applicable
		Tamoxifen	0	826	1,358	0
FinOMOP-THL	18 to 54	Anastrozole	0	118	20	0
		Letrozole	<5	2,099	361	Not applicable
		Tamoxifen	<5	5,795	994	Not applicable
	≥55	Anastrozole	0	2,201	411	0
		Letrozole	<5	26,674	4,758	Not applicable
		Tamoxifen	<5	2,247	403	Not applicable
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,100	3,316	0
		Letrozole	0	3,776	5,321	0
		Tamoxifen	0	4,309	6,500	0
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	0	4,839	12,907	0
		Tamoxifen	<5	17,130	45,629	Not applicable

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
	≥55	Anastrozole	0	6,051	19,690	0
		Letrozole	6	27,930	85,086	7 (3–15)
		Tamoxifen	5	4,218	10,430	48 (16–112)
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	<5	7,349	20,994	Not applicable
	≥55	Anastrozole	0	5,195	13,623	0
		Letrozole	5	14,351	40,321	12 (4–29)
		Tamoxifen	<5	5,198	12,980	Not applicable

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CI= Confidence interval; CPRD GOLD= Clinical Practice Research Datalink; DA=Disease Analyzer Germany; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System; py= person-years.

Table 19. Incidence rates of retinal vascular disorder per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	500	1,151	0
		Letrozole	0	752	1,507	0
		Tamoxifen	<5	2,485	4,784	Not applicable
	≥55	Anastrozole	20	5,771	13,924	144 (88–222)
		Letrozole	11	3,716	7,942	139 (69–248)
		Tamoxifen	<5	820	1,355	Not applicable
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,103	362	0
		Tamoxifen	0	5,808	996	0
	≥55	Anastrozole	<5	2,195	409	Not applicable
		Letrozole	<5	26,672	4,754	Not applicable
		Tamoxifen	<5	2,247	403	Not applicable
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,347	6,087	0
	≥55	Anastrozole	0	2,088	3,309	0
		Letrozole	<5	3,755	5,308	Not applicable
		Tamoxifen	<5	4,302	6,491	Not applicable
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	<5	4,839	12,905	Not applicable
		Tamoxifen	0	17,138	45,659	0
	≥55	Anastrozole	8	6,041	19,655	41 (18–80)

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		Letrozole	25	27,894	84,975	29 (19–43)
		Tamoxifen	<5	4,216	10,431	Not applicable
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	<5	7,348	20,989	Not applicable
	≥55	Anastrozole	15	5,160	13,500	111 (62–183)
		Letrozole	39	14,247	39,980	98 (69–133)
		Tamoxifen	11	5,174	12,954	85 (42–152)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Incidence rates of ***uveitis*** (**Table 20**) per 100,000 person-years were generally low or not estimable. Among postmenopausal women, in NAJS, IRs were 64 (29–122) for anastrozole and 63 (20–146) for letrozole users. In FinOMOP-THL, letrozole groups had a IR of 169 (73–333). In BIFAP, IRs were 56 (28–100) for anastrozole, 46 (33–63) for letrozole, and 48 (16–112) for tamoxifen users. In CPRD GOLD, IRs were 52 (21–107) for anastrozole and 40 (23–65) for letrozole users. Among premenopausal women, incidence rates were only estimated for letrozole 62 (27–123) and for tamoxifen 24 (12–43) in BIFAP.

Table 20. Incidence rates of uveitis per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	500	1,154	0
		Letrozole	0	748	1,504	0
		Tamoxifen	<5	2,479	4,782	Not applicable
	≥55	Anastrozole	9	5,800	13,991	64 (29–122)
		Letrozole	5	3,730	7,983	63 (20–146)
		Tamoxifen	0	822	1,351	0
FinOMOP-THL	18 to 54	Anastrozole	0	118	20	0
		Letrozole	<5	2,084	359	Not applicable
		Tamoxifen	<5	5,737	984	Not applicable
	≥55	Anastrozole	<5	2,190	408	Not applicable
		Letrozole	8	26,537	4,732	169 (73–333)
		Tamoxifen	0	2,235	401	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,098	3,315	0
		Letrozole	<5	3,774	5,314	Not applicable
		Tamoxifen	0	4,306	6,498	0
BIFAP	18 to 54	Anastrozole	<5	828	2,699	Not applicable

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		Letrozole	8	4,828	12,860	62 (27–123)
		Tamoxifen	11	17,098	45,542	24 (12–43)
	≥55	Anastrozole	11	6,034	19,611	56 (28–100)
		Letrozole	39	27,864	84,802	46 (33–63)
		Tamoxifen	5	4,210	10,410	48 (16–112)
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,284	3,225	0
		Tamoxifen	<5	7,312	20,908	Not applicable
	≥55	Anastrozole	7	5,157	13,507	52 (21–107)
		Letrozole	16	14,288	40,132	40 (23–65)
		Tamoxifen	<5	5,170	12,929	Not applicable

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Among postmenopausal women the IRs of ***visual impairment*** in NAJS were 194 (128–282) for anastrozole and 101 (44–199) for letrozole users (**Table 21**). In IQVIA DA Germany, IR for tamoxifen users was 108 (44–223). In BIFAP, letrozole group had a IR of 13 (6–23). In CPRD GOLD, IRs were 44 (16–96) for anastrozole and 22 (10–42) for letrozole. The Incidence rate of ***visual impairment*** per 100,000 person-years for premenopausal women could only be estimated for the tamoxifen group in IQVIA DA Germany and was 132 (CI: 57–260).

Table 21. Incidence rates of visual impairment per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	<5	500	1,142	Not applicable
		Letrozole	<5	751	1,503	Not applicable
		Tamoxifen	<5	2,481	4,783	Not applicable
	≥55	Anastrozole	27	5,779	13,908	194 (128–282)
		Letrozole	8	3,710	7,931	101 (44–199)
		Tamoxifen	<5	819	1,342	Not applicable
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,106	363	0
		Tamoxifen	0	5,807	996	0
	≥55	Anastrozole	0	2,203	411	0
		Letrozole	<5	26,767	4,773	Not applicable
		Tamoxifen	0	2,256	404	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	<5	409	615	NA
		Tamoxifen	8	3,335	6,071	132 (57–260)

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
	≥55	Anastrozole	<5	2,066	3,286	Not applicable
		Letrozole	<5	3,724	5,267	Not applicable
		Tamoxifen	7	4,266	6,468	108 (44–223)
BIFAP	18 to 54	Anastrozole	<5	829	2,705	Not applicable
		Letrozole	<5	4,840	12,909	Not applicable
		Tamoxifen	<5	17,136	45,649	Not applicable
	≥55	Anastrozole	<5	6,051	19,689	Not applicable
		Letrozole	11	27,937	85,122	13 (6–23)
		Tamoxifen	<5	4,223	10,455	Not applicable
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	0	7,348	20,992	0
	≥55	Anastrozole	6	5,194	13,611	44 (16–96)
		Letrozole	9	14,333	40,289	22 (10–42)
		Tamoxifen	<5	5,199	12,990	Not applicable

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Finally, incidence rates ***of vitreomacular traction syndrome*** (**Annex II**) could not be estimated for any subgroup, and fewer than five events were detected among postmenopausal women in CPRD GOLD, for all three drugs, and in BIFAP, for the anastrozole group.

Incidence rates of eye disorders by age group

We report IRs by age group for the most common eye disorders in postmenopausal women: cataract (**Table 22**), degeneration of retina (**Table 23**), and keratitis (**Annex II**). Results for all other eye disorders are available in the Shiny app, 95%CI were wide across all estimates and are reported in the table.

Across all databases, except IQVIA DA Germany, the IRs of ***cataract*** (**Table 22**) increased with age and were highest among women aged 75–84, IRs dropped slightly in women 85 years and older.

Table 22. Incidence rates of cataract per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	Anastrozole	55 to 64	90	1,873	4,635	1,942 (1,561–2,387)
		65 to 74	190	1,879	4,266	4,454 (3,843–5,134)
		75 to 84	93	820	1,553	5,987 (4,832–7,334)
		≥85	10	145	247	4,045 (1,940–7,438)
	Letrozole	55 to 64	39	1,209	2,709	1,440 (1,024–1,968)
		65 to 74	107	1,276	2,588	4,134 (3,388–4,995)
		75 to 84	44	499	884	4,978 (3,617–6,682)
		≥85	<5	116	159	Not applicable

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
	Tamoxifen	55 to 64	10	315	548	1,824 (875–3,354)
		65 to 74	20	231	372	5,378 (3,285–8,305)
		75 to 84	9	104	145	6,188 (2,830–11,747)
		≥85	0	33	33	0
FinOMOP-THL	Anastrozole	55 to 64	0	678	118	0
		65 to 74	<5	657	119	Not applicable
		75 to 84	5	455	89	5,627 (1,827–13,131)
		≥85	0	173	37	0
	Letrozole	55 to 64	13	8,874	1,531	849 (452–1,452)
		65 to 74	40	8,707	1,526	2,620 (1,872–3,568)
		75 to 84	55	4,302	791	6,951 (5,236–9,048)
		≥85	11	1,377	271	4,058 (2,026–7,260)
	Tamoxifen	55 to 64	0	807	139	0
		65 to 74	6	605	105	5,700 (2,092–12,408)
		75 to 84	6	377	71	8,470 (3,108–18,435)
		≥85	0	175	34	0
IQVIA DA Germany	Anastrozole	55 to 64	<5	629	1,142	Not applicable
		65 to 74	<5	686	1,092	Not applicable
		75 to 84	7	593	877	798 (321–1,645)
		≥85	<5	124	138	Not applicable
	Letrozole	55 to 64	<5	1,176	1,852	Not applicable
		65 to 74	<5	1,168	1,673	Not applicable
		75 to 84	<5	1,028	1,362	Not applicable
		≥85	<5	261	264	Not applicable
	Tamoxifen	55 to 64	<5	1,691	2,681	Not applicable
		65 to 74	11	1,409	2,209	498 (249–891)
		75 to 84	5	896	1,239	404 (131–942)
		≥85	<5	200	228	Not applicable
BIFAP	Anastrozole	55 to 64	109	2,209	7,407	1,472 (1,208–1,775)
		65 to 74	210	1,726	5,245	4,003 (3,480–4,583)
		75 to 84	138	901	2,421	5,700 (4,789–6,735)
		≥85	22	286	667	3,297 (2,066–4,992)
	Letrozole	55 to 64	464	10,259	31,812	1,459 (1,329–1,598)
		65 to 74	799	7,718	22,817	3,502 (3,263–3,753)
		75 to 84	524	4,326	11,333	4,624 (4,236–5,037)
		≥85	91	1,459	3,263	2,789 (2,245–3,424)
	Tamoxifen	55 to 64	46	1,993	5,011	918 (672–1,224)

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		65 to 74	88	992	2,423	3,632 (2,913–4,475)
		75 to 84	55	508	1,053	5,224 (3,935–6,799)
		≥85	14	230	430	3,255 (1,779–5,461)
CPRD GOLD	Anastrozole	55 to 64	11	1,693	4,538	242 (121–434)
		65 to 74	79	1,835	4,866	1,624 (1,285–2,024)
		75 to 84	64	959	2,237	2,861 (2,204–3,654)
		≥85	10	288	558	1,791 (859–3,294)
	Letrozole	55 to 64	69	4,126	12,737	542 (422–686)
		65 to 74	161	4,450	13,164	1,223 (1,041–1,427)
		75 to 84	217	2,956	7,288	2,978 (2,595–3,401)
		≥85	78	1,430	2,726	2,861 (2,262–3,571)
	Tamoxifen	55 to 64	28	2,003	5,124	546 (363–790)
		65 to 74	56	1,772	4,629	1,210 (914–1,571)
		75 to 84	53	766	1,719	3,083 (2,309–4,033)
		≥85	11	287	408	2,698 (1,347–4,827)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Similar patterns were observed for the ***degeneration of the retina***, where highest rates were observed in older age groups (**Table 23**).

Table 23. Incidence rates of degeneration of retina per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	Anastrozole	55 to 64	16	1,955	5,016	319 (182–518)
		65 to 74	24	2,252	5,550	432 (277–643)
		75 to 84	15	1,268	2,687	558 (312–921)
		≥85	<5	216	385	Not applicable
	Letrozole	55 to 64	6	1,253	2,880	208 (76–454)
		65 to 74	14	1,465	3,198	438 (239–734)
		75 to 84	7	765	1,477	474 (191–976)
		≥85	<5	190	283	Not applicable
	Tamoxifen	55 to 64	<5	331	590	Not applicable
		65 to 74	<5	264	434	Not applicable
		75 to 84	<5	159	238	Not applicable
		≥85	0	50	59	0
FinOMOP-THL	Anastrozole	55 to 64	0	681	119	0
		65 to 74	0	711	129	0
		75 to 84	0	540	106	0

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
		≥85	<5	209	44	Not applicable
	Letrozole	55 to 64	<5	9,069	1,565	Not applicable
		65 to 74	6	9,564	1,682	357 (131–776)
		75 to 84	10	5,630	1,038	963 (462–1,771)
		≥85	10	1,734	341	2,930 (1,405–5,389)
	Tamoxifen	55 to 64	<5	820	141	Not applicable
		65 to 74	0	660	115	0
		75 to 84	<5	499	94	Not applicable
		≥85	0	206	40	0
IQVIA DA Germany	Anastrozole	55 to 64	0	633	1,147	0
		65 to 74	0	698	1,097	0
		75 to 84	0	626	916	0
		≥85	0	140	152	0
	Letrozole	55 to 64	0	1,181	1,861	0
		65 to 74	0	1,198	1,706	0
		75 to 84	0	1,106	1,451	0
		≥85	0	293	303	0
	Tamoxifen	55 to 64	0	1,699	2,687	0
		65 to 74	0	1,426	2,240	0
		75 to 84	0	958	1,319	0
		≥85	0	227	255	0
BIFAP	Anastrozole	55 to 64	5	2,311	7,973	63 (20–146)
		65 to 74	11	1,988	6,521	169 (84–302)
		75 to 84	23	1,253	3,825	601 (381–902)
		≥85	<5	417	1,055	Not applicable
	Letrozole	55 to 64	32	10,624	33,709	95 (65–134)
		65 to 74	67	8,824	27,686	242 (188–307)
		75 to 84	85	6,005	17,301	491 (392–607)
		≥85	27	2,111	4,975	543 (358–790)
	Tamoxifen	55 to 64	<5	2,065	5,258	Not applicable
		65 to 74	5	1,120	2,911	172 (56–401)
		75 to 84	8	686	1,522	526 (227–1,036)
		≥85	<5	307	613	Not applicable
CPRD GOLD	Anastrozole	55 to 64	5	1,715	4,634	108 (35–252)
		65 to 74	10	1,910	5,227	191 (92–352)
		75 to 84	24	1,101	2,690	892 (572–1,328)
		≥85	6	364	710	846 (310–1,841)

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
	Letrozole	55 to 64	12	4,197	13,034	92 (48–161)
		65 to 74	38	4,620	13,828	275 (194–377)
		75 to 84	75	3,397	8,795	853 (671–1,069)
		≥85	43	1,761	3,507	1,226 (887–1,651)
	Tamoxifen	55 to 64	<5	2,024	5,247	Not applicable
		65 to 74	8	1,850	4,958	161 (70–318)
		75 to 84	9	875	2,022	445 (204–845)
		≥85	5	352	534	936 (304–2,185)

CI= Confidence interval; py= person-years; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

For ***keratitis*** (**Annex III**) IR per 100,000 could only be estimated in individual treatment groups across some databases, without substantial differences between age groups.

9.3. Postmenopausal women demographics and comorbidities

The demographics of postmenopausal women included in the study are presented in **Table 24**. The median age was between 67 and 70 years old, and majority of patients were in age groups 55–64 and 65–74.

Table 24. Demographics of postmenopausal women with breast cancer treated with anastrozole, letrozole or tamoxifen

Data source	Treatment	Number of patients	Age, Median [IQR]	Age range	Number of patients in age groups (%)			
					55-64	65-74	75-84	≥85
NAJS	Anastrozole	5,822	68 [63 - 75]	55 to 98	1,968 (34)	2,312 (40)	1,308 (22)	234 (4)
	Letrozole	3,738	68 [62 - 75]	55 to 97	1,260 (34)	1,492 (40)	790 (21)	196 (5)
	Tamoxifen	826	67 [60 - 76]	55 to 101	333 (40)	270 (33)	170 (21)	53 (6)
FinOMOP-THL	Anastrozole	2,209	70 [63 - 79]	55 to 101	686 (31)	723 (33)	572 (26)	228 (10)
	Letrozole	26,841	68 [62 - 76]	55 to 101	9,124 (34)	9,739 (36)	5,980 (22)	1,998 (7)
	Tamoxifen	2,260	68 [61 - 78]	55 to 99	821 (36)	675 (30)	531 (23)	233 (10)
IQVIA DA Germany	Anastrozole	2,100	70 [63 - 78]	55 to 95	633 (30)	698 (33)	628 (30)	141 (7)
	Letrozole	3,778	70 [63 - 78]	55 to 97	1,181 (31)	1,198 (32)	1,106 (29)	293 (8)
	Tamoxifen	4,311	67 [61 - 75]	55 to 97	1,700 (39)	1,426 (33)	958 (22)	227 (5)
BIFAP	Anastrozole	6,056	68 [61 - 76]	55 to 102	2,315 (38)	2,011 (33)	1,285 (21)	445 (7)
	Letrozole	27,965	68 [61 - 76]	55 to 104	10,669 (38)	8,910 (32)	6,172 (22)	2,214 (8)
	Tamoxifen	4,224	65 [59 - 74]	55 to 99	2,074 (49)	1,134 (27)	701 (17)	315 (7)

CPRD GOLD	Anastrozole	5,206	68 [63 - 76]	55 to 103	1,719 (33)	1,931 (37)	1,153 (22)	403 (8)
	Letrozole	14,370	70 [63 - 80]	55 to 104	4,205 (29)	4,675 (33)	3,537 (25)	1,953 (14)
	Tamoxifen	5,204	67 [61 - 75]	55 to 103	2,028 (39)	1,871 (36)	912 (18)	393 (8)

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; DA=Disease Analyzer Germany; IQR= interquartile range; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System; SD: Standard deviation.

Table 25 shows the prevalence of selected comorbidities in postmenopausal women treated with anastrozole, letrozole, or tamoxifen across five databases any time prior to treatment start. The most prevalent conditions across the databases in descending order were typically hypertension, hyperlipidaemia, diabetes, obesity, autoimmune disease, and psoriasis. In general, although the prevalence of conditions varied between databases, the prevalence of comorbidities within each data source was similar for patients treated with letrozole and anastrozole and slightly lower for tamoxifen users. As an exception, tamoxifen treated patients had a higher prevalence of autoimmune disease—e.g., in FinOMOP-THL it was 9% compared to 3% and 4% for anastrozole and letrozole users.

Table 25. Comorbidities in postmenopausal women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Treatment	Autoimmune disease	Diabetes	Hyperlipidaemia	Hypertension	Obesity	Psoriasis
NAJS	Anastrozole	418 (7.18 %)	1433 (24.61 %)	930 (15.97 %)	4,524 (77.71 %)	569 (9.77 %)	135 (2.32 %)
	Letrozole	289 (7.73 %)	903 (24.16 %)	584 (15.62 %)	2,857 (76.43 %)	307 (8.21 %)	113 (3.02 %)
	Tamoxifen	65 (7.87 %)	181 (21.91 %)	120 (14.53 %)	605 (73.24 %)	53 (6.42 %)	28 (3.39 %)
FinOMOP-THL	Anastrozole	68 (3.08 %)	372 (16.84 %)	294 (13.31 %)	920 (41.65 %)	63 (2.85 %)	29 (1.31 %)
	Letrozole	1,047 (3.9 %)	4,309 (16.05 %)	4,900 (18.26 %)	11,804 (43.98 %)	1,171 (4.36 %)	370 (1.38 %)
	Tamoxifen	195 (8.63 %)	282 (12.48 %)	322 (14.25 %)	845 (37.39 %)	65 (2.88 %)	21 (0.93 %)
IQVIA DA Germany	Anastrozole	85 (4.05 %)	320 (15.24 %)	283 (13.48 %)	805 (38.33 %)	337 (16.05 %)	26 (1.24 %)
	Letrozole	184 (4.87 %)	566 (14.98 %)	597 (15.8 %)	1448 (38.33 %)	575 (15.22 %)	60 (1.59 %)
	Tamoxifen	176 (4.08 %)	456 (10.58 %)	477 (11.06 %)	1,316 (30.53 %)	529 (12.27 %)	54 (1.25 %)
BIFAP	Anastrozole	172 (2.84 %)	917 (15.14 %)	1682 (27.77 %)	2,219 (36.64 %)	820 (13.54 %)	87 (1.44 %)
	Letrozole	882 (3.15 %)	4,125 (14.75 %)	8490 (30.36 %)	10,586 (37.85 %)	3,810 (13.62 %)	449 (1.61 %)
	Tamoxifen	154 (3.65 %)	461 (10.91 %)	1062 (25.14 %)	1,225 (29 %)	432 (10.23 %)	69 (1.63 %)
CPRD GOLD	Anastrozole	163 (3.13 %)	512 (9.83 %)	649 (12.47 %)	1,613 (30.98 %)	466 (8.95 %)	224 (4.3 %)
	Letrozole	400 (2.78 %)	1,705 (11.86 %)	1537 (10.7 %)	4,379 (30.47 %)	1,529 (10.64 %)	459 (3.19 %)
	Tamoxifen	194 (3.73 %)	411 (7.9 %)	500 (9.61 %)	1,460 (28.06 %)	487 (9.36 %)	175 (3.36 %)

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; DA=Disease Analyzer Germany; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

9.4. Cumulative incidence of eye disorders

The cumulative incidence of all visual system disorders in postmenopausal women is presented in **Figure 4**, selected eye disorders combined in **Figure 5**, cataract in **Figure 6**, and the degeneration of retina in **Figure 7**. Additionally, we presented the cumulative incidence of all visual eye disorders (**Figure 8**) and cataract (**Figure 9**) among premenopausal women.

Overall, results suggest a clear difference between databases. In BIFAP, CPRD GOLD, and NAJS, the cumulative incidence of eye disorders increases steadily over time, reaching approximately 20% in CPRD GOLD, more than 30% in BIFAP, and over 50% in NAJS by year 5. The three treatment groups show broadly similar trends. For tamoxifen, the cumulative incidence is slightly below that of anastrozole in BIFAP and CPRD GOLD. For example, in BIFAP, the cumulative incidence for all eye disorders anastrozole at 4 years of follow-up was higher (31.8% (95% CI: 30–34) compared to tamoxifen (25.2% (22–28)), for selected eye disorders combined it was 14.8% (14–16) for anastrozole at 4 years of follow-up, compared to 11.6% (10–13) for tamoxifen users.

In IQVIA DA Germany and FinOMOP-THL, the cumulative probability is low compared to other databases. In FinOMOP-THL, the cumulative incidence cannot be estimated after 6 months of follow-up.

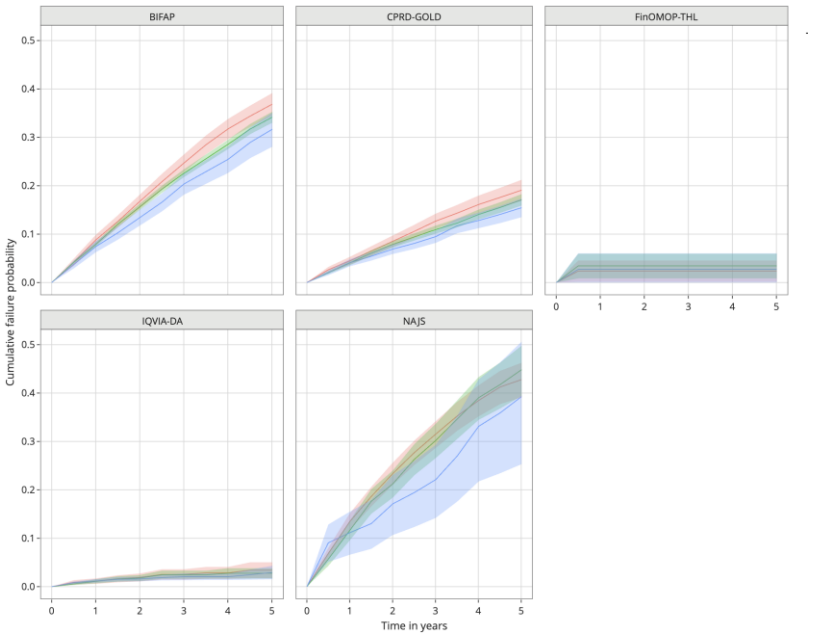

Figure 4. Cumulative incidence of all visual system disorders among postmenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

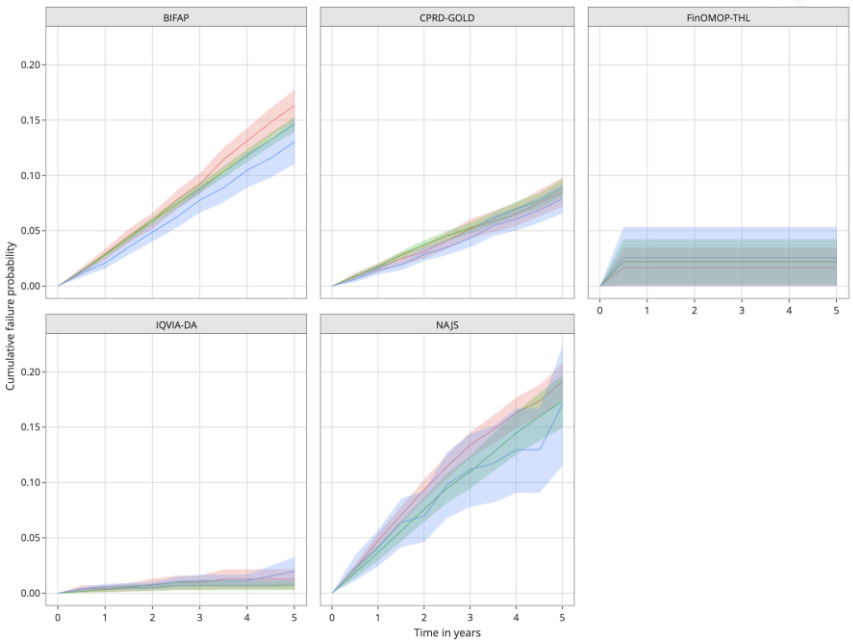

Figure 5. Cumulative incidence of selected eye disorders among postmenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

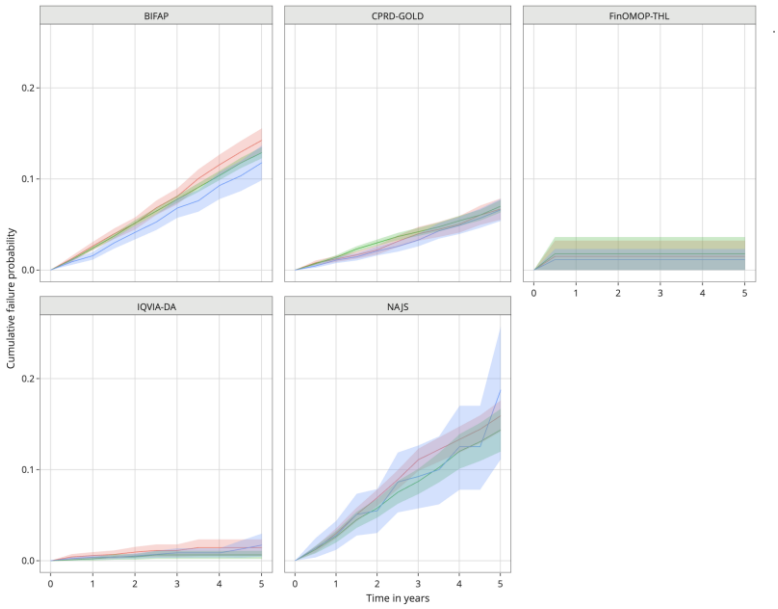

Figure 6. Cumulative incidence of cataract among postmenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

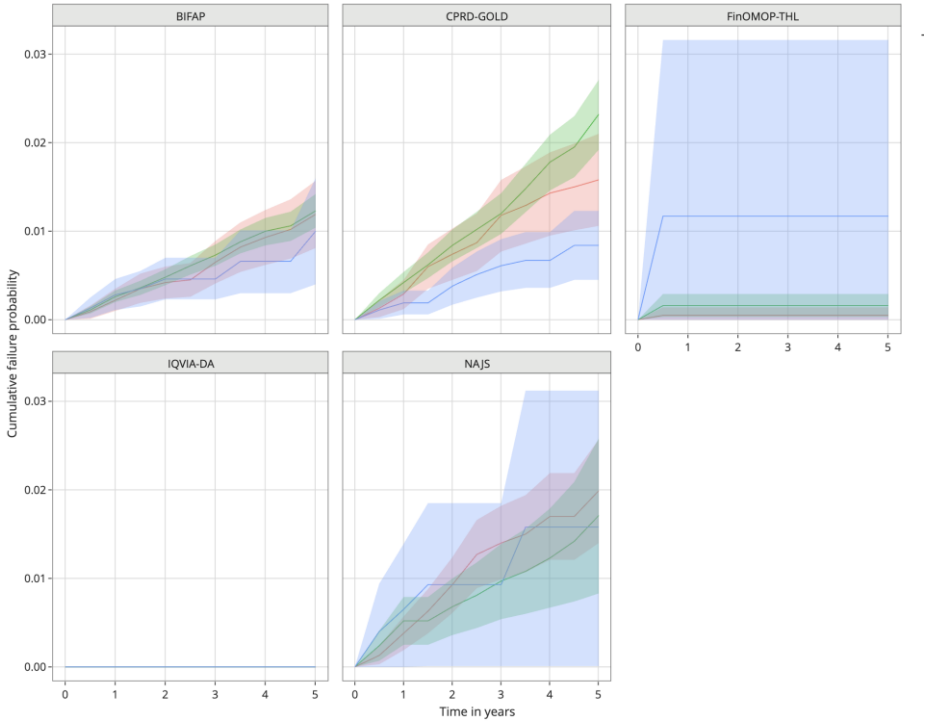

Figure 7. Cumulative incidence of degeneration of retina among postmenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

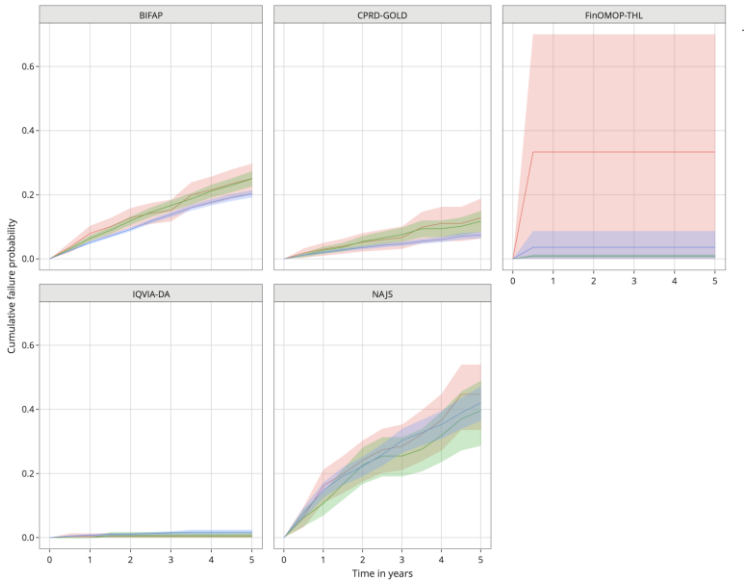

Figure 8. Cumulative incidence of all visual eye disorders among premenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

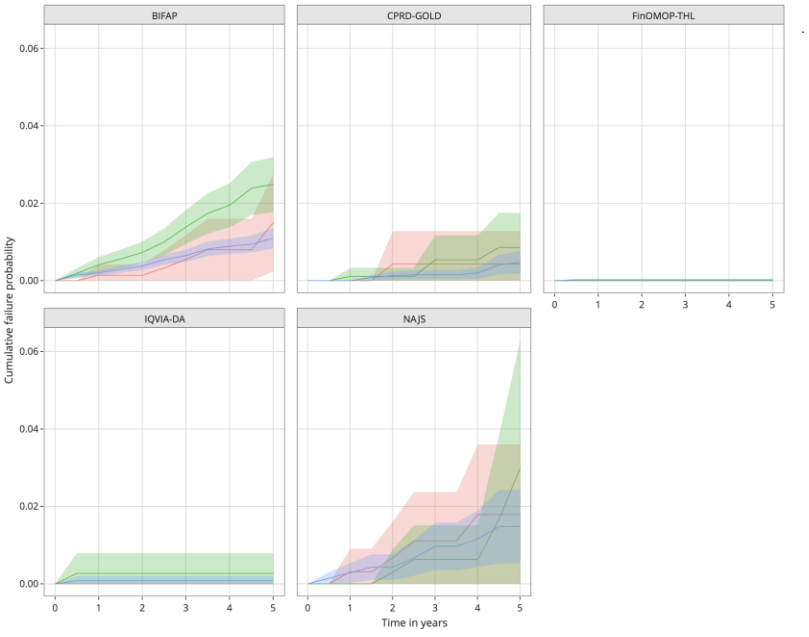

Figure 9. Cumulative incidence of cataract among premenopausal women with breast cancer treated with anastrozole (red line), letrozole (green line), and tamoxifen (blue line).

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 months up to 5 years.
BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA= IQVIA Disease Analyzer (IQVIA DA Germany); FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

9.5. Time to events in patients with eye disorders

Time to onset of eye disorders was only described for the cohort of patients who experienced them. **Table 26** presents the median time to onset of eye disorders in women treated with anastrozole, letrozole, or tamoxifen in NAJS. Median time to event was only slightly shorter for tamoxifen for all visual system eye disorders (0.63 years) and combination of selected eye disorders (1.3 years) compared to letrozole and anastrozole, although IQRs were wide and overlapped. For the other eye disorders the difference was less pronounced, or counts were not available across all treatment groups.

Table 26. Median time to onset of eye disorders in years in NAJS.

Outcome	Treatment	Patient	Median, years (IQR)
All visual system disorders	Anastrozole	481	1.12 (0.46–2.32)
	Letrozole	279	1.21 (0.51–2.41)
	Tamoxifen	43	0.63 (0.16–2.49)
Selected eye disorders combined	Anastrozole	413	1.58 (0.79–2.64)
	Letrozole	223	1.42 (0.59–2.55)
	Tamoxifen	37	1.30 (0.48–2.78)
Cataract	Anastrozole	383	1.68 (0.84–2.72)
	Letrozole	194	1.49 (0.64–2.55)
	Tamoxifen	39	1.48 (0.76–3.07)
Degeneration of retina	Anastrozole	57	1.79 (0.95–2.45)
	Letrozole	28	0.92 (0.41–2.56)
	Tamoxifen	5	0.96 (0.48–1.20)
Keratitis	Anastrozole	34	1.51 (0.85–2.84)
	Letrozole	19	0.80 (0.30–2.75)
Retinal detachment	Anastrozole	19	2.45 (1.34–3.61)
	Letrozole	19	1.33 (0.58–2.15)
Retinal vascular disorder	Anastrozole	20	1.79 (0.42–2.92)
	Letrozole	11	2.07 (1.65–2.95)
Uveitis	Anastrozole	9	0.42 (0.30–0.79)
	Letrozole	5	1.99 (0.04–2.66)
Visual impairment	Anastrozole	27	1.34 (0.39–2.70)
	Letrozole	8	2.41 (1.48–3.66)

NAJS= Croatian National Public Health Information System.

In FinOMOP-THL and IQVIA DA Germany (**Annex III**), the median times to onset for all visual system disorders was shortest and similar for patients treated with three drugs.

Table 27 and **Table 28** present the median time to onset of eye disorders in BIFAP and CPRD GOLD. Across various eye disorders and treatment groups, the time to onset ranged from 1 to 4 years. In BIFAP and CPRD GOLD, median time for tamoxifen users was slightly shorter, but similar to NAJS, IQRs were wide and overlapped .

Table 27. Median time to onset of eye disorders in years in BIFAP.

Outcome	Treatment	Patient	Median, years (IQR)
All visual system disorders	Anastrozole	770	1.70 (0.73–2.92)
	Letrozole	3160	1.57 (0.69–2.76)
	Tamoxifen	363	1.36 (0.55–2.44)
Selected eye disorders combined	Anastrozole	528	2.10 (1.00–3.41)
	Letrozole	2068	1.81 (0.90–3.09)
	Tamoxifen	228	1.61 (0.79–2.65)
Cataract	Anastrozole	479	2.14 (0.99–3.41)
	Letrozole	1878	1.86 (0.93–3.15)
	Tamoxifen	203	1.62 (0.89–2.78)
Degeneration of retina	Anastrozole	42	2.08 (0.91–3.30)
	Letrozole	211	1.92 (0.87–3.22)
	Tamoxifen	19	0.86 (0.59–1.74)
Keratitis	Anastrozole	54	1.93 (1.15–3.37)
	Letrozole	273	1.72 (0.82–2.93)
	Tamoxifen	30	1.91 (0.76–2.70)
Macular hole	Letrozole	17	2.33 (1.62–3.43)
Retinal artery occlusion	Letrozole	5	0.53 (0.44–0.72)
Retinal detachment	Anastrozole	19	1.60 (1.09–2.88)
	Letrozole	53	1.39 (0.72–2.14)
	Tamoxifen	5	1.11 (1.04–1.61)
Retinal haemorrhage	Letrozole	5	2.63 (2.22–4.22)
Retinal tear	Letrozole	6	1.62 (1.52–1.68)
	Tamoxifen	5	0.99 (0.53–1.04)
Retinal vascular disorder	Anastrozole	8	2.47 (0.96–4.15)
	Letrozole	25	1.64 (0.53–2.59)
Uveitis	Anastrozole	11	1.76 (0.62–2.60)
	Letrozole	39	1.95 (0.91–2.71)
	Tamoxifen	5	2.27 (0.24–3.11)
Visual impairment	Letrozole	11	0.65 (0.43–1.52)

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público.

Table 28. Median time to onset of eye disorders in years in CPRD GOLD.

Outcome	Treatment	Patient	Median (IQR)
All visual system disorders	Anastrozole	332	1.60 (0.56–2.98)
	Letrozole	909	1.62 (0.68–3.34)
	Tamoxifen	288	1.49 (0.59–3.07)
Selected eye disorders combined	Anastrozole	203	1.96 (0.76–3.33)
	Letrozole	641	1.87 (0.78–3.72)
	Tamoxifen	179	1.94 (0.83–3.39)
Cataract	Anastrozole	164	2.10 (0.65–3.61)
	Letrozole	525	1.79 (0.78–3.79)
	Tamoxifen	148	2.18 (0.93–3.54)
Degeneration of retina	Anastrozole	45	1.63 (0.99–2.88)
	Letrozole	168	1.94 (0.78–3.60)
	Tamoxifen	24	1.95 (0.70–2.84)
Keratitis	Anastrozole	6	3.27 (1.72–5.07)
	Letrozole	34	1.59 (0.59–3.88)
	Tamoxifen	5	3.79 (3.47–4.88)
Retinal artery occlusion	Letrozole	9	3.98 (3.03–4.88)
Retinal detachment	Anastrozole	8	2.94 (1.57–4.08)
	Letrozole	20	3.50 (1.41–4.83)
	Tamoxifen	6	1.39 (1.20–1.76)
Retinal haemorrhage	Letrozole	28	2.02 (0.91–2.74)
Retinal tear	Letrozole	5	2.55 (1.99–4.35)
Retinal vascular disorder	Anastrozole	15	1.72 (0.94–3.67)
	Letrozole	39	2.29 (1.41–3.68)
	Tamoxifen	11	1.63 (0.92–1.96)
Uveitis	Anastrozole	7	1.02 (0.81–1.55)
	Letrozole	16	1.41 (0.94–1.85)
Visual impairment	Anastrozole	6	0.85 (0.40–1.13)
	Letrozole	9	1.80 (1.09–3.93)

CPRD GOLD= Clinical Practice Research Datalink GOLD.

9.6. Sensitivity analysis

When comparing incidence rates per 100,000 for the most common outcomes (all visual eye disorders, selected eye disorders combined, and cataract—See **Annex III**) after running sensitivity analysis, the incidence rates only change in the case when the event numbers are low, and additional follow-up increases the number of events. For example, in FinOMOP-THL, the incidence of cataract in postmenopausal women treated with anastrozole changed from 1,925 (774–3,967) to 3,093 (2,055–4,470), mainly due to a 4-time increase in the number of events, from 7 to 28. In databases with higher event numbers and longer follow-up periods (e.g., CPRD GOLD and BIFAP), the changes in incidence rates were minimal, if any.

Increasing the gap to construct the drug era and time, which is accounted for in the follow-up from 30 to 90 days, increased the median follow-up time in each database (**Table 29**). However, in FinOMOP-THL, mean follow-up times remained short, with values ranging from 65 to 68 days for the 30-day to 155 to 171 days with the 90-day window, depending on the drug. In IQVIA DA Germany, follow-up times were also longer with a 90-day window, but still below 1,000 days.

In BIFAP, mean follow-up times were the longest, exceeding 1,100 days for most drugs under the 30-day window and rising to over 1,200–1,350 days with the 90-day window. CPRD GOLD and NAJS yielded comparable follow-up times, though slightly lower than in BIFAP, with values ranging from 600 to 1,026 days for the 30-day window and from 1,077 to 1,251 days for the 90-day window.

Table 29. Sensitivity analysis: mean follow-up time (days) of postmenopausal women with breast cancer treated with anastrozole, letrozole, or tamoxifen, where 30 and 90 days were used to create the drug era and were added to the end of the exposure.

Data source	Treatment	Time window: 30 days (days, SD)	Tine window: 90 days (days, SD)
NAJS	Letrozole	782.29 (656.45)	1,051.22 (678.55)
	Anastrozole	883.11 (712.69)	1,251.28 (725.60)
	Tamoxifen	600.56 (625.97)	838.57 (682.62)
FinOMOP-THL	Letrozole	65.13 (20.04)	155.41 (93.23)
	Anastrozole	68.13 (24.89)	171.14 (110.31)
	Tamoxifen	65.50 (22.10)	156.72 (93.89)
IQVIA DA Germany	Letrozole	514.51 (530.69)	781.03 (685.13)
	Anastrozole	576.80 (583.96)	870.45 (756.10)
	Tamoxifen	550.98 (545.91)	863.14 (747.73)
BIFAP	Letrozole	1,112.85 (695.27)	1,263.80 (693.44)
	Anastrozole	1,188.41 (729.42)	1,351.34 (722.71)
	Tamoxifen	904.34 (611.47)	1,140.24 (634.00)
CPRD GOLD	Letrozole	1,026.29 (884.70)	1,154.47 (920.03)
	Anastrozole	957.61 (824.83	1,077.36 (862.56)
	Tamoxifen	913.06 (805.81)	1,088.45 (874.29)

SD – standard deviation; BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink; DA=Disease Analyzer Germany; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Finally, we tested how changing the time gap from 30 to 90 days affects the survival estimates (See **Annex III**). Similar to incidence rates per 100,000, cumulative incidence curves were almost identical in databases with extended follow-up and a reasonable number of events. At the same time, additional follow-up allowed for constructing cumulative incidence curves beyond 6 months for FinOMOP-THL.

10. DISCUSSION

10.1. Key results

The incidence of visual system disorders varied substantially by data source, age group (pre- and postmenopausal women), but not by type of treatment within the same data source and age groups. Overall, postmenopausal women experienced higher incidences of both overall and specific eye disorders, particularly in data sources that included primary care data, such as NAJS, BIFAP, and CPRD GOLD. In contrast, premenopausal women showed lower incidence rates for most conditions.

The highest IRs were consistently observed in NAJS, exceeding 10,000 per 100,000 person-years in both premenopausal and postmenopausal for several treatment groups—13,025 for anastrozole and 12,499 per 100,000 person-years for tamoxifen in premenopausal women. In contrast, IQVIA DA Germany reported the lowest IRs, with values often below 1,000 per 100,000 person-years, particularly in premenopausal women, where some subgroup rates could not be estimated due to low event counts. Within the databases, IRs among users of the three drug user groups were similar.

Among individual eye disorders, cataract had the highest IRs per 100,000 person-years among postmenopausal women. In NAJS, rates were 3,579 per 100,000 person-years for anastrozole, in BIFAP—3,043 per 100,000 person-years for anastrozole, and in CPRD GOLD—1,462 per 100,000 person-years for letrozole. In contrast, rates among premenopausal women were lower or non-estimable. Keratitis IRs among premenopausal women reached 495 per 100,000 person-years for anastrozole in BIFAP and 240 per 100,000 person-years for tamoxifen. IRs for degeneration of retina were generally below 600 per 100,000 person-years, with some exceptions such as 1,282 per 100,000 person-years for tamoxifen in postmenopausal women in FinOMOP-THL. In most other databases and age groups, rates were considerably lower or cannot be estimated. Several other eye conditions, including retinal detachment, macular hole, retinal artery occlusion, retinal tear, retinal vascular disorders, and vitreomacular traction, were rare and could frequently not be estimated due to small case counts.

IRs of cataract generally increased with age among postmenopausal women, with a decline or non-estimable rates in the ≥85 age group due to low event counts and limited follow-up. For degeneration of the retina, all estimable IRs per 100,000 person-years also showed a consistent increase with age across treatment groups and data sources. In contrast, incidence rates of keratitis showed no consistent age-related pattern.

Similar to incidence rates, cumulative incidence varied between databases. In BIFAP, CPRD GOLD, and NAJS, the cumulative incidence of eye disorders increases steadily, reaching around 20% in CPRD GOLD, over 30% in BIFAP, and more than 50% in NAJS by five years. However, treatment group differences were modest, with tamoxifen generally showing slightly lower cumulative incidence than anastrozole in BIFAP and CPRD GOLD. In contrast, IQVIA DA Germany and FinOMOP-THL showed lower cumulative probabilities. Notably, in FinOMOP-THL, cumulative incidence could not be reliably estimated beyond the first 6 months of follow-up due to short exposure durations.

Overall, the study population was predominantly composed of women aged 55–74, with relatively fewer patients in older age groups. Letrozole was the most frequently used drug in all databases, particularly in BIFAP and CPRD GOLD. Anastrozole and tamoxifen users were fewer but showed similar age distributions.

Across all databases, the prevalence of comorbidities were similar across treatment groups, with exception of autoimmune diseases, which were more frequent in tamoxifen users, especially in FinOMOP-THL.

Median time to onset of event was somewhat lower for tamoxifen compared to letrozole and anastrozole but IQR were wide and overlapped.

When comparing incidence rates for the most common outcomes in the main and sensitivity analysis with extended gap and time window and thus extended follow-up, they only increased slightly in situations where the number of events was very low, and additional follow-up increased it (e.g., FinOMOP-THL). In

databases with a reasonable number of events and longer follow-up periods observed in the main analysis (e.g., CPRD-GOLD and BIFAP), the changes in incidence rates in the sensitivity analysis were minimal, if any.

10.2. Limitations

General study limitations

The study relied on routinely collected healthcare data, making data quality an important consideration. In particular, the identification of breast cancer patients and eye disorders varied across databases. As for cancer diagnoses, only FinOMOP-THL and CPRD GOLD had cancer diagnoses been validated against cancer registry data, and NAJS included cancer registry data. As for eye disorders, not all databases have patient-level linkage to secondary care data. This could have led to an underestimation of eye disorders, particularly for rare conditions. Furthermore, IRs of eye disorder varied substantially between the databases, and low rates in FinOMOP-THL can be explained by short follow-up.

Another general limitation is that prescription periods were used as a proxy for drug use due to the lack of direct information on actual consumption. This approach assumed that individuals adhered fully to the prescribed regimen for the entire duration. However, this may not have reflected real-world behaviours, such as partial adherence, delayed initiation, early discontinuation, or complete non-use. To control for this, we added a window following the end of the first treatment era, but misclassification of exposure might still be a concern.

Moreover, prescription durations varied across different brands or formulations due to differences in package sizes, dosing instructions, and refill intervals. This heterogeneity introduced inconsistencies in exposure assessment and could have resulted in differential misclassifications of exposure duration.

Study specific limitations

As for cancer diagnoses, in FinOMOP-THL (19) and CPRD GOLD (20), cancer diagnoses had been validated against cancer registry data, meaning that these databases were less likely to be affected by misclassification.

As for eye disorders, while false positives were expected to be relatively low, false negatives were likely more common, especially in databases without patient-level linkage to secondary care data. This could have led to an underestimation of eye disorders, particularly for rare conditions. Furthermore, incidence rates of eye disorder varied substantially between the databases, and although really low rates in FinOMOP-THL can be explained by short follow-up, in other databases it likely depends on the quality and completeness of the data on diagnoses of eye disorders collected in each of the databases. At the same time, differential misclassification of eye disorders between the treatments is not likely, as we observed quite similar levels within databases.

We observed the highest incidence rates of eye disorders in NAJS. In this database, the coexistence of confirmed and suspicious diagnoses could have led to overestimation of the prevalence of conditions generally diagnosed and managed by GPs and primary care, but it is not likely to be differential across treatment groups.

When interpreting incidence rates, several database-specific factors were considered that likely affect the follow-up times we observed in each database. In FinOMOP-THL, the follow-up was too short to obtain meaningful estimates of incidence rates, which suggests that this data source is not useful for the estimation of incidence of adverse events on long-term therapy in this setting. While it collects discharge records across all medical facilities, it likely misses the longer follow-up of patients on adjuvant therapy.

We were not able to estimate incidence rates across several outcomes due to zero or small counts. It could also be the specific reason for low rates in IQVIA DA Germany, where events may have been missed due to a lack of patient-level cross-identification between practices and linkage to hospitalisation.

As for medication drug era, for FinOMOP-THL, we noticed that sensitivity analysis increased the follow-up to almost twice, which also implies the importance of defining the gap to build drug era or drug exposure period correctly. As we identified in FinOMOP-THL, the duration of the drug exposure was artificially restricted to a predefined period (30 days), despite the fact that packages included 100 tables, meaning that it should be 100 days.

Indication (adjuvant therapy or treatment of advanced tumours) was not available across databases. Therefore, it was assumed that treatment initiated within 365 days after cancer diagnosis included therapy for hormone receptor-positive advanced breast cancer, hormone receptor-positive early invasive breast cancer, and adjuvant treatment of hormone receptor-positive early invasive breast cancer. However, by excluding patients with prior use of anti-oestrogens, the study avoided including patients who received AI for adjuvant treatment after 2 to 3 years of tamoxifen therapy.

Finally, certain degree of misclassification was expected, as patients' age was used as a proxy to identify postmenopausal women (defined as age 55 years and above). Different studies report different average ages of menopause (21,22).

10.3. Interpretation

Overall, we included more than 25,000 postmenopausal women treated for breast cancer using anastrozole, 86,000 with letrozole, and 53,000 with tamoxifen. The number of participants in our cohort study was greater than that of other previous studies which hypothesise the association between AI use and eye disorders.

Previous studies were case reports, case series, reports from clinical trials, or analyses of adverse events reporting systems (15). Overall, more than 9,700 events were identified across all participants, with over 5,000 events of selected eye disorders (cataract, degeneration of retina, keratitis, macular hole, retinal artery occlusion, retinal detachment, retinal haemorrhage, retinal tear, retinal vascular disorder, uveitis, visual impairment). Whilst the number of participants in our study was greater than other studies, our study was still limited in its ability to measure the incidence of some events which were rare, including macular holes, retinal haemorrhages, retinal tears, and retinal vascular disorders. For these rare eye disorders, comparative analysis would be problematic because they were not identified across all treatment groups.

We also noticed substantial heterogeneity in incidence rates between the data sources, whereas the incidence rates of eye disorders were more homogeneous within each data source.

Incidence of selected eye disorders within data sources varied as expected by age groups (premenopausal vs. postmenopausal), especially for eye disorders that are more common in older age groups (e.g., cataract). At the same time, the incidence of inflammatory diseases (keratitis, uveitis) was more homogeneous between the age groups. The incidence of cataract and degeneration of the retina increased with age in most studies on the epidemiology of these conditions in the general population (23).

The most common newly diagnosed eye disorder in postmenopausal women across all databases was cataract, with IR observed as expected in women of this age. The age-standardised prevalence in 2020 for moderate and severe vision impairment in adults aged 50 years and older caused by cataract in Central Europe, Eastern Europe, and Central Asia was 21.3 per 1,000 (23).

The cumulative incidence of eye disorder, assessed over a five-year period, was in line with the estimates of incidence rates per person-year of follow-up that we obtained, and incidence rates did not appear to change at different periods during the follow-up.

Differences in cumulative incidence were not substantial and there was no overlap between confidence intervals, making it may be difficult to compare treatment groups without additional information on patient and tumour characteristics. No significant differences were observed in terms of cumulative survival in the

sensitivity analysis when the gap to build the drug era and the time added to follow-up were changed from 30 to 90 days.

Finally, the median time to eye disorders in the cohort of patients who experienced eye disorders was also described in this study. In general, the time to onset of eye disorder was shorter for tamoxifen compared to letrozole and anastrozole in BIFAP, IQVIA DA Germany, and NAJS, but not in CPRD GOLD. Still, differences were not consistent across different eye disorders and databases and IQRs were wide.

Our study encompasses a diverse range of data sources, representing various settings, that may impact on the observed IR. The follow-up time and the number of events were sufficient to estimate IR across most subgroups for NAJS, BIFAP, and CPRD GOLD mainly because these databases along primary healthcare data include public secondary care data, have linkages to other databases, including patients' hospital diagnoses at discharge or prescribed medications databases.

On the other hand, FinOMOP-THL contains nationwide data on hospital discharge, but is less likely to have extensive follow-up, as primary care databases would. IQVIA DA Germany represents primary healthcare data; however, the average follow-up in IQVIA DA Germany is much shorter when compared to BIFAP and CPRD GOLD, probably because the end of observation is at moment of last encounter.

The results obtained from various data sources have significant implications for future studies of adverse events associated with AI use in breast cancer treatment. Registries and data sources with limited follow-up time (FinOMOP-THL and IQVIA DA Germany) that do not collect information for the entire duration of treatment, which can last for years, are likely to miss the long-term effects of those drugs. At the same time, sources that include longer follow-up data (NAJS, BIFAP, CPRD GOLD), including information based on primary care visits, are more suitable for studies of events during adjuvant treatment. At the same time, to minimise the degree of bias, it is crucial to obtain reliable and granular information about breast cancer diagnosis and initial indication for therapy that is likely to be present in sources linked to specialised cancer care. In our study, we were unable to obtain information on cancer stage or tumour characteristics, which is essential for ensuring the homogeneity of participants.

We should also highlight the differences in the number of patients treated with anastrozole, letrozole, and tamoxifen across various data sources. Across all databases, more premenopausal women were treated with tamoxifen compared to letrozole and anastrozole (tamoxifen users were 66% in NAJS, 73% in FinOMOP-THL, 83% IQVIA DA Germany, 75% in BIFAP and 80% in CPRD GOLD). The proportion of premenopausal women treated with anastrozole was lowest among the three drugs across all databases.

At the same time, in postmenopausal women, the preferences were different; the proportion of patients treated with anastrozole was highest in NAJS (56%). In FinOMOP-THL (85%), BIFAP (73%), and CPRD GOLD (58%), the highest proportion of postmenopausal women were treated with letrozole. In IQVIA DA Germany, tamoxifen (43%) was used slightly more often. Our study did not distinguish between the types of treatment (adjuvant or for advanced tumours), so this difference could be due to the case mix in different databases; however, primary healthcare data sources with longer follow-up are more likely to include patients treated in adjuvant settings.

Distribution of patients in our cohorts is more likely to reflect national guidelines and preferences. In Germany, tamoxifen was predominantly recommended until 2019, and AI agents were only predominantly used with ovarian function suppression after 2022 (24). A previous study conducted in Spain revealed more patients using AI than tamoxifen in the period between 2006 and 2015 (25). In the UK, AI were already used slightly more often than tamoxifen for breast cancer patients diagnosed before 2000 (26). In Finland, AI and tamoxifen were used almost equally in the treatment of breast cancer patients between 2006 and 2011 (27). Finally, the Croatian database covers the most recent period after 2017 and is likely to have more patients treated with AI.

10.4. Generalisability

We used electronic healthcare data from five sources across five European countries, enhancing the generalisability of our findings to the broader European region. These sources included primary care records, national health registries, and prescription databases. However, the observed heterogeneity in our results suggests differences in follow-up duration, data collection practices, and how and where different eye disorders are diagnosed and treated (primary or specialised care) across countries. These differences may limit comparability even within Europe and further constrain generalisability to non-European settings, where healthcare systems, population characteristics, and data infrastructure may differ substantially.

11. CONCLUSION

Using real-world data from five European countries, we identified heterogeneity in incidence rates of eye disorders across data sources and age groups, but when compared within a database, IRs in patients exposed to different drugs (anastrozole, letrozole and tamoxifen) were typically similar. There were no consistent or large differences in IRs of different eye disorders by the type of drug, particularly in postmenopausal women. However, some aspects such as absence of detailed clinical data (e.g. cancer stage) and lack of follow up across some databases should be considered when interpreting the result of this study.

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13. ANNEXES

Annex I. Additional information

Database description

Croatian National Public Health Information System (NAJS), Croatia

The National Public Health Information System (Nacionalni javnozdravstveni informacijski sustav - NAJS) is an organised system of information services by the Croatian Institute of Public Health (CIPH). This database was established in 1998, with nationwide coverage, representing approximately 5.4 million inhabitants. Settings covered include public primary, secondary/outpatient, and inpatient care. Data is retrieved primarily from EHR and holds information on demographics, inpatient and outpatient visits, conditions and procedures, drugs (outpatient and inpatient prescriptions), measurements, and inpatient and outpatient dates of death. NAJS provides linkage between medical and public health data collected and stored in health registries and other health data collections, including cancer registry, mortality, work injuries, occupational diseases, communicable and non-communicable diseases, health events, disabilities, psychosis and suicide, diabetes, drug abuse and others. The CDM population comprises all publicly insured persons residing in Croatia starting in 2015.

Finnish Care Register for Health Care (FinOMOP-THL), Finland

The Finnish Care Register for Health Care (fi: Hoitoilmoitusrekisteri) continues the former Hospital Discharge Register, which originally gathered data on patients discharged from hospitals (1). The Care Register has comprehensive data on the use of services and service users from Finnish public inpatient and outpatient primary and specialised care nationwide. Since 1998, the register has covered public outpatient and inpatient specialised care and private inpatient care (TerveysHilmo). Since 2011, the register has covered public primary care (AvoHilmo). Since 2020, the register has covered private outpatient care and occupational care. The CDM is currently produced from the data collection on inpatient and outpatient specialised care (TerveysHilmo) and is limited to observation periods commencing after 01/01/2015. The inclusion of data collected before 2015 is also being planned. The National Population Registry is also used as a source for the CDM database. The National Population Registry data forms the basis for forming the patient population. This ensures up-to-date location (municipality of residence) of patients and complete death occurrences (although not the cause of death). Using the complete population as a basis for the person table also facilitates calculations on a population level, e.g., incidence rates. THL database is used to assess the quality of cancer registry data in Finland (2).

IQVIA Disease Analyzer (IQVIA DA Germany) Germany, Germany

IQVIA Disease Analyzer (DA) Germany is a database of de-identified electronic medical records from specialised and general primary practices (GP) in Germany since 1992. This dataset encompasses approximately 3% of all outpatient practices within Germany, ensuring a substantial representation of the national healthcare landscape (3,4). The sampling methods used for practice selection, taking into account physician's demographics, specialty focus, community size category and federal state location, was instrumental in constructing a database that accurately mirrors the diverse spectrum of healthcare providers in the country (3). Consequently, data within IQVIA DA Germany database has been demonstrated to be representative of general and specialised practices throughout Germany.

The database contains demographics records, basic medical data, disease diagnosis according to International Classification of Diseases, 10th revision (ICD-10), and prescription records (4). While the database partly records information on deaths and procedures, it currently does not support linkage with external data sources and therefore, information on mortality is incomplete. Routine updates are conducted at regular intervals. Data quality is assessed based on several criteria, including completeness of information and correctness (e.g. linkage between diagnosis and prescriptions).

No registration or approval is required for drug utilisation studies. As previously demonstrated, IQVIA DA Germany is suitable for pharmacoepidemiologic and pharmacoeconomic studies (3–6).

Base de Datos para la Investgación Farmacoepidemiológica en el Ámbito Público (BIFAP), Spain

BIFAP is a longitudinal population-based data source of medical patient records of the Spanish National Health Service from several participating Regions throughout Spain (7). The population currently included represents 36% of the total Spanish population. The Spanish National Health Service provides universal access to health services through the Regional Healthcare Services. Primary care physicians, both General practitioners (GPs) and paediatricians, have a central role. They act as gatekeepers of the system and exchange information with other levels of care to ensure continuity. Most (98.9%) of the population is registered with a primary care physician and, in addition, most drug prescriptions are written at the primary care level. BIFAP includes a collection of databases linked at individual patient levels. The main one is the Primary care Database, given the central role of primary care physicians in the Spanish National Health Service. There are additional important structural databases like the medicines dispensed at community pharmacies and the patients' hospital diagnosis at discharge linked to BIFAP. Linkage to SARS-CoV-2 diagnostics test and COVID-19 vaccination registries are also included. Additional databases are also linked for a subset of patients (hospital pharmacy, cause of death registry). BIFAP program is a non-profit program financed by the Spanish Agency of Medicines and Medical Devices, a government agency belonging to the Ministry of Health in collaboration with the regional health authorities. The main use of BIFAP is for research purposes to evaluate the adverse and beneficial effects of drugs and drug utilisation patterns in the general population under real conditions of use.

Clinical Practice Research Datalink GOLD (CPRD GOLD), UK

The Clinical Practice Research Datalink (CPRD) collects data from three primary care electronic patient record (EPR) systems: Vision®, EMIS Web®, and TPP®. Vision® and EMIS Web® contribute to the observational databases CPRD GOLD, which includes practices across the UK, and CPRD Aurum, which hosts practices from England, respectively. Vision®, EMIS Web®, and TPP® underlie the CPRD Interventional Research services. (8). 98% of the population in the United Kingdom (UK) is registered with a GP primarily responsible for non-emergency care and referrals to secondary care as needed. The CPRD GOLD January 2024 release has 364 currently contributing GP practices (7 in England, 110 in Wales, 207 in Scotland, and 40 in Northern Ireland). CPRD GOLD Jan-2024 contains 984 historical and current GP practices from the four UK constituent countries [median of 19.1 (13.4–21.9) years of GP contribution], with coverage of >21.3 million patients. Of these, nearly 3 million are alive and currently registered in a contributing GP practice. CPRD GOLD provides longitudinal information about patients' demographics, symptoms, conditions, referrals, vaccinations, prescriptions, measurements, and laboratory test results collected by participating GP practices, as part of their NHS care. While, in the raw data, clinical and prescribing information is coded by using Vision® bespoke coding systems (i.e., medcode and prodcode, respectively), CPRD provides dictionaries for their translation into standard coding systems.

DATA MANAGEMENT

All databases are mapped to the OMOP common data model. This enables the use of standardised analytics and tools across the network since the structure of the data, and the terminology system is harmonised. The OMOP CDM is developed and maintained by the Observational Health Data Sciences and Informatics (OHDSI) initiative and is described in detail on the wiki page of the CDM: https://ohdsi.github.io/CommonDataModel and in The Book of OHDSI: http://book.ohdsi.org

The analytic code for this study was written in R. Each data partner executed the study code against their database containing patient-level data and returned the results set which only contained aggregated data. The results from each of the contributing data sites were then combined in tables and figures for the study report.

Data storage and protection

For this study, participants from various EU member states processed personal data from individuals collected in national or regional electronic health record databases. Due to the sensitive nature of this personal medical data, it was essential to be fully aware of ethical and regulatory aspects and to take all reasonable measures to ensure compliance with ethical and privacy regulations.

All databases used in this study had already been used for pharmacoepidemiological research and had well-developed mechanisms in place to ensure adherence to European and local regulations governing the ethical use of data and adequate privacy control. In accordance with these regulations, rather than combining person-level data and performing only a central analysis, local analyses were conducted to generate non-identifiable aggregate summary results.

The output files were stored in the DARWIN Digital Research Environment. These output files did not contain any data that could allow the identification of subjects included in the study. The DRE implemented additional security measures to ensure a high level of protection for stored data, in compliance with the local implementation of the General Data Protection Regulation (GDPR) (EU) 679/2016 in the various member states.

QUALITY CONTROL

General database quality control

Several open-source quality control mechanisms for the OMOP CDM have been developed (see Chapter 15 of The Book of OHDSI http://book.ohdsi.org/DataQuality.html). In particular, data partners are expected to run the OHDSI *DataQualityDashboard* tool (https://github.com/OHDSI/DataQualityDashboard). This tool provides numerous checks relating to the conformance, completeness, and plausibility of the mapped data. Conformance focuses on checks that describe the compliance of the representation of data against internal or external formatting, relational, or computational definitions; completeness in the sense of data quality is solely focused on quantifying missingness or the absence of data, while plausibility seeks to determine the believability or truthfulness of data values. Each of these categories has one or more subcategories and are evaluated in two contexts: validation and verification. Validation relates to how well data aligns with external benchmarks with expectations derived from known true standards. In contrast, verification relates to how well data conforms to local knowledge, metadata descriptions, and system assumptions.

Study-specific quality control

When defining breast cancers, outcomes and co-morbidities, a systematic search of possible codes for inclusion was identified using *CodelistGenerator* R package (https://github.com/darwin-eu/CodelistGenerator). This software allows the user to define a search strategy and queries the vocabulary tables of the OMOP CDM to find potentially relevant codes. The codes returned were reviewed by two clinical epidemiologists to consider their relevance.

In addition, the *CohortDiagnostics* R package (https://github.com/OHDSI/CohortDiagnostics) was run to assess the use of different codes across the databases contributing to the study and identify any codes potentially omitted in error. This allowed for a consideration of the validity of the study cohort of patients and co-morbidities in each of the databases and inform decisions around whether multiple definitions were required.

The study code was based on three R packages currently being developed to (1) estimate incidence rates (*IncidencePrevalence*), (2) characterise demographic and clinical characteristics (*PatientProfiles* and *CohortCharacteristics*). These packages include numerous automated unit tests to ensure the validity of the codes, alongside software peer review and user testing.

The study code is made publicly available via GitHub.

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Annex II. Supplementary materials

Table S1. List of concepts for breast cancer.

Id	Code	Name	Class
36560989	8550/3-C50.6	Acinar cell carcinoma of axillary tail of breast	ICDO Condition
44501094	8550/3-C50.9	Acinar cell carcinoma of breast, NOS	ICDO Condition
44502783	8550/3-C50.1	Acinar cell carcinoma of central portion of breast	ICDO Condition
36528296	8550/3-C50.3	Acinar cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36553302	8550/3-C50.5	Acinar cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36566267	8550/3-C50.0	Acinar cell carcinoma of nipple	ICDO Condition
36528268	8550/3-C50.8	Acinar cell carcinoma of overlapping lesion of breast	ICDO Condition
36523946	8550/3-C50.2	Acinar cell carcinoma of upper-inner quadrant of breast	ICDO Condition
44500080	8550/3-C50.4	Acinar cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36517161	8551/3-C50.6	Acinar cell cystadenocarcinoma of axillary tail of breast	ICDO Condition
36524667	8551/3-C50.9	Acinar cell cystadenocarcinoma of breast, NOS	ICDO Condition
36559540	8551/3-C50.1	Acinar cell cystadenocarcinoma of central portion of breast	ICDO Condition
36535001	8551/3-C50.3	Acinar cell cystadenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36547927	8551/3-C50.5	Acinar cell cystadenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36534084	8551/3-C50.0	Acinar cell cystadenocarcinoma of nipple	ICDO Condition
36540781	8551/3-C50.8	Acinar cell cystadenocarcinoma of overlapping lesion of breast	ICDO Condition
36528684	8551/3-C50.2	Acinar cell cystadenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36533091	8551/3-C50.4	Acinar cell cystadenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36534214	8261/3-C50.6	Adenocarcinoma in villous adenoma of axillary tail of breast	ICDO Condition
36530730	8261/3-C50.9	Adenocarcinoma in villous adenoma of breast, NOS	ICDO Condition
36548881	8261/3-C50.1	Adenocarcinoma in villous adenoma of central portion of breast	ICDO Condition
36534866	8261/3-C50.3	Adenocarcinoma in villous adenoma of lower-inner quadrant of breast	ICDO Condition
36520750	8261/3-C50.5	Adenocarcinoma in villous adenoma of lower-outer quadrant of breast	ICDO Condition
36567217	8261/3-C50.0	Adenocarcinoma in villous adenoma of nipple	ICDO Condition
36554325	8261/3-C50.8	Adenocarcinoma in villous adenoma of overlapping lesion of breast	ICDO Condition
36547352	8261/3-C50.2	Adenocarcinoma in villous adenoma of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36566738	8261/3-C50.4	Adenocarcinoma in villous adenoma of upper-outer quadrant of breast	ICDO Condition
36553114	8573/3-C50.6	Adenocarcinoma with apocrine metaplasia of axillary tail of breast	ICDO Condition
36567106	8573/3-C50.9	Adenocarcinoma with apocrine metaplasia of breast, NOS	ICDO Condition
36526872	8573/3-C50.5	Adenocarcinoma with apocrine metaplasia of lower-outer quadrant of breast	ICDO Condition
36566773	8573/3-C50.0	Adenocarcinoma with apocrine metaplasia of nipple	ICDO Condition
36533099	8571/3-C50.6	Adenocarcinoma with cartilaginous and osseous metaplasia of axillary tail of breast	ICDO Condition
36527204	8571/3-C50.9	Adenocarcinoma with cartilaginous and osseous metaplasia of breast, NOS	ICDO Condition
36533485	8571/3-C50.1	Adenocarcinoma with cartilaginous and osseous metaplasia of central portion of breast	ICDO Condition
36547578	8571/3-C50.3	Adenocarcinoma with cartilaginous and osseous metaplasia of lower-inner quadrant of breast	ICDO Condition
36520011	8571/3-C50.5	Adenocarcinoma with cartilaginous and osseous metaplasia of lower-outer quadrant of breast	ICDO Condition
36557153	8571/3-C50.0	Adenocarcinoma with cartilaginous and osseous metaplasia of nipple	ICDO Condition
36525405	8571/3-C50.8	Adenocarcinoma with cartilaginous and osseous metaplasia of overlapping lesion of breast	ICDO Condition
36545580	8571/3-C50.2	Adenocarcinoma with cartilaginous and osseous metaplasia of upper-inner quadrant of breast	ICDO Condition
36530836	8255/3-C50.6	Adenocarcinoma with mixed subtypes of axillary tail of breast	ICDO Condition
44502281	8255/3-C50.9	Adenocarcinoma with mixed subtypes of breast, NOS	ICDO Condition
44501266	8255/3-C50.1	Adenocarcinoma with mixed subtypes of central portion of breast	ICDO Condition
36541548	8255/3-C50.3	Adenocarcinoma with mixed subtypes of lower-inner quadrant of breast	ICDO Condition
36551939	8255/3-C50.5	Adenocarcinoma with mixed subtypes of lower-outer quadrant of breast	ICDO Condition
36551299	8255/3-C50.0	Adenocarcinoma with mixed subtypes of nipple	ICDO Condition
36565039	8255/3-C50.8	Adenocarcinoma with mixed subtypes of overlapping lesion of breast	ICDO Condition
44502534	8255/3-C50.2	Adenocarcinoma with mixed subtypes of upper-inner quadrant of breast	ICDO Condition
44501345	8255/3-C50.4	Adenocarcinoma with mixed subtypes of upper-outer quadrant of breast	ICDO Condition
36562380	8574/3-C50.6	Adenocarcinoma with neuroendocrine differentiation of axillary tail of breast	ICDO Condition
36551719	8574/3-C50.0	Adenocarcinoma with neuroendocrine differentiation of nipple	ICDO Condition
36559062	8572/3-C50.6	Adenocarcinoma with spindle cell metaplasia of axillary tail of breast	ICDO Condition

Id	Code	Name	Class
36542053	8572/3-C50.9	Adenocarcinoma with spindle cell metaplasia of breast, NOS	ICDO Condition
36550327	8572/3-C50.1	Adenocarcinoma with spindle cell metaplasia of central portion of breast	ICDO Condition
36564788	8572/3-C50.3	Adenocarcinoma with spindle cell metaplasia of lower-inner quadrant of breast	ICDO Condition
36541792	8572/3-C50.0	Adenocarcinoma with spindle cell metaplasia of nipple	ICDO Condition
36567559	8572/3-C50.2	Adenocarcinoma with spindle cell metaplasia of upper-inner quadrant of breast	ICDO Condition
36541767	8570/3-C50.6	Adenocarcinoma with squamous metaplasia of axillary tail of breast	ICDO Condition
36520568	8570/3-C50.1	Adenocarcinoma with squamous metaplasia of central portion of breast	ICDO Condition
36552975	8570/3-C50.3	Adenocarcinoma with squamous metaplasia of lower-inner quadrant of breast	ICDO Condition
36556660	8570/3-C50.5	Adenocarcinoma with squamous metaplasia of lower-outer quadrant of breast	ICDO Condition
36553810	8570/3-C50.0	Adenocarcinoma with squamous metaplasia of nipple	ICDO Condition
36546948	8570/3-C50.2	Adenocarcinoma with squamous metaplasia of upper-inner quadrant of breast	ICDO Condition
36544230	8200/3-C50.6	Adenoid cystic carcinoma of axillary tail of breast	ICDO Condition
42512701	8983/3-C50.6	Adenomyoepithelioma with carcinoma of axillary tail of breast	ICDO Condition
42512894	8983/3-C50.9	Adenomyoepithelioma with carcinoma of breast, NOS	ICDO Condition
42512546	8983/3-C50.1	Adenomyoepithelioma with carcinoma of central portion of breast	ICDO Condition
42511993	8983/3-C50.3	Adenomyoepithelioma with carcinoma of lower-inner quadrant of breast	ICDO Condition
42512278	8983/3-C50.5	Adenomyoepithelioma with carcinoma of lower-outer quadrant of breast	ICDO Condition
42512817	8983/3-C50.0	Adenomyoepithelioma with carcinoma of nipple	ICDO Condition
42512919	8983/3-C50.2	Adenomyoepithelioma with carcinoma of upper-inner quadrant of breast	ICDO Condition
42512003	8983/3-C50.4	Adenomyoepithelioma with carcinoma of upper-outer quadrant of breast	ICDO Condition
36559532	8560/3-C50.6	Adenosquamous carcinoma of axillary tail of breast	ICDO Condition
36529053	8560/3-C50.9	Adenosquamous carcinoma of breast, NOS	ICDO Condition
36567537	8560/3-C50.0	Adenosquamous carcinoma of nipple	ICDO Condition
36533146	8251/3-C50.6	Alveolar adenocarcinoma of axillary tail of breast	ICDO Condition
36531301	8251/3-C50.9	Alveolar adenocarcinoma of breast, NOS	ICDO Condition
36520865	8251/3-C50.1	Alveolar adenocarcinoma of central portion of breast	ICDO Condition
36545416	8251/3-C50.3	Alveolar adenocarcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36563347	8251/3-C50.5	Alveolar adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36566941	8251/3-C50.0	Alveolar adenocarcinoma of nipple	ICDO Condition
36553169	8251/3-C50.8	Alveolar adenocarcinoma of overlapping lesion of breast	ICDO Condition
36555646	8251/3-C50.2	Alveolar adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36517972	8251/3-C50.4	Alveolar adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36558729	9581/3-C50.6	Alveolar soft part sarcoma of axillary tail of breast	ICDO Condition
36550812	9581/3-C50.9	Alveolar soft part sarcoma of breast, NOS	ICDO Condition
36534703	9581/3-C50.1	Alveolar soft part sarcoma of central portion of breast	ICDO Condition
36550634	9581/3-C50.3	Alveolar soft part sarcoma of lower-inner quadrant of breast	ICDO Condition
36548673	9581/3-C50.5	Alveolar soft part sarcoma of lower-outer quadrant of breast	ICDO Condition
36552133	9581/3-C50.0	Alveolar soft part sarcoma of nipple	ICDO Condition
36517713	9581/3-C50.8	Alveolar soft part sarcoma of overlapping lesion of breast	ICDO Condition
36559931	9581/3-C50.2	Alveolar soft part sarcoma of upper-inner quadrant of breast	ICDO Condition
36528036	9581/3-C50.4	Alveolar soft part sarcoma of upper-outer quadrant of breast	ICDO Condition
36555909	8894/3-C50.6	Angiomyosarcoma of axillary tail of breast	ICDO Condition
36559567	8894/3-C50.9	Angiomyosarcoma of breast, NOS	ICDO Condition
36531855	8894/3-C50.1	Angiomyosarcoma of central portion of breast	ICDO Condition
36567107	8894/3-C50.3	Angiomyosarcoma of lower-inner quadrant of breast	ICDO Condition
36555393	8894/3-C50.5	Angiomyosarcoma of lower-outer quadrant of breast	ICDO Condition
36568025	8894/3-C50.0	Angiomyosarcoma of nipple	ICDO Condition
36558164	8894/3-C50.8	Angiomyosarcoma of overlapping lesion of breast	ICDO Condition
36530947	8894/3-C50.2	Angiomyosarcoma of upper-inner quadrant of breast	ICDO Condition
36556120	8894/3-C50.4	Angiomyosarcoma of upper-outer quadrant of breast	ICDO Condition
36526963	8401/3-C50.6	Apocrine adenocarcinoma of axillary tail of breast	ICDO Condition
44502289	8513/3-C50.6	Atypical medullary carcinoma of axillary tail of breast	ICDO Condition
44501022	8513/3-C50.9	Atypical medullary carcinoma of breast, NOS	ICDO Condition
44501530	8513/3-C50.1	Atypical medullary carcinoma of central portion of breast	ICDO Condition
44501218	8513/3-C50.3	Atypical medullary carcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
44501805	8513/3-C50.0	Atypical medullary carcinoma of nipple	ICDO Condition
36561242	8147/3-C50.6	Basal cell adenocarcinoma of axillary tail of breast	ICDO Condition
36549037	8147/3-C50.9	Basal cell adenocarcinoma of breast, NOS	ICDO Condition
36521879	8147/3-C50.1	Basal cell adenocarcinoma of central portion of breast	ICDO Condition
36524455	8147/3-C50.3	Basal cell adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36542579	8147/3-C50.5	Basal cell adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36517996	8147/3-C50.0	Basal cell adenocarcinoma of nipple	ICDO Condition
36560662	8147/3-C50.8	Basal cell adenocarcinoma of overlapping lesion of breast	ICDO Condition
36537242	8147/3-C50.2	Basal cell adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36517529	8147/3-C50.4	Basal cell adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36531464	8123/3-C50.9	Basaloid carcinoma of breast, NOS	ICDO Condition
42511930	8123/3-C50.8	Basaloid carcinoma of overlapping lesion of breast	ICDO Condition
42512929	8123/3-C50.4	Basaloid carcinoma of upper-outer quadrant of breast	ICDO Condition
42512266	8941/3-C50.9	Carcinoma ex pleomorphic adenoma of breast, NOS	ICDO Condition
4157448	372096000	Carcinoma of male breast	Clinical Finding
37399542	716593008	Carcinoma of salivary gland type of breast	Clinical Finding
36544715	8231/3-C50.6	Carcinoma simplex of axillary tail of breast	ICDO Condition
36564416	8231/3-C50.9	Carcinoma simplex of breast, NOS	ICDO Condition
36530779	8231/3-C50.1	Carcinoma simplex of central portion of breast	ICDO Condition
36518801	8231/3-C50.3	Carcinoma simplex of lower-inner quadrant of breast	ICDO Condition
36541559	8231/3-C50.5	Carcinoma simplex of lower-outer quadrant of breast	ICDO Condition
36555657	8231/3-C50.0	Carcinoma simplex of nipple	ICDO Condition
36535615	8231/3-C50.8	Carcinoma simplex of overlapping lesion of breast	ICDO Condition
36523044	8231/3-C50.2	Carcinoma simplex of upper-inner quadrant of breast	ICDO Condition
36543383	8231/3-C50.4	Carcinoma simplex of upper-outer quadrant of breast	ICDO Condition
36534548	8035/3-C50.6	Carcinoma with osteoclast-like giant cells of axillary tail of breast	ICDO Condition
36565720	8035/3-C50.9	Carcinoma with osteoclast-like giant cells of breast, NOS	ICDO Condition
36567931	8035/3-C50.1	Carcinoma with osteoclast-like giant cells of central portion of breast	ICDO Condition

Id	Code	Name	Class
36523701	8035/3-C50.3	Carcinoma with osteoclast-like giant cells of lower-inner quadrant of breast	ICDO Condition
36560521	8035/3-C50.5	Carcinoma with osteoclast-like giant cells of lower-outer quadrant of breast	ICDO Condition
36531354	8035/3-C50.0	Carcinoma with osteoclast-like giant cells of nipple	ICDO Condition
36527755	8035/3-C50.8	Carcinoma with osteoclast-like giant cells of overlapping lesion of breast	ICDO Condition
36548065	8035/3-C50.2	Carcinoma with osteoclast-like giant cells of upper-inner quadrant of breast	ICDO Condition
36543673	8035/3-C50.4	Carcinoma with osteoclast-like giant cells of upper-outer quadrant of breast	ICDO Condition
36540234	8021/3-C50.6	Carcinoma, anaplastic, NOS, of axillary tail of breast	ICDO Condition
44501699	8021/3-C50.9	Carcinoma, anaplastic, NOS, of breast, NOS	ICDO Condition
36531469	8021/3-C50.1	Carcinoma, anaplastic, NOS, of central portion of breast	ICDO Condition
36537809	8021/3-C50.3	Carcinoma, anaplastic, NOS, of lower-inner quadrant of breast	ICDO Condition
36558782	8021/3-C50.5	Carcinoma, anaplastic, NOS, of lower-outer quadrant of breast	ICDO Condition
36553980	8021/3-C50.0	Carcinoma, anaplastic, NOS, of nipple	ICDO Condition
36534751	8021/3-C50.8	Carcinoma, anaplastic, NOS, of overlapping lesion of breast	ICDO Condition
36536886	8021/3-C50.2	Carcinoma, anaplastic, NOS, of upper-inner quadrant of breast	ICDO Condition
36548861	8021/3-C50.4	Carcinoma, anaplastic, NOS, of upper-outer quadrant of breast	ICDO Condition
1553463	8145/3-C50.9	Carcinoma, diffuse type of breast, NOS	ICDO Condition
36540630	8020/3-C50.6	Carcinoma, undifferentiated, NOS, of axillary tail of breast	ICDO Condition
36544307	8020/3-C50.1	Carcinoma, undifferentiated, NOS, of central portion of breast	ICDO Condition
36550782	8020/3-C50.3	Carcinoma, undifferentiated, NOS, of lower-inner quadrant of breast	ICDO Condition
36566265	8020/3-C50.5	Carcinoma, undifferentiated, NOS, of lower-outer quadrant of breast	ICDO Condition
36547912	8020/3-C50.0	Carcinoma, undifferentiated, NOS, of nipple	ICDO Condition
44502004	8020/3-C50.2	Carcinoma, undifferentiated, NOS, of upper-inner quadrant of breast	ICDO Condition
36559478	8981/3-C50.6	Carcinosarcoma, embryonal of axillary tail of breast	ICDO Condition
36559269	8981/3-C50.9	Carcinosarcoma, embryonal of breast, NOS	ICDO Condition
36567615	8981/3-C50.1	Carcinosarcoma, embryonal of central portion of breast	ICDO Condition
36548429	8981/3-C50.3	Carcinosarcoma, embryonal of lower-inner quadrant of breast	ICDO Condition
36521363	8981/3-C50.5	Carcinosarcoma, embryonal of lower-outer quadrant of breast	ICDO Condition
36562037	8981/3-C50.0	Carcinosarcoma, embryonal of nipple	ICDO Condition

Id	Code	Name	Class
36547579	8981/3-C50.8	Carcinosarcoma, embryonal of overlapping lesion of breast	ICDO Condition
36522989	8981/3-C50.2	Carcinosarcoma, embryonal of upper-inner quadrant of breast	ICDO Condition
36519476	8981/3-C50.4	Carcinosarcoma, embryonal of upper-outer quadrant of breast	ICDO Condition
36549622	8980/3-C50.6	Carcinosarcoma, NOS, of axillary tail of breast	ICDO Condition
36524276	8980/3-C50.9	Carcinosarcoma, NOS, of breast, NOS	ICDO Condition
36519461	8980/3-C50.1	Carcinosarcoma, NOS, of central portion of breast	ICDO Condition
44502559	8980/3-C50.5	Carcinosarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36533887	8980/3-C50.0	Carcinosarcoma, NOS, of nipple	ICDO Condition
36549753	8310/3-C50.6	Clear cell adenocarcinoma, NOS, of axillary tail of breast	ICDO Condition
36518754	8310/3-C50.9	Clear cell adenocarcinoma, NOS, of breast, NOS	ICDO Condition
36551469	8310/3-C50.1	Clear cell adenocarcinoma, NOS, of central portion of breast	ICDO Condition
36529768	8310/3-C50.3	Clear cell adenocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36521809	8310/3-C50.5	Clear cell adenocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36561381	8310/3-C50.0	Clear cell adenocarcinoma, NOS, of nipple	ICDO Condition
36530728	8310/3-C50.2	Clear cell adenocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36567418	8501/3-C50.0	Comedocarcinoma, NOS, of nipple	ICDO Condition
44501262	8201/3-C50.6	Cribriform carcinoma, NOS, of axillary tail of breast	ICDO Condition
44499538	8201/3-C50.0	Cribriform carcinoma, NOS, of nipple	ICDO Condition
36552252	8440/3-C50.6	Cystadenocarcinoma, NOS, of axillary tail of breast	ICDO Condition
36561513	8440/3-C50.9	Cystadenocarcinoma, NOS, of breast, NOS	ICDO Condition
36549402	8440/3-C50.1	Cystadenocarcinoma, NOS, of central portion of breast	ICDO Condition
36542396	8440/3-C50.3	Cystadenocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36551482	8440/3-C50.5	Cystadenocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36550109	8440/3-C50.0	Cystadenocarcinoma, NOS, of nipple	ICDO Condition
36519532	8440/3-C50.8	Cystadenocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36547095	8440/3-C50.2	Cystadenocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36565077	8440/3-C50.4	Cystadenocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36520324	8858/3-C50.6	Dedifferentiated liposarcoma of axillary tail of breast	ICDO Condition

Id	Code	Name	Class
36528705	8858/3-C50.9	Dedifferentiated liposarcoma of breast, NOS	ICDO Condition
36526097	8858/3-C50.1	Dedifferentiated liposarcoma of central portion of breast	ICDO Condition
36551063	8858/3-C50.3	Dedifferentiated liposarcoma of lower-inner quadrant of breast	ICDO Condition
36537797	8858/3-C50.5	Dedifferentiated liposarcoma of lower-outer quadrant of breast	ICDO Condition
36523456	8858/3-C50.0	Dedifferentiated liposarcoma of nipple	ICDO Condition
36561593	8858/3-C50.8	Dedifferentiated liposarcoma of overlapping lesion of breast	ICDO Condition
36517816	8858/3-C50.2	Dedifferentiated liposarcoma of upper-inner quadrant of breast	ICDO Condition
36520923	8858/3-C50.4	Dedifferentiated liposarcoma of upper-outer quadrant of breast	ICDO Condition
42512254	8832/3-C50.9	Dermatofibrosarcoma protuberans, fibrosarcomatous of breast, NOS	ICDO Condition
42512707	8832/3-C50.2	Dermatofibrosarcoma protuberans, fibrosarcomatous of upper-inner quadrant of breast	ICDO Condition
36537745	8806/3-C50.6	Desmoplastic small round cell tumor of axillary tail of breast	ICDO Condition
36518567	8806/3-C50.9	Desmoplastic small round cell tumor of breast, NOS	ICDO Condition
36522362	8806/3-C50.1	Desmoplastic small round cell tumor of central portion of breast	ICDO Condition
36530716	8806/3-C50.3	Desmoplastic small round cell tumor of lower-inner quadrant of breast	ICDO Condition
36546349	8806/3-C50.5	Desmoplastic small round cell tumor of lower-outer quadrant of breast	ICDO Condition
36543766	8806/3-C50.0	Desmoplastic small round cell tumor of nipple	ICDO Condition
36521418	8806/3-C50.8	Desmoplastic small round cell tumor of overlapping lesion of breast	ICDO Condition
36567415	8806/3-C50.2	Desmoplastic small round cell tumor of upper-inner quadrant of breast	ICDO Condition
36523568	8806/3-C50.4	Desmoplastic small round cell tumor of upper-outer quadrant of breast	ICDO Condition
36545391	8514/3-C50.6	Duct carcinoma, desmoplastic type of axillary tail of breast	ICDO Condition
36551694	8514/3-C50.9	Duct carcinoma, desmoplastic type of breast, NOS	ICDO Condition
36528580	8514/3-C50.1	Duct carcinoma, desmoplastic type of central portion of breast	ICDO Condition
36551404	8514/3-C50.3	Duct carcinoma, desmoplastic type of lower-inner quadrant of breast	ICDO Condition
36559774	8514/3-C50.5	Duct carcinoma, desmoplastic type of lower-outer quadrant of breast	ICDO Condition
36518002	8514/3-C50.0	Duct carcinoma, desmoplastic type of nipple	ICDO Condition
36548379	8514/3-C50.8	Duct carcinoma, desmoplastic type of overlapping lesion of breast	ICDO Condition
36524955	8514/3-C50.2	Duct carcinoma, desmoplastic type of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36556632	8514/3-C50.4	Duct carcinoma, desmoplastic type of upper-outer quadrant of breast	ICDO Condition
44500946	8910/3-C50.4	Embryonal rhabdomyosarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36550286	8991/3-C50.6	Embryonal sarcoma of axillary tail of breast	ICDO Condition
36557460	8991/3-C50.9	Embryonal sarcoma of breast, NOS	ICDO Condition
36536416	8991/3-C50.1	Embryonal sarcoma of central portion of breast	ICDO Condition
36528936	8991/3-C50.3	Embryonal sarcoma of lower-inner quadrant of breast	ICDO Condition
36517946	8991/3-C50.5	Embryonal sarcoma of lower-outer quadrant of breast	ICDO Condition
36545441	8991/3-C50.0	Embryonal sarcoma of nipple	ICDO Condition
36523336	8991/3-C50.8	Embryonal sarcoma of overlapping lesion of breast	ICDO Condition
36540456	8991/3-C50.2	Embryonal sarcoma of upper-inner quadrant of breast	ICDO Condition
36548860	8991/3-C50.4	Embryonal sarcoma of upper-outer quadrant of breast	ICDO Condition
36564156	8504/3-C50.6	Encapsulated papillary carcinoma with invasion of axillary tail of breast	ICDO Condition
36563169	8562/3-C50.6	Epithelial-myoepithelial carcinoma of axillary tail of breast	ICDO Condition
36518059	8562/3-C50.9	Epithelial-myoepithelial carcinoma of breast, NOS	ICDO Condition
44502830	8562/3-C50.1	Epithelial-myoepithelial carcinoma of central portion of breast	ICDO Condition
44502038	8562/3-C50.3	Epithelial-myoepithelial carcinoma of lower-inner quadrant of breast	ICDO Condition
36558395	8562/3-C50.5	Epithelial-myoepithelial carcinoma of lower-outer quadrant of breast	ICDO Condition
36536105	8562/3-C50.0	Epithelial-myoepithelial carcinoma of nipple	ICDO Condition
36534772	8562/3-C50.8	Epithelial-myoepithelial carcinoma of overlapping lesion of breast	ICDO Condition
36553182	8562/3-C50.2	Epithelial-myoepithelial carcinoma of upper-inner quadrant of breast	ICDO Condition
36532659	8562/3-C50.4	Epithelial-myoepithelial carcinoma of upper-outer quadrant of breast	ICDO Condition
36520234	9133/3-C50.6	Epithelioid hemangioendothelioma, NOS, of axillary tail of breast	ICDO Condition
36532396	9133/3-C50.9	Epithelioid hemangioendothelioma, NOS, of breast, NOS	ICDO Condition
36542675	9133/3-C50.1	Epithelioid hemangioendothelioma, NOS, of central portion of breast	ICDO Condition
36536576	9133/3-C50.3	Epithelioid hemangioendothelioma, NOS, of lower-inner quadrant of breast	ICDO Condition
36559643	9133/3-C50.5	Epithelioid hemangioendothelioma, NOS, of lower-outer quadrant of breast	ICDO Condition
36556060	9133/3-C50.0	Epithelioid hemangioendothelioma, NOS, of nipple	ICDO Condition
36546986	9133/3-C50.8	Epithelioid hemangioendothelioma, NOS, of overlapping lesion of breast	ICDO Condition

Id	Code	Name	Class
36565450	9133/3-C50.2	Epithelioid hemangioendothelioma, NOS, of upper-inner quadrant of breast	ICDO Condition
36520108	9133/3-C50.4	Epithelioid hemangioendothelioma, NOS, of upper-outer quadrant of breast	ICDO Condition
36549912	8891/3-C50.6	Epithelioid leiomyosarcoma of axillary tail of breast	ICDO Condition
36548237	8891/3-C50.9	Epithelioid leiomyosarcoma of breast, NOS	ICDO Condition
36557388	8891/3-C50.1	Epithelioid leiomyosarcoma of central portion of breast	ICDO Condition
36539508	8891/3-C50.3	Epithelioid leiomyosarcoma of lower-inner quadrant of breast	ICDO Condition
36539936	8891/3-C50.5	Epithelioid leiomyosarcoma of lower-outer quadrant of breast	ICDO Condition
36525641	8891/3-C50.0	Epithelioid leiomyosarcoma of nipple	ICDO Condition
36564395	8891/3-C50.8	Epithelioid leiomyosarcoma of overlapping lesion of breast	ICDO Condition
36519466	8891/3-C50.2	Epithelioid leiomyosarcoma of upper-inner quadrant of breast	ICDO Condition
36546786	8891/3-C50.4	Epithelioid leiomyosarcoma of upper-outer quadrant of breast	ICDO Condition
36560036	8804/3-C50.6	Epithelioid sarcoma, NOS, of axillary tail of breast	ICDO Condition
36520318	8804/3-C50.9	Epithelioid sarcoma, NOS, of breast, NOS	ICDO Condition
36540393	8804/3-C50.1	Epithelioid sarcoma, NOS, of central portion of breast	ICDO Condition
36533124	8804/3-C50.3	Epithelioid sarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36532772	8804/3-C50.5	Epithelioid sarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36525676	8804/3-C50.0	Epithelioid sarcoma, NOS, of nipple	ICDO Condition
36536931	8804/3-C50.8	Epithelioid sarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36537312	8804/3-C50.2	Epithelioid sarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36546265	8804/3-C50.4	Epithelioid sarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36567892	8011/3-C50.6	Epithelioma, malignant of axillary tail of breast	ICDO Condition
36552908	8011/3-C50.9	Epithelioma, malignant of breast, NOS	ICDO Condition
36550208	8011/3-C50.1	Epithelioma, malignant of central portion of breast	ICDO Condition
36567185	8011/3-C50.3	Epithelioma, malignant of lower-inner quadrant of breast	ICDO Condition
36564823	8011/3-C50.5	Epithelioma, malignant of lower-outer quadrant of breast	ICDO Condition
36544024	8011/3-C50.0	Epithelioma, malignant of nipple	ICDO Condition
36542995	8011/3-C50.8	Epithelioma, malignant of overlapping lesion of breast	ICDO Condition
36525372	8011/3-C50.2	Epithelioma, malignant of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36527416	8011/3-C50.4	Epithelioma, malignant of upper-outer quadrant of breast	ICDO Condition
36524679	8813/3-C50.6	Fascial fibrosarcoma of axillary tail of breast	ICDO Condition
36560798	8813/3-C50.9	Fascial fibrosarcoma of breast, NOS	ICDO Condition
36520635	8813/3-C50.1	Fascial fibrosarcoma of central portion of breast	ICDO Condition
36558989	8813/3-C50.3	Fascial fibrosarcoma of lower-inner quadrant of breast	ICDO Condition
36546058	8813/3-C50.5	Fascial fibrosarcoma of lower-outer quadrant of breast	ICDO Condition
36564200	8813/3-C50.0	Fascial fibrosarcoma of nipple	ICDO Condition
36562364	8813/3-C50.8	Fascial fibrosarcoma of overlapping lesion of breast	ICDO Condition
36566406	8813/3-C50.2	Fascial fibrosarcoma of upper-inner quadrant of breast	ICDO Condition
36555370	8813/3-C50.4	Fascial fibrosarcoma of upper-outer quadrant of breast	ICDO Condition
36535389	8857/3-C50.6	Fibroblastic liposarcoma of axillary tail of breast	ICDO Condition
36560391	8857/3-C50.9	Fibroblastic liposarcoma of breast, NOS	ICDO Condition
36559860	8857/3-C50.1	Fibroblastic liposarcoma of central portion of breast	ICDO Condition
36547599	8857/3-C50.3	Fibroblastic liposarcoma of lower-inner quadrant of breast	ICDO Condition
36533446	8857/3-C50.5	Fibroblastic liposarcoma of lower-outer quadrant of breast	ICDO Condition
36553938	8857/3-C50.0	Fibroblastic liposarcoma of nipple	ICDO Condition
36536856	8857/3-C50.8	Fibroblastic liposarcoma of overlapping lesion of breast	ICDO Condition
36520287	8857/3-C50.2	Fibroblastic liposarcoma of upper-inner quadrant of breast	ICDO Condition
36549852	8857/3-C50.4	Fibroblastic liposarcoma of upper-outer quadrant of breast	ICDO Condition
36522923	8810/3-C50.6	Fibrosarcoma, NOS, of axillary tail of breast	ICDO Condition
36544998	8810/3-C50.9	Fibrosarcoma, NOS, of breast, NOS	ICDO Condition
36558564	8810/3-C50.1	Fibrosarcoma, NOS, of central portion of breast	ICDO Condition
36518395	8810/3-C50.3	Fibrosarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36556960	8810/3-C50.5	Fibrosarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36528520	8810/3-C50.0	Fibrosarcoma, NOS, of nipple	ICDO Condition
36546843	8810/3-C50.8	Fibrosarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36544595	8810/3-C50.2	Fibrosarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36567500	8810/3-C50.4	Fibrosarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36528664	8030/3-C50.6	Giant cell and spindle cell carcinoma of axillary tail of breast	ICDO Condition
36548595	8030/3-C50.9	Giant cell and spindle cell carcinoma of breast, NOS	ICDO Condition
36541277	8030/3-C50.1	Giant cell and spindle cell carcinoma of central portion of breast	ICDO Condition
36531282	8030/3-C50.3	Giant cell and spindle cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36553346	8030/3-C50.5	Giant cell and spindle cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36532695	8030/3-C50.0	Giant cell and spindle cell carcinoma of nipple	ICDO Condition
36533026	8030/3-C50.8	Giant cell and spindle cell carcinoma of overlapping lesion of breast	ICDO Condition
36547953	8030/3-C50.2	Giant cell and spindle cell carcinoma of upper-inner quadrant of breast	ICDO Condition
44501468	8030/3-C50.4	Giant cell and spindle cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36552843	8031/3-C50.6	Giant cell carcinoma of axillary tail of breast	ICDO Condition
36560382	8031/3-C50.9	Giant cell carcinoma of breast, NOS	ICDO Condition
36522493	8031/3-C50.1	Giant cell carcinoma of central portion of breast	ICDO Condition
36541774	8031/3-C50.3	Giant cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36538685	8031/3-C50.5	Giant cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36542372	8031/3-C50.0	Giant cell carcinoma of nipple	ICDO Condition
36520932	8031/3-C50.8	Giant cell carcinoma of overlapping lesion of breast	ICDO Condition
36559160	8031/3-C50.2	Giant cell carcinoma of upper-inner quadrant of breast	ICDO Condition
36523654	8031/3-C50.4	Giant cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36561865	8802/3-C50.6	Giant cell sarcoma of axillary tail of breast	ICDO Condition
44498972	8802/3-C50.9	Giant cell sarcoma of breast, NOS	ICDO Condition
36543764	8802/3-C50.1	Giant cell sarcoma of central portion of breast	ICDO Condition
36528697	8802/3-C50.3	Giant cell sarcoma of lower-inner quadrant of breast	ICDO Condition
36560414	8802/3-C50.5	Giant cell sarcoma of lower-outer quadrant of breast	ICDO Condition
36532451	8802/3-C50.0	Giant cell sarcoma of nipple	ICDO Condition
36552428	8802/3-C50.8	Giant cell sarcoma of overlapping lesion of breast	ICDO Condition
44502403	8802/3-C50.2	Giant cell sarcoma of upper-inner quadrant of breast	ICDO Condition
44501287	8802/3-C50.4	Giant cell sarcoma of upper-outer quadrant of breast	ICDO Condition
36540058	8015/3-C50.6	Glassy cell carcinoma of axillary tail of breast	ICDO Condition

Id	Code	Name	Class
36524742	8015/3-C50.9	Glassy cell carcinoma of breast, NOS	ICDO Condition
36533520	8015/3-C50.1	Glassy cell carcinoma of central portion of breast	ICDO Condition
36541577	8015/3-C50.3	Glassy cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36558210	8015/3-C50.5	Glassy cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36530498	8015/3-C50.0	Glassy cell carcinoma of nipple	ICDO Condition
36562136	8015/3-C50.8	Glassy cell carcinoma of overlapping lesion of breast	ICDO Condition
36551633	8015/3-C50.2	Glassy cell carcinoma of upper-inner quadrant of breast	ICDO Condition
36522382	8015/3-C50.4	Glassy cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36520334	8315/3-C50.6	Glycogen-rich carcinoma of axillary tail of breast	ICDO Condition
36543982	8315/3-C50.9	Glycogen-rich carcinoma of breast, NOS	ICDO Condition
36533162	8315/3-C50.1	Glycogen-rich carcinoma of central portion of breast	ICDO Condition
36551971	8315/3-C50.3	Glycogen-rich carcinoma of lower-inner quadrant of breast	ICDO Condition
36551983	8315/3-C50.5	Glycogen-rich carcinoma of lower-outer quadrant of breast	ICDO Condition
36564604	8315/3-C50.0	Glycogen-rich carcinoma of nipple	ICDO Condition
36567044	8315/3-C50.2	Glycogen-rich carcinoma of upper-inner quadrant of breast	ICDO Condition
36562515	8320/3-C50.6	Granular cell carcinoma of axillary tail of breast	ICDO Condition
36531629	8320/3-C50.9	Granular cell carcinoma of breast, NOS	ICDO Condition
36542024	8320/3-C50.1	Granular cell carcinoma of central portion of breast	ICDO Condition
36562723	8320/3-C50.3	Granular cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36553245	8320/3-C50.5	Granular cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36563848	8320/3-C50.0	Granular cell carcinoma of nipple	ICDO Condition
36549543	8320/3-C50.8	Granular cell carcinoma of overlapping lesion of breast	ICDO Condition
36550013	8320/3-C50.2	Granular cell carcinoma of upper-inner quadrant of breast	ICDO Condition
36567481	8320/3-C50.4	Granular cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36525967	9580/3-C50.6	Granular cell tumor, malignant of axillary tail of breast	ICDO Condition
36521129	9580/3-C50.9	Granular cell tumor, malignant of breast, NOS	ICDO Condition
36527310	9580/3-C50.1	Granular cell tumor, malignant of central portion of breast	ICDO Condition
36523631	9580/3-C50.3	Granular cell tumor, malignant of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36536981	9580/3-C50.5	Granular cell tumor, malignant of lower-outer quadrant of breast	ICDO Condition
36559780	9580/3-C50.0	Granular cell tumor, malignant of nipple	ICDO Condition
36531892	9580/3-C50.8	Granular cell tumor, malignant of overlapping lesion of breast	ICDO Condition
36550240	9580/3-C50.2	Granular cell tumor, malignant of upper-inner quadrant of breast	ICDO Condition
36541004	9580/3-C50.4	Granular cell tumor, malignant of upper-outer quadrant of breast	ICDO Condition
36526940	9130/3-C50.6	Hemangioendothelioma, malignant of axillary tail of breast	ICDO Condition
36543949	9130/3-C50.9	Hemangioendothelioma, malignant of breast, NOS	ICDO Condition
36534970	9130/3-C50.1	Hemangioendothelioma, malignant of central portion of breast	ICDO Condition
36566966	9130/3-C50.3	Hemangioendothelioma, malignant of lower-inner quadrant of breast	ICDO Condition
36532078	9130/3-C50.5	Hemangioendothelioma, malignant of lower-outer quadrant of breast	ICDO Condition
36549874	9130/3-C50.0	Hemangioendothelioma, malignant of nipple	ICDO Condition
36522831	9130/3-C50.8	Hemangioendothelioma, malignant of overlapping lesion of breast	ICDO Condition
36526309	9130/3-C50.2	Hemangioendothelioma, malignant of upper-inner quadrant of breast	ICDO Condition
36534268	9130/3-C50.4	Hemangioendothelioma, malignant of upper-outer quadrant of breast	ICDO Condition
36530311	9120/3-C50.6	Hemangiosarcoma of axillary tail of breast	ICDO Condition
36517806	9120/3-C50.0	Hemangiosarcoma of nipple	ICDO Condition
4142116	427685000	HER2-positive carcinoma of breast	Clinical Finding
37397555	718220008	Hereditary breast and ovarian cancer syndrome	Clinical Finding
4216891	417181009	Hormone receptor positive malignant neoplasm of breast	Clinical Finding
4330242	431396003	Human epidermal growth factor 2 negative carcinoma of breast	Clinical Finding
36529489	8814/3-C50.6	Infantile fibrosarcoma of axillary tail of breast	ICDO Condition
36524228	8814/3-C50.9	Infantile fibrosarcoma of breast, NOS	ICDO Condition
36523839	8814/3-C50.1	Infantile fibrosarcoma of central portion of breast	ICDO Condition
36522525	8814/3-C50.3	Infantile fibrosarcoma of lower-inner quadrant of breast	ICDO Condition
36556402	8814/3-C50.5	Infantile fibrosarcoma of lower-outer quadrant of breast	ICDO Condition
36561380	8814/3-C50.0	Infantile fibrosarcoma of nipple	ICDO Condition
36557850	8814/3-C50.8	Infantile fibrosarcoma of overlapping lesion of breast	ICDO Condition
36526578	8814/3-C50.2	Infantile fibrosarcoma of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36537553	8814/3-C50.4	Infantile fibrosarcoma of upper-outer quadrant of breast	ICDO Condition
37208322	1080091000119100	Infiltrating ductal carcinoma of axillary tail of left female breast	Clinical Finding
37208326	1080171000119100	Infiltrating ductal carcinoma of axillary tail of right female breast	Clinical Finding
4308306	422399001	Infiltrating ductal carcinoma of breast, stage 1	Clinical Finding
4310988	422479008	Infiltrating ductal carcinoma of breast, stage 2	Clinical Finding
4313043	423114009	Infiltrating ductal carcinoma of breast, stage 3	Clinical Finding
4310721	424229006	Infiltrating ductal carcinoma of breast, stage 4	Clinical Finding
36712719	1080151000119109	Infiltrating ductal carcinoma of upper inner quadrant of left female breast	Clinical Finding
36712722	1080231000119108	Infiltrating ductal carcinoma of upper inner quadrant of right female breast	Clinical Finding
36712720	1080161000119106	Infiltrating ductal carcinoma of upper outer quadrant of left female breast	Clinical Finding
36712723	1080241000119104	Infiltrating ductal carcinoma of upper outer quadrant of right female breast	Clinical Finding
36560602	8521/3-C50.6	Infiltrating ductular carcinoma of axillary tail of breast	ICDO Condition
36528584	8521/3-C50.1	Infiltrating ductular carcinoma of central portion of breast	ICDO Condition
36537097	8521/3-C50.3	Infiltrating ductular carcinoma of lower-inner quadrant of breast	ICDO Condition
36518332	8521/3-C50.0	Infiltrating ductular carcinoma of nipple	ICDO Condition
36523820	8524/3-C50.6	Infiltrating lobular mixed with other types of carcinoma of axillary tail of breast	ICDO Condition
36528635	8524/3-C50.0	Infiltrating lobular mixed with other types of carcinoma of nipple	ICDO Condition
36561082	8530/3-C50.6	Inflammatory carcinoma of axillary tail of breast	ICDO Condition
44501898	8530/3-C50.1	Inflammatory carcinoma of central portion of breast	ICDO Condition
44501093	8530/3-C50.3	Inflammatory carcinoma of lower-inner quadrant of breast	ICDO Condition
44501024	8530/3-C50.5	Inflammatory carcinoma of lower-outer quadrant of breast	ICDO Condition
44501583	8530/3-C50.0	Inflammatory carcinoma of nipple	ICDO Condition
44501220	8530/3-C50.2	Inflammatory carcinoma of upper-inner quadrant of breast	ICDO Condition
37017351	713609000	Invasive carcinoma of breast	Clinical Finding
36533269	8014/3-C50.6	Large cell carcinoma with rhabdoid phenotype of axillary tail of breast	ICDO Condition
36531399	8014/3-C50.9	Large cell carcinoma with rhabdoid phenotype of breast, NOS	ICDO Condition
36544559	8014/3-C50.1	Large cell carcinoma with rhabdoid phenotype of central portion of breast	ICDO Condition

Id	Code	Name	Class
36535414	8014/3-C50.3	Large cell carcinoma with rhabdoid phenotype of lower-inner quadrant of breast	ICDO Condition
36562047	8014/3-C50.5	Large cell carcinoma with rhabdoid phenotype of lower-outer quadrant of breast	ICDO Condition
36559859	8014/3-C50.0	Large cell carcinoma with rhabdoid phenotype of nipple	ICDO Condition
36561110	8014/3-C50.8	Large cell carcinoma with rhabdoid phenotype of overlapping lesion of breast	ICDO Condition
36549110	8014/3-C50.2	Large cell carcinoma with rhabdoid phenotype of upper-inner quadrant of breast	ICDO Condition
36540213	8014/3-C50.4	Large cell carcinoma with rhabdoid phenotype of upper-outer quadrant of breast	ICDO Condition
36541378	8012/3-C50.6	Large cell carcinoma, NOS, of axillary tail of breast	ICDO Condition
36522474	8012/3-C50.3	Large cell carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36520780	8012/3-C50.5	Large cell carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36522838	8012/3-C50.0	Large cell carcinoma, NOS, of nipple	ICDO Condition
36567173	8013/3-C50.6	Large cell neuroendocrine carcinoma of axillary tail of breast	ICDO Condition
36566968	8013/3-C50.9	Large cell neuroendocrine carcinoma of breast, NOS	ICDO Condition
36538145	8013/3-C50.1	Large cell neuroendocrine carcinoma of central portion of breast	ICDO Condition
36560911	8013/3-C50.3	Large cell neuroendocrine carcinoma of lower-inner quadrant of breast	ICDO Condition
36539856	8013/3-C50.5	Large cell neuroendocrine carcinoma of lower-outer quadrant of breast	ICDO Condition
36563615	8013/3-C50.0	Large cell neuroendocrine carcinoma of nipple	ICDO Condition
36562163	8013/3-C50.2	Large cell neuroendocrine carcinoma of upper-inner quadrant of breast	ICDO Condition
36518182	8890/3-C50.6	Leiomyosarcoma, NOS, of axillary tail of breast	ICDO Condition
36521409	8890/3-C50.9	Leiomyosarcoma, NOS, of breast, NOS	ICDO Condition
36522205	8890/3-C50.1	Leiomyosarcoma, NOS, of central portion of breast	ICDO Condition
36537192	8890/3-C50.3	Leiomyosarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36518251	8890/3-C50.5	Leiomyosarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36524088	8890/3-C50.0	Leiomyosarcoma, NOS, of nipple	ICDO Condition
44500213	8890/3-C50.2	Leiomyosarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36561070	8314/3-C50.6	Lipid-rich carcinoma of axillary tail of breast	ICDO Condition
36556710	8314/3-C50.9	Lipid-rich carcinoma of breast, NOS	ICDO Condition

Id	Code	Name	Class
36549616	8314/3-C50.1	Lipid-rich carcinoma of central portion of breast	ICDO Condition
36553876	8314/3-C50.3	Lipid-rich carcinoma of lower-inner quadrant of breast	ICDO Condition
36552738	8314/3-C50.5	Lipid-rich carcinoma of lower-outer quadrant of breast	ICDO Condition
36528685	8314/3-C50.0	Lipid-rich carcinoma of nipple	ICDO Condition
36550530	8314/3-C50.8	Lipid-rich carcinoma of overlapping lesion of breast	ICDO Condition
36554194	8314/3-C50.2	Lipid-rich carcinoma of upper-inner quadrant of breast	ICDO Condition
36563893	8314/3-C50.4	Lipid-rich carcinoma of upper-outer quadrant of breast	ICDO Condition
36549499	8850/3-C50.6	Liposarcoma, NOS, of axillary tail of breast	ICDO Condition
36547585	8850/3-C50.9	Liposarcoma, NOS, of breast, NOS	ICDO Condition
36534479	8850/3-C50.1	Liposarcoma, NOS, of central portion of breast	ICDO Condition
36529158	8850/3-C50.3	Liposarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36530938	8850/3-C50.5	Liposarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36565000	8850/3-C50.0	Liposarcoma, NOS, of nipple	ICDO Condition
36555561	8850/3-C50.8	Liposarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36557208	8850/3-C50.2	Liposarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36522987	8850/3-C50.4	Liposarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36535157	8851/3-C50.6	Liposarcoma, well differentiated, NOS, of axillary tail of breast	ICDO Condition
36532123	8851/3-C50.9	Liposarcoma, well differentiated, NOS, of breast, NOS	ICDO Condition
36522990	8851/3-C50.1	Liposarcoma, well differentiated, NOS, of central portion of breast	ICDO Condition
36528060	8851/3-C50.3	Liposarcoma, well differentiated, NOS, of lower-inner quadrant of breast	ICDO Condition
36523301	8851/3-C50.5	Liposarcoma, well differentiated, NOS, of lower-outer quadrant of breast	ICDO Condition
36541890	8851/3-C50.0	Liposarcoma, well differentiated, NOS, of nipple	ICDO Condition
36549739	8851/3-C50.8	Liposarcoma, well differentiated, NOS, of overlapping lesion of breast	ICDO Condition
36529416	8851/3-C50.2	Liposarcoma, well differentiated, NOS, of upper-inner quadrant of breast	ICDO Condition
36519517	8851/3-C50.4	Liposarcoma, well differentiated, NOS, of upper-outer quadrant of breast	ICDO Condition
4293714	403458008	Localized skin involvement by breast carcinoma	Clinical Finding
4091471	188168005	Malignant neoplasm of ectopic site of male breast	Clinical Finding
36517781	8005/3-C50.6	Malignant tumor, clear cell type of axillary tail of breast	ICDO Condition

Id	Code	Name	Class
36530347	8005/3-C50.9	Malignant tumor, clear cell type of breast, NOS	ICDO Condition
36549060	8005/3-C50.1	Malignant tumor, clear cell type of central portion of breast	ICDO Condition
36531444	8005/3-C50.3	Malignant tumor, clear cell type of lower-inner quadrant of breast	ICDO Condition
36526286	8005/3-C50.5	Malignant tumor, clear cell type of lower-outer quadrant of breast	ICDO Condition
36517509	8005/3-C50.0	Malignant tumor, clear cell type of nipple	ICDO Condition
36556569	8005/3-C50.8	Malignant tumor, clear cell type of overlapping lesion of breast	ICDO Condition
36533102	8005/3-C50.2	Malignant tumor, clear cell type of upper-inner quadrant of breast	ICDO Condition
36552981	8005/3-C50.4	Malignant tumor, clear cell type of upper-outer quadrant of breast	ICDO Condition
36535359	8003/3-C50.6	Malignant tumor, giant cell type of axillary tail of breast	ICDO Condition
36549561	8003/3-C50.9	Malignant tumor, giant cell type of breast, NOS	ICDO Condition
36555928	8003/3-C50.1	Malignant tumor, giant cell type of central portion of breast	ICDO Condition
36556912	8003/3-C50.3	Malignant tumor, giant cell type of lower-inner quadrant of breast	ICDO Condition
36531430	8003/3-C50.5	Malignant tumor, giant cell type of lower-outer quadrant of breast	ICDO Condition
36542809	8003/3-C50.0	Malignant tumor, giant cell type of nipple	ICDO Condition
36524703	8003/3-C50.8	Malignant tumor, giant cell type of overlapping lesion of breast	ICDO Condition
36532993	8003/3-C50.2	Malignant tumor, giant cell type of upper-inner quadrant of breast	ICDO Condition
36551499	8003/3-C50.4	Malignant tumor, giant cell type of upper-outer quadrant of breast	ICDO Condition
36565177	8002/3-C50.6	Malignant tumor, small cell type of axillary tail of breast	ICDO Condition
36560601	8002/3-C50.9	Malignant tumor, small cell type of breast, NOS	ICDO Condition
36537040	8002/3-C50.1	Malignant tumor, small cell type of central portion of breast	ICDO Condition
36525822	8002/3-C50.3	Malignant tumor, small cell type of lower-inner quadrant of breast	ICDO Condition
36551426	8002/3-C50.5	Malignant tumor, small cell type of lower-outer quadrant of breast	ICDO Condition
36556445	8002/3-C50.0	Malignant tumor, small cell type of nipple	ICDO Condition
36521324	8002/3-C50.8	Malignant tumor, small cell type of overlapping lesion of breast	ICDO Condition
36538787	8002/3-C50.2	Malignant tumor, small cell type of upper-inner quadrant of breast	ICDO Condition
36518762	8002/3-C50.4	Malignant tumor, small cell type of upper-outer quadrant of breast	ICDO Condition
36528591	8004/3-C50.6	Malignant tumor, spindle cell type of axillary tail of breast	ICDO Condition
36553720	8004/3-C50.9	Malignant tumor, spindle cell type of breast, NOS	ICDO Condition

Id	Code	Name	Class
36530382	8004/3-C50.1	Malignant tumor, spindle cell type of central portion of breast	ICDO Condition
36560955	8004/3-C50.3	Malignant tumor, spindle cell type of lower-inner quadrant of breast	ICDO Condition
36559682	8004/3-C50.5	Malignant tumor, spindle cell type of lower-outer quadrant of breast	ICDO Condition
36547138	8004/3-C50.0	Malignant tumor, spindle cell type of nipple	ICDO Condition
36554336	8004/3-C50.8	Malignant tumor, spindle cell type of overlapping lesion of breast	ICDO Condition
36566465	8004/3-C50.2	Malignant tumor, spindle cell type of upper-inner quadrant of breast	ICDO Condition
36553232	8004/3-C50.4	Malignant tumor, spindle cell type of upper-outer quadrant of breast	ICDO Condition
42512581	8511/3-C50.9	Medullary carcinoma with amyloid stroma (ICD-O-2) of breast, NOS	ICDO Condition
36549055	8512/3-C50.6	Medullary carcinoma with lymphoid stroma of axillary tail of breast	ICDO Condition
36529963	8512/3-C50.9	Medullary carcinoma with lymphoid stroma of breast, NOS	ICDO Condition
36546913	8512/3-C50.1	Medullary carcinoma with lymphoid stroma of central portion of breast	ICDO Condition
36522605	8512/3-C50.0	Medullary carcinoma with lymphoid stroma of nipple	ICDO Condition
36553527	8510/3-C50.0	Medullary carcinoma, NOS, of nipple	ICDO Condition
36541149	8247/3-C50.8	Merkel cell carcinoma of overlapping lesion of breast	ICDO Condition
36552745	8990/3-C50.6	Mesenchymoma, malignant of axillary tail of breast	ICDO Condition
36550276	8990/3-C50.9	Mesenchymoma, malignant of breast, NOS	ICDO Condition
36542663	8990/3-C50.1	Mesenchymoma, malignant of central portion of breast	ICDO Condition
36561524	8990/3-C50.3	Mesenchymoma, malignant of lower-inner quadrant of breast	ICDO Condition
36524477	8990/3-C50.5	Mesenchymoma, malignant of lower-outer quadrant of breast	ICDO Condition
36523859	8990/3-C50.0	Mesenchymoma, malignant of nipple	ICDO Condition
36523976	8990/3-C50.8	Mesenchymoma, malignant of overlapping lesion of breast	ICDO Condition
36519661	8990/3-C50.2	Mesenchymoma, malignant of upper-inner quadrant of breast	ICDO Condition
36533084	8990/3-C50.4	Mesenchymoma, malignant of upper-outer quadrant of breast	ICDO Condition
36522830	8323/3-C50.6	Mixed cell adenocarcinoma of axillary tail of breast	ICDO Condition
36529409	8323/3-C50.9	Mixed cell adenocarcinoma of breast, NOS	ICDO Condition
36565348	8323/3-C50.1	Mixed cell adenocarcinoma of central portion of breast	ICDO Condition
36542692	8323/3-C50.3	Mixed cell adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36520531	8323/3-C50.5	Mixed cell adenocarcinoma of lower-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36556222	8323/3-C50.0	Mixed cell adenocarcinoma of nipple	ICDO Condition
36527144	8323/3-C50.8	Mixed cell adenocarcinoma of overlapping lesion of breast	ICDO Condition
36562423	8323/3-C50.2	Mixed cell adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36533612	8323/3-C50.4	Mixed cell adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36557811	8855/3-C50.6	Mixed liposarcoma of axillary tail of breast	ICDO Condition
36527783	8855/3-C50.9	Mixed liposarcoma of breast, NOS	ICDO Condition
36563581	8855/3-C50.1	Mixed liposarcoma of central portion of breast	ICDO Condition
36565702	8855/3-C50.3	Mixed liposarcoma of lower-inner quadrant of breast	ICDO Condition
36544564	8855/3-C50.5	Mixed liposarcoma of lower-outer quadrant of breast	ICDO Condition
36554750	8855/3-C50.0	Mixed liposarcoma of nipple	ICDO Condition
36563350	8855/3-C50.8	Mixed liposarcoma of overlapping lesion of breast	ICDO Condition
36518080	8855/3-C50.2	Mixed liposarcoma of upper-inner quadrant of breast	ICDO Condition
36541217	8855/3-C50.4	Mixed liposarcoma of upper-outer quadrant of breast	ICDO Condition
42512327	8154/3-C50.5	Mixed neuroendocrine non-neuroendocrine neoplasm (MiNEN) of lower-outer quadrant of breast	ICDO Condition
36517460	8481/3-C50.0	Mucin-producing adenocarcinoma of nipple	ICDO Condition
36524938	8470/3-C50.6	Mucinous cystadenocarcinoma, NOS, of axillary tail of breast	ICDO Condition
36522650	8470/3-C50.9	Mucinous cystadenocarcinoma, NOS, of breast, NOS	ICDO Condition
36524556	8470/3-C50.1	Mucinous cystadenocarcinoma, NOS, of central portion of breast	ICDO Condition
36527646	8470/3-C50.3	Mucinous cystadenocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36537129	8470/3-C50.5	Mucinous cystadenocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36517515	8470/3-C50.0	Mucinous cystadenocarcinoma, NOS, of nipple	ICDO Condition
36562161	8470/3-C50.8	Mucinous cystadenocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36554193	8470/3-C50.2	Mucinous cystadenocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36526076	8470/3-C50.4	Mucinous cystadenocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
1553390	8430/3-C50.9	Mucoepidermoid carcinoma of breast, NOS	ICDO Condition
36544172	8982/3-C50.6	Myoepithelial carcinoma of axillary tail of breast	ICDO Condition
36542378	8982/3-C50.9	Myoepithelial carcinoma of breast, NOS	ICDO Condition

Id	Code	Name	Class
36549581	8982/3-C50.1	Myoepithelial carcinoma of central portion of breast	ICDO Condition
36545829	8982/3-C50.3	Myoepithelial carcinoma of lower-inner quadrant of breast	ICDO Condition
36538039	8982/3-C50.0	Myoepithelial carcinoma of nipple	ICDO Condition
36555848	8982/3-C50.2	Myoepithelial carcinoma of upper-inner quadrant of breast	ICDO Condition
42511999	8825/3-C50.6	Myofibroblastic sarcoma of axillary tail of breast	ICDO Condition
42512037	8825/3-C50.9	Myofibroblastic sarcoma of breast, NOS	ICDO Condition
42512742	8825/3-C50.1	Myofibroblastic sarcoma of central portion of breast	ICDO Condition
42512085	8825/3-C50.3	Myofibroblastic sarcoma of lower-inner quadrant of breast	ICDO Condition
42512653	8825/3-C50.5	Myofibroblastic sarcoma of lower-outer quadrant of breast	ICDO Condition
42512503	8825/3-C50.0	Myofibroblastic sarcoma of nipple	ICDO Condition
42512759	8825/3-C50.8	Myofibroblastic sarcoma of overlapping lesion of breast	ICDO Condition
36402607	8825/3-C50.2	Myofibroblastic sarcoma of upper-inner quadrant of breast	ICDO Condition
42511622	8825/3-C50.4	Myofibroblastic sarcoma of upper-outer quadrant of breast	ICDO Condition
36545749	8895/3-C50.6	Myosarcoma of axillary tail of breast	ICDO Condition
36525023	8895/3-C50.9	Myosarcoma of breast, NOS	ICDO Condition
36561034	8895/3-C50.1	Myosarcoma of central portion of breast	ICDO Condition
36567378	8895/3-C50.3	Myosarcoma of lower-inner quadrant of breast	ICDO Condition
36518379	8895/3-C50.5	Myosarcoma of lower-outer quadrant of breast	ICDO Condition
36538776	8895/3-C50.0	Myosarcoma of nipple	ICDO Condition
36529340	8895/3-C50.8	Myosarcoma of overlapping lesion of breast	ICDO Condition
36533703	8895/3-C50.2	Myosarcoma of upper-inner quadrant of breast	ICDO Condition
36519452	8895/3-C50.4	Myosarcoma of upper-outer quadrant of breast	ICDO Condition
36558767	8811/3-C50.6	Myxofibrosarcoma of axillary tail of breast	ICDO Condition
36540040	8811/3-C50.9	Myxofibrosarcoma of breast, NOS	ICDO Condition
36540561	8811/3-C50.1	Myxofibrosarcoma of central portion of breast	ICDO Condition
36537764	8811/3-C50.3	Myxofibrosarcoma of lower-inner quadrant of breast	ICDO Condition
36541919	8811/3-C50.5	Myxofibrosarcoma of lower-outer quadrant of breast	ICDO Condition
36525707	8811/3-C50.0	Myxofibrosarcoma of nipple	ICDO Condition

Id	Code	Name	Class
36548606	8811/3-C50.8	Myxofibrosarcoma of overlapping lesion of breast	ICDO Condition
36562692	8811/3-C50.2	Myxofibrosarcoma of upper-inner quadrant of breast	ICDO Condition
36554403	8811/3-C50.4	Myxofibrosarcoma of upper-outer quadrant of breast	ICDO Condition
36545870	8896/3-C50.6	Myxoid leiomyosarcoma of axillary tail of breast	ICDO Condition
36559313	8896/3-C50.9	Myxoid leiomyosarcoma of breast, NOS	ICDO Condition
36562822	8896/3-C50.1	Myxoid leiomyosarcoma of central portion of breast	ICDO Condition
36519123	8896/3-C50.3	Myxoid leiomyosarcoma of lower-inner quadrant of breast	ICDO Condition
36555597	8896/3-C50.5	Myxoid leiomyosarcoma of lower-outer quadrant of breast	ICDO Condition
36564713	8896/3-C50.0	Myxoid leiomyosarcoma of nipple	ICDO Condition
36527762	8896/3-C50.8	Myxoid leiomyosarcoma of overlapping lesion of breast	ICDO Condition
36526087	8896/3-C50.2	Myxoid leiomyosarcoma of upper-inner quadrant of breast	ICDO Condition
36553380	8896/3-C50.4	Myxoid leiomyosarcoma of upper-outer quadrant of breast	ICDO Condition
36547106	8852/3-C50.6	Myxoid liposarcoma of axillary tail of breast	ICDO Condition
44499760	8852/3-C50.9	Myxoid liposarcoma of breast, NOS	ICDO Condition
36566242	8852/3-C50.1	Myxoid liposarcoma of central portion of breast	ICDO Condition
36564468	8852/3-C50.3	Myxoid liposarcoma of lower-inner quadrant of breast	ICDO Condition
36528424	8852/3-C50.5	Myxoid liposarcoma of lower-outer quadrant of breast	ICDO Condition
36530388	8852/3-C50.0	Myxoid liposarcoma of nipple	ICDO Condition
36531951	8852/3-C50.8	Myxoid liposarcoma of overlapping lesion of breast	ICDO Condition
36545414	8852/3-C50.2	Myxoid liposarcoma of upper-inner quadrant of breast	ICDO Condition
44500746	8852/3-C50.4	Myxoid liposarcoma of upper-outer quadrant of breast	ICDO Condition
36529381	8246/3-C50.6	Neuroendocrine carcinoma, NOS, of axillary tail of breast	ICDO Condition
36522453	8246/3-C50.1	Neuroendocrine carcinoma, NOS, of central portion of breast	ICDO Condition
36532906	8246/3-C50.3	Neuroendocrine carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36534320	8246/3-C50.5	Neuroendocrine carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36530356	8246/3-C50.0	Neuroendocrine carcinoma, NOS, of nipple	ICDO Condition
36520875	8246/3-C50.8	Neuroendocrine carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36537327	8246/3-C50.2	Neuroendocrine carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
44502228	8240/3-C50.9	Neuroendocrine tumor, NOS, of breast, NOS	ICDO Condition
44500293	8240/3-C50.5	Neuroendocrine tumor, NOS, of lower-outer quadrant of breast	ICDO Condition
44501832	8046/3-C50.5	Non-small cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36518120	8290/3-C50.6	Oxyphilic adenocarcinoma of axillary tail of breast	ICDO Condition
36545241	8290/3-C50.9	Oxyphilic adenocarcinoma of breast, NOS	ICDO Condition
36556030	8290/3-C50.1	Oxyphilic adenocarcinoma of central portion of breast	ICDO Condition
36526057	8290/3-C50.3	Oxyphilic adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36522006	8290/3-C50.5	Oxyphilic adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36557321	8290/3-C50.0	Oxyphilic adenocarcinoma of nipple	ICDO Condition
36517852	8290/3-C50.8	Oxyphilic adenocarcinoma of overlapping lesion of breast	ICDO Condition
36554142	8290/3-C50.2	Oxyphilic adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36526784	8290/3-C50.4	Oxyphilic adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36543350	8541/3-C50.6	Paget disease and infiltrating duct carcinoma of breast of axillary tail of breast	ICDO Condition
36554778	8543/3-C50.6	Paget disease and intraductal carcinoma of breast of axillary tail of breast	ICDO Condition
44499975	8543/3-C50.3	Paget disease and intraductal carcinoma of breast of lower-inner quadrant of breast	ICDO Condition
36554022	8543/3-C50.5	Paget disease and intraductal carcinoma of breast of lower-outer quadrant of breast	ICDO Condition
36551819	8543/3-C50.2	Paget disease and intraductal carcinoma of breast of upper-inner quadrant of breast	ICDO Condition
44502291	8543/3-C50.4	Paget disease and intraductal carcinoma of breast of upper-outer quadrant of breast	ICDO Condition
36554287	8540/3-C50.6	Paget disease, mammary of axillary tail of breast	ICDO Condition
44502829	8540/3-C50.1	Paget disease, mammary of central portion of breast	ICDO Condition
36519367	8540/3-C50.3	Paget disease, mammary of lower-inner quadrant of breast	ICDO Condition
44498966	8540/3-C50.5	Paget disease, mammary of lower-outer quadrant of breast	ICDO Condition
44499516	8540/3-C50.2	Paget disease, mammary of upper-inner quadrant of breast	ICDO Condition
44501584	8540/3-C50.4	Paget disease, mammary of upper-outer quadrant of breast	ICDO Condition
36523418	8260/3-C50.6	Papillary adenocarcinoma, NOS, of axillary tail of breast	ICDO Condition
44499545	8260/3-C50.9	Papillary adenocarcinoma, NOS, of breast, NOS	ICDO Condition

Id	Code	Name	Class
36541626	8260/3-C50.1	Papillary adenocarcinoma, NOS, of central portion of breast	ICDO Condition
44502944	8260/3-C50.3	Papillary adenocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36563435	8260/3-C50.5	Papillary adenocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36551065	8260/3-C50.8	Papillary adenocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44501572	8260/3-C50.2	Papillary adenocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44499506	8260/3-C50.4	Papillary adenocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36402624	8343/2-C50.1	Papillary carcinoma, metastatic site of central portion of breast	ICDO Condition
36402560	8343/2-C50.5	Papillary carcinoma, metastatic site of lower-outer quadrant of breast	ICDO Condition
36402476	8343/2-C50.4	Papillary carcinoma, metastatic site of upper-outer quadrant of breast	ICDO Condition
44500428	8050/3-C50.6	Papillary carcinoma, NOS, of axillary tail of breast	ICDO Condition
44499008	8050/3-C50.1	Papillary carcinoma, NOS, of central portion of breast	ICDO Condition
36523039	8050/3-C50.3	Papillary carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
44500632	8050/3-C50.5	Papillary carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
44502215	8050/3-C50.2	Papillary carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44503195	8050/3-C50.4	Papillary carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36527105	8052/3-C50.6	Papillary squamous cell carcinoma of axillary tail of breast	ICDO Condition
36536913	8052/3-C50.9	Papillary squamous cell carcinoma of breast, NOS	ICDO Condition
36557335	8052/3-C50.1	Papillary squamous cell carcinoma of central portion of breast	ICDO Condition
36552277	8052/3-C50.3	Papillary squamous cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36530333	8052/3-C50.5	Papillary squamous cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36540867	8052/3-C50.0	Papillary squamous cell carcinoma of nipple	ICDO Condition
36564394	8052/3-C50.8	Papillary squamous cell carcinoma of overlapping lesion of breast	ICDO Condition
36529041	8052/3-C50.2	Papillary squamous cell carcinoma of upper-inner quadrant of breast	ICDO Condition
36529833	8052/3-C50.4	Papillary squamous cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36536731	9020/3-C50.6	Phyllodes tumor, malignant of axillary tail of breast	ICDO Condition
36567530	8022/3-C50.6	Pleomorphic carcinoma of axillary tail of breast	ICDO Condition
44502601	8022/3-C50.9	Pleomorphic carcinoma of breast, NOS	ICDO Condition
36523128	8022/3-C50.1	Pleomorphic carcinoma of central portion of breast	ICDO Condition

Id	Code	Name	Class
36546214	8022/3-C50.3	Pleomorphic carcinoma of lower-inner quadrant of breast	ICDO Condition
36559115	8022/3-C50.5	Pleomorphic carcinoma of lower-outer quadrant of breast	ICDO Condition
36534279	8022/3-C50.0	Pleomorphic carcinoma of nipple	ICDO Condition
36548692	8022/3-C50.8	Pleomorphic carcinoma of overlapping lesion of breast	ICDO Condition
36530207	8022/3-C50.2	Pleomorphic carcinoma of upper-inner quadrant of breast	ICDO Condition
44500974	8022/3-C50.4	Pleomorphic carcinoma of upper-outer quadrant of breast	ICDO Condition
36539108	8854/3-C50.6	Pleomorphic liposarcoma of axillary tail of breast	ICDO Condition
36541294	8854/3-C50.9	Pleomorphic liposarcoma of breast, NOS	ICDO Condition
36541542	8854/3-C50.1	Pleomorphic liposarcoma of central portion of breast	ICDO Condition
36534032	8854/3-C50.3	Pleomorphic liposarcoma of lower-inner quadrant of breast	ICDO Condition
36562005	8854/3-C50.5	Pleomorphic liposarcoma of lower-outer quadrant of breast	ICDO Condition
36548236	8854/3-C50.0	Pleomorphic liposarcoma of nipple	ICDO Condition
36529460	8854/3-C50.8	Pleomorphic liposarcoma of overlapping lesion of breast	ICDO Condition
36543320	8854/3-C50.2	Pleomorphic liposarcoma of upper-inner quadrant of breast	ICDO Condition
36541395	8854/3-C50.4	Pleomorphic liposarcoma of upper-outer quadrant of breast	ICDO Condition
36547460	8034/3-C50.6	Polygonal cell carcinoma of axillary tail of breast	ICDO Condition
36552748	8034/3-C50.9	Polygonal cell carcinoma of breast, NOS	ICDO Condition
36535967	8034/3-C50.1	Polygonal cell carcinoma of central portion of breast	ICDO Condition
36523687	8034/3-C50.3	Polygonal cell carcinoma of lower-inner quadrant of breast	ICDO Condition
36545339	8034/3-C50.5	Polygonal cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36526585	8034/3-C50.0	Polygonal cell carcinoma of nipple	ICDO Condition
36558722	8034/3-C50.8	Polygonal cell carcinoma of overlapping lesion of breast	ICDO Condition
36527249	8034/3-C50.2	Polygonal cell carcinoma of upper-inner quadrant of breast	ICDO Condition
36536562	8034/3-C50.4	Polygonal cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36549527	8525/3-C50.6	Polymorphous adenocarcinoma of axillary tail of breast	ICDO Condition
36553823	8525/3-C50.9	Polymorphous adenocarcinoma of breast, NOS	ICDO Condition
36522024	8525/3-C50.1	Polymorphous adenocarcinoma of central portion of breast	ICDO Condition
36527079	8525/3-C50.3	Polymorphous adenocarcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36524341	8525/3-C50.5	Polymorphous adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36531090	8525/3-C50.0	Polymorphous adenocarcinoma of nipple	ICDO Condition
36517791	8525/3-C50.8	Polymorphous adenocarcinoma of overlapping lesion of breast	ICDO Condition
36531418	8525/3-C50.2	Polymorphous adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36541123	8525/3-C50.4	Polymorphous adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
608891	15950141000119105	Primary basal cell carcinoma of skin of left breast	Clinical Finding
608890	15950101000119108	Primary basal cell carcinoma of skin of right breast	Clinical Finding
37016439	45221000119105	Primary invasive malignant neoplasm of female breast	Clinical Finding
36716497	722524005	Primary invasive pleomorphic lobular carcinoma of breast	Clinical Finding
37018660	96291000119105	Primary malignant inflammatory neoplasm of female breast	Clinical Finding
436050	93681000	Primary malignant neoplasm of areola of male breast	Clinical Finding
36712934	15635801000119106	Primary malignant neoplasm of bilateral female breasts	Clinical Finding
36684819	353441000119103	Primary malignant neoplasm of central portion of female left breast	Clinical Finding
36684821	353521000119108	Primary malignant neoplasm of central portion of female right breast	Clinical Finding
4246036	93776002	Primary malignant neoplasm of ectopic female breast tissue	Clinical Finding
4246810	93777006	Primary malignant neoplasm of ectopic male breast tissue	Clinical Finding
36684818	353431000119107	Primary malignant neoplasm of female left breast	Clinical Finding
765123	353511000119101	Primary malignant neoplasm of female right breast	Clinical Finding
37208047	354491000119109	Primary malignant neoplasm of left male breast	Clinical Finding
37208048	354591000119108	Primary malignant neoplasm of right male breast	Clinical Finding
608892	15950221000119108	Primary malignant neoplasm of skin of left breast	Clinical Finding
608889	15950061000119105	Primary malignant neoplasm of skin of right breast	Clinical Finding
608887	15949941000119101	Primary squamous cell carcinoma of skin of left breast	Clinical Finding
608888	15950021000119100	Primary squamous cell carcinoma of skin of right breast	Clinical Finding
36559188	8033/3-C50.6	Pseudosarcomatous carcinoma of axillary tail of breast	ICDO Condition
44501469	8033/3-C50.9	Pseudosarcomatous carcinoma of breast, NOS	ICDO Condition
36562806	8033/3-C50.1	Pseudosarcomatous carcinoma of central portion of breast	ICDO Condition
36567470	8033/3-C50.3	Pseudosarcomatous carcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36531481	8033/3-C50.5	Pseudosarcomatous carcinoma of lower-outer quadrant of breast	ICDO Condition
36557230	8033/3-C50.0	Pseudosarcomatous carcinoma of nipple	ICDO Condition
36560656	8033/3-C50.8	Pseudosarcomatous carcinoma of overlapping lesion of breast	ICDO Condition
36524836	8033/3-C50.2	Pseudosarcomatous carcinoma of upper-inner quadrant of breast	ICDO Condition
36537380	8900/3-C50.6	Rhabdomyosarcoma, NOS, of axillary tail of breast	ICDO Condition
36554624	8900/3-C50.9	Rhabdomyosarcoma, NOS, of breast, NOS	ICDO Condition
36517986	8900/3-C50.1	Rhabdomyosarcoma, NOS, of central portion of breast	ICDO Condition
36553856	8900/3-C50.3	Rhabdomyosarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36550130	8900/3-C50.5	Rhabdomyosarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36531426	8900/3-C50.0	Rhabdomyosarcoma, NOS, of nipple	ICDO Condition
36567767	8900/3-C50.8	Rhabdomyosarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36520106	8900/3-C50.2	Rhabdomyosarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36518026	8900/3-C50.4	Rhabdomyosarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36519163	8853/3-C50.6	Round cell liposarcoma of axillary tail of breast	ICDO Condition
36529125	8853/3-C50.9	Round cell liposarcoma of breast, NOS	ICDO Condition
36537336	8853/3-C50.1	Round cell liposarcoma of central portion of breast	ICDO Condition
36528830	8853/3-C50.3	Round cell liposarcoma of lower-inner quadrant of breast	ICDO Condition
36527189	8853/3-C50.5	Round cell liposarcoma of lower-outer quadrant of breast	ICDO Condition
36527177	8853/3-C50.0	Round cell liposarcoma of nipple	ICDO Condition
36560152	8853/3-C50.8	Round cell liposarcoma of overlapping lesion of breast	ICDO Condition
36533618	8853/3-C50.2	Round cell liposarcoma of upper-inner quadrant of breast	ICDO Condition
36566288	8853/3-C50.4	Round cell liposarcoma of upper-outer quadrant of breast	ICDO Condition
40489927	448435005	Sarcoma lower inner quadrant of female breast	Clinical Finding
40486565	447784001	Sarcoma of axillary tail of female breast	Clinical Finding
40489928	448436006	Sarcoma of central portion of female breast	Clinical Finding
40489942	448449001	Sarcoma of female breast	Clinical Finding
40489485	448388003	Sarcoma of lower outer quadrant of female breast	Clinical Finding
40488945	448257000	Sarcoma of male breast	Clinical Finding

Id	Code	Name	Class
40489897	448408001	Sarcoma of upper inner quadrant of female breast	Clinical Finding
40489945	448451002	Sarcoma upper outer quadrant of female breast	Clinical Finding
36528514	8800/3-C50.6	Sarcoma, NOS, of axillary tail of breast	ICDO Condition
36535284	8800/3-C50.1	Sarcoma, NOS, of central portion of breast	ICDO Condition
44502788	8800/3-C50.3	Sarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36547608	8800/3-C50.5	Sarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36557226	8800/3-C50.0	Sarcoma, NOS, of nipple	ICDO Condition
36554475	8800/3-C50.2	Sarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44500243	8141/3-C50.6	Scirrhous adenocarcinoma of axillary tail of breast	ICDO Condition
44505312	8141/3-C50.9	Scirrhous adenocarcinoma of breast, NOS	ICDO Condition
44502224	8141/3-C50.3	Scirrhous adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
44500441	8141/3-C50.0	Scirrhous adenocarcinoma of nipple	ICDO Condition
4112073	254839007	Scirrhous carcinoma of breast	Clinical Finding
36554770	8410/3-C50.6	Sebaceous carcinoma of axillary tail of breast	ICDO Condition
36518732	8410/3-C50.9	Sebaceous carcinoma of breast, NOS	ICDO Condition
36537176	8410/3-C50.1	Sebaceous carcinoma of central portion of breast	ICDO Condition
36527956	8410/3-C50.3	Sebaceous carcinoma of lower-inner quadrant of breast	ICDO Condition
36534450	8410/3-C50.5	Sebaceous carcinoma of lower-outer quadrant of breast	ICDO Condition
36560055	8410/3-C50.0	Sebaceous carcinoma of nipple	ICDO Condition
36555608	8410/3-C50.8	Sebaceous carcinoma of overlapping lesion of breast	ICDO Condition
36526572	8410/3-C50.2	Sebaceous carcinoma of upper-inner quadrant of breast	ICDO Condition
36517616	8410/3-C50.4	Sebaceous carcinoma of upper-outer quadrant of breast	ICDO Condition
36567251	8502/3-C50.6	Secretory carcinoma of axillary tail of breast	ICDO Condition
44502032	8502/3-C50.9	Secretory carcinoma of breast, NOS	ICDO Condition
36559168	8502/3-C50.1	Secretory carcinoma of central portion of breast	ICDO Condition
36535215	8502/3-C50.3	Secretory carcinoma of lower-inner quadrant of breast	ICDO Condition
44501091	8502/3-C50.5	Secretory carcinoma of lower-outer quadrant of breast	ICDO Condition
36530409	8502/3-C50.0	Secretory carcinoma of nipple	ICDO Condition

Id	Code	Name	Class
36535892	8502/3-C50.8	Secretory carcinoma of overlapping lesion of breast	ICDO Condition
44502448	8502/3-C50.2	Secretory carcinoma of upper-inner quadrant of breast	ICDO Condition
36541968	8490/3-C50.6	Signet ring cell carcinoma of axillary tail of breast	ICDO Condition
36525331	8490/3-C50.3	Signet ring cell carcinoma of lower-inner quadrant of breast	ICDO Condition
44499651	8490/3-C50.5	Signet ring cell carcinoma of lower-outer quadrant of breast	ICDO Condition
36518802	8490/3-C50.0	Signet ring cell carcinoma of nipple	ICDO Condition
36534192	8043/3-C50.6	Small cell carcinoma, fusiform cell of axillary tail of breast	ICDO Condition
36519482	8043/3-C50.9	Small cell carcinoma, fusiform cell of breast, NOS	ICDO Condition
36517160	8043/3-C50.1	Small cell carcinoma, fusiform cell of central portion of breast	ICDO Condition
36544560	8043/3-C50.3	Small cell carcinoma, fusiform cell of lower-inner quadrant of breast	ICDO Condition
36556455	8043/3-C50.5	Small cell carcinoma, fusiform cell of lower-outer quadrant of breast	ICDO Condition
36538093	8043/3-C50.0	Small cell carcinoma, fusiform cell of nipple	ICDO Condition
36523967	8043/3-C50.8	Small cell carcinoma, fusiform cell of overlapping lesion of breast	ICDO Condition
36535115	8043/3-C50.2	Small cell carcinoma, fusiform cell of upper-inner quadrant of breast	ICDO Condition
36557767	8043/3-C50.4	Small cell carcinoma, fusiform cell of upper-outer quadrant of breast	ICDO Condition
36552490	8041/3-C50.6	Small cell carcinoma, NOS, of axillary tail of breast	ICDO Condition
44503003	8041/3-C50.9	Small cell carcinoma, NOS, of breast, NOS	ICDO Condition
44501831	8041/3-C50.1	Small cell carcinoma, NOS, of central portion of breast	ICDO Condition
36528242	8041/3-C50.3	Small cell carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36524153	8041/3-C50.5	Small cell carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36546405	8041/3-C50.0	Small cell carcinoma, NOS, of nipple	ICDO Condition
36529555	8803/3-C50.6	Small cell sarcoma of axillary tail of breast	ICDO Condition
36534384	8803/3-C50.9	Small cell sarcoma of breast, NOS	ICDO Condition
36543041	8803/3-C50.1	Small cell sarcoma of central portion of breast	ICDO Condition
36529672	8803/3-C50.3	Small cell sarcoma of lower-inner quadrant of breast	ICDO Condition
36531630	8803/3-C50.5	Small cell sarcoma of lower-outer quadrant of breast	ICDO Condition
36520783	8803/3-C50.0	Small cell sarcoma of nipple	ICDO Condition
36518015	8803/3-C50.8	Small cell sarcoma of overlapping lesion of breast	ICDO Condition

Id	Code	Name	Class
36537111	8803/3-C50.2	Small cell sarcoma of upper-inner quadrant of breast	ICDO Condition
36563260	8803/3-C50.4	Small cell sarcoma of upper-outer quadrant of breast	ICDO Condition
36538977	8230/3-C50.6	Solid carcinoma, NOS, of axillary tail of breast	ICDO Condition
36564142	8230/3-C50.9	Solid carcinoma, NOS, of breast, NOS	ICDO Condition
44501139	8230/3-C50.1	Solid carcinoma, NOS, of central portion of breast	ICDO Condition
44501636	8230/3-C50.3	Solid carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36520166	8230/3-C50.5	Solid carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36522135	8230/3-C50.0	Solid carcinoma, NOS, of nipple	ICDO Condition
42512871	8509/3-C50.6	Solid papillary carcinoma with invasion of axillary tail of breast	ICDO Condition
42512881	8509/3-C50.0	Solid papillary carcinoma with invasion of nipple	ICDO Condition
36527665	8815/3-C50.6	Solitary fibrous tumor, malignant of axillary tail of breast	ICDO Condition
36530384	8815/3-C50.9	Solitary fibrous tumor, malignant of breast, NOS	ICDO Condition
36540725	8815/3-C50.1	Solitary fibrous tumor, malignant of central portion of breast	ICDO Condition
36567407	8815/3-C50.3	Solitary fibrous tumor, malignant of lower-inner quadrant of breast	ICDO Condition
36549234	8815/3-C50.5	Solitary fibrous tumor, malignant of lower-outer quadrant of breast	ICDO Condition
36538045	8815/3-C50.0	Solitary fibrous tumor, malignant of nipple	ICDO Condition
36565102	8815/3-C50.8	Solitary fibrous tumor, malignant of overlapping lesion of breast	ICDO Condition
36560753	8815/3-C50.2	Solitary fibrous tumor, malignant of upper-inner quadrant of breast	ICDO Condition
36540833	8815/3-C50.4	Solitary fibrous tumor, malignant of upper-outer quadrant of breast	ICDO Condition
36542375	8032/3-C50.6	Spindle cell carcinoma, NOS, of axillary tail of breast	ICDO Condition
44503001	8032/3-C50.9	Spindle cell carcinoma, NOS, of breast, NOS	ICDO Condition
36556416	8032/3-C50.1	Spindle cell carcinoma, NOS, of central portion of breast	ICDO Condition
36553819	8032/3-C50.3	Spindle cell carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36549647	8032/3-C50.5	Spindle cell carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36550807	8032/3-C50.0	Spindle cell carcinoma, NOS, of nipple	ICDO Condition
44500482	8032/3-C50.2	Spindle cell carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44499867	8032/3-C50.4	Spindle cell carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36548253	8801/3-C50.6	Spindle cell sarcoma of axillary tail of breast	ICDO Condition

Id	Code	Name	Class
36518199	8801/3-C50.9	Spindle cell sarcoma of breast, NOS	ICDO Condition
36540100	8801/3-C50.1	Spindle cell sarcoma of central portion of breast	ICDO Condition
36520295	8801/3-C50.3	Spindle cell sarcoma of lower-inner quadrant of breast	ICDO Condition
36520815	8801/3-C50.5	Spindle cell sarcoma of lower-outer quadrant of breast	ICDO Condition
36539962	8801/3-C50.0	Spindle cell sarcoma of nipple	ICDO Condition
36517736	8801/3-C50.8	Spindle cell sarcoma of overlapping lesion of breast	ICDO Condition
36546034	8801/3-C50.2	Spindle cell sarcoma of upper-inner quadrant of breast	ICDO Condition
44503036	8801/3-C50.4	Spindle cell sarcoma of upper-outer quadrant of breast	ICDO Condition
36517170	8078/3-C50.6	Squamous cell carcinoma with horn formation of axillary tail of breast	ICDO Condition
36560838	8078/3-C50.9	Squamous cell carcinoma with horn formation of breast, NOS	ICDO Condition
36550543	8078/3-C50.1	Squamous cell carcinoma with horn formation of central portion of breast	ICDO Condition
36523677	8078/3-C50.3	Squamous cell carcinoma with horn formation of lower-inner quadrant of breast	ICDO Condition
36535386	8078/3-C50.5	Squamous cell carcinoma with horn formation of lower-outer quadrant of breast	ICDO Condition
36557277	8078/3-C50.0	Squamous cell carcinoma with horn formation of nipple	ICDO Condition
36546640	8078/3-C50.8	Squamous cell carcinoma with horn formation of overlapping lesion of breast	ICDO Condition
36560767	8078/3-C50.2	Squamous cell carcinoma with horn formation of upper-inner quadrant of breast	ICDO Condition
36545094	8078/3-C50.4	Squamous cell carcinoma with horn formation of upper-outer quadrant of breast	ICDO Condition
36552210	8075/3-C50.6	Squamous cell carcinoma, adenoid of axillary tail of breast	ICDO Condition
36548304	8075/3-C50.9	Squamous cell carcinoma, adenoid of breast, NOS	ICDO Condition
36547817	8075/3-C50.1	Squamous cell carcinoma, adenoid of central portion of breast	ICDO Condition
36558743	8075/3-C50.3	Squamous cell carcinoma, adenoid of lower-inner quadrant of breast	ICDO Condition
36526932	8075/3-C50.5	Squamous cell carcinoma, adenoid of lower-outer quadrant of breast	ICDO Condition
36552161	8075/3-C50.0	Squamous cell carcinoma, adenoid of nipple	ICDO Condition
36557111	8075/3-C50.8	Squamous cell carcinoma, adenoid of overlapping lesion of breast	ICDO Condition
36564349	8075/3-C50.2	Squamous cell carcinoma, adenoid of upper-inner quadrant of breast	ICDO Condition
36554310	8075/3-C50.4	Squamous cell carcinoma, adenoid of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36530629	8071/3-C50.6	Squamous cell carcinoma, keratinizing, NOS, of axillary tail of breast	ICDO Condition
36554108	8071/3-C50.9	Squamous cell carcinoma, keratinizing, NOS, of breast, NOS	ICDO Condition
36539089	8071/3-C50.1	Squamous cell carcinoma, keratinizing, NOS, of central portion of breast	ICDO Condition
36565773	8071/3-C50.3	Squamous cell carcinoma, keratinizing, NOS, of lower-inner quadrant of breast	ICDO Condition
36550420	8071/3-C50.5	Squamous cell carcinoma, keratinizing, NOS, of lower-outer quadrant of breast	ICDO Condition
36530435	8071/3-C50.0	Squamous cell carcinoma, keratinizing, NOS, of nipple	ICDO Condition
36554415	8071/3-C50.8	Squamous cell carcinoma, keratinizing, NOS, of overlapping lesion of breast	ICDO Condition
36546809	8071/3-C50.2	Squamous cell carcinoma, keratinizing, NOS, of upper-inner quadrant of breast	ICDO Condition
44502923	8071/3-C50.4	Squamous cell carcinoma, keratinizing, NOS, of upper-outer quadrant of breast	ICDO Condition
36534399	8072/3-C50.6	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of axillary tail of breast	ICDO Condition
36535694	8072/3-C50.9	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of breast, NOS	ICDO Condition
36519042	8072/3-C50.1	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of central portion of breast	ICDO Condition
36565553	8072/3-C50.3	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of lower-inner quadrant of breast	ICDO Condition
36523366	8072/3-C50.5	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of lower-outer quadrant of breast	ICDO Condition
36542432	8072/3-C50.0	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of nipple	ICDO Condition
36560809	8072/3-C50.8	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of overlapping lesion of breast	ICDO Condition
36529597	8072/3-C50.2	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of upper-inner quadrant of breast	ICDO Condition
36539772	8072/3-C50.4	Squamous cell carcinoma, large cell, nonkeratinizing, NOS, of upper-outer quadrant of breast	ICDO Condition
36540907	8076/3-C50.6	Squamous cell carcinoma, microinvasive of axillary tail of breast	ICDO Condition
36520348	8076/3-C50.9	Squamous cell carcinoma, microinvasive of breast, NOS	ICDO Condition
36567613	8076/3-C50.1	Squamous cell carcinoma, microinvasive of central portion of breast	ICDO Condition
36562994	8076/3-C50.3	Squamous cell carcinoma, microinvasive of lower-inner quadrant of breast	ICDO Condition
36556882	8076/3-C50.5	Squamous cell carcinoma, microinvasive of lower-outer quadrant of breast	ICDO Condition
36550519	8076/3-C50.0	Squamous cell carcinoma, microinvasive of nipple	ICDO Condition
36561989	8076/3-C50.8	Squamous cell carcinoma, microinvasive of overlapping lesion of breast	ICDO Condition

Id	Code	Name	Class
36558311	8076/3-C50.2	Squamous cell carcinoma, microinvasive of upper-inner quadrant of breast	ICDO Condition
36531700	8076/3-C50.4	Squamous cell carcinoma, microinvasive of upper-outer quadrant of breast	ICDO Condition
36554911	8070/3-C50.6	Squamous cell carcinoma, NOS, of axillary tail of breast	ICDO Condition
36563027	8070/3-C50.1	Squamous cell carcinoma, NOS, of central portion of breast	ICDO Condition
36564686	8070/3-C50.5	Squamous cell carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36520200	8070/3-C50.0	Squamous cell carcinoma, NOS, of nipple	ICDO Condition
36517865	8070/3-C50.2	Squamous cell carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36525506	8073/3-C50.6	Squamous cell carcinoma, small cell, nonkeratinizing of axillary tail of breast	ICDO Condition
36524937	8073/3-C50.9	Squamous cell carcinoma, small cell, nonkeratinizing of breast, NOS	ICDO Condition
36564694	8073/3-C50.1	Squamous cell carcinoma, small cell, nonkeratinizing of central portion of breast	ICDO Condition
36533729	8073/3-C50.3	Squamous cell carcinoma, small cell, nonkeratinizing of lower-inner quadrant of breast	ICDO Condition
36566889	8073/3-C50.5	Squamous cell carcinoma, small cell, nonkeratinizing of lower-outer quadrant of breast	ICDO Condition
36531652	8073/3-C50.0	Squamous cell carcinoma, small cell, nonkeratinizing of nipple	ICDO Condition
36555428	8073/3-C50.8	Squamous cell carcinoma, small cell, nonkeratinizing of overlapping lesion of breast	ICDO Condition
36567249	8073/3-C50.2	Squamous cell carcinoma, small cell, nonkeratinizing of upper-inner quadrant of breast	ICDO Condition
36532972	8073/3-C50.4	Squamous cell carcinoma, small cell, nonkeratinizing of upper-outer quadrant of breast	ICDO Condition
36553652	8074/3-C50.6	Squamous cell carcinoma, spindle cell of axillary tail of breast	ICDO Condition
44498946	8074/3-C50.9	Squamous cell carcinoma, spindle cell of breast, NOS	ICDO Condition
36519648	8074/3-C50.1	Squamous cell carcinoma, spindle cell of central portion of breast	ICDO Condition
36539982	8074/3-C50.3	Squamous cell carcinoma, spindle cell of lower-inner quadrant of breast	ICDO Condition
36524995	8074/3-C50.5	Squamous cell carcinoma, spindle cell of lower-outer quadrant of breast	ICDO Condition
36552573	8074/3-C50.0	Squamous cell carcinoma, spindle cell of nipple	ICDO Condition
36548535	8074/3-C50.8	Squamous cell carcinoma, spindle cell of overlapping lesion of breast	ICDO Condition
36551002	8074/3-C50.2	Squamous cell carcinoma, spindle cell of upper-inner quadrant of breast	ICDO Condition
36525217	8074/3-C50.4	Squamous cell carcinoma, spindle cell of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36518232	8935/3-C50.6	Stromal sarcoma, NOS, of axillary tail of breast	ICDO Condition
44500808	8935/3-C50.9	Stromal sarcoma, NOS, of breast, NOS	ICDO Condition
36565027	8935/3-C50.1	Stromal sarcoma, NOS, of central portion of breast	ICDO Condition
36550334	8935/3-C50.3	Stromal sarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36555919	8935/3-C50.5	Stromal sarcoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36532444	8935/3-C50.0	Stromal sarcoma, NOS, of nipple	ICDO Condition
36528748	8935/3-C50.8	Stromal sarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36548291	8935/3-C50.2	Stromal sarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44502791	8935/3-C50.4	Stromal sarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36539620	8143/3-C50.6	Superficial spreading adenocarcinoma of axillary tail of breast	ICDO Condition
36518133	8143/3-C50.9	Superficial spreading adenocarcinoma of breast, NOS	ICDO Condition
36542790	8143/3-C50.1	Superficial spreading adenocarcinoma of central portion of breast	ICDO Condition
36539880	8143/3-C50.3	Superficial spreading adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36526082	8143/3-C50.5	Superficial spreading adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36546031	8143/3-C50.0	Superficial spreading adenocarcinoma of nipple	ICDO Condition
36549507	8143/3-C50.8	Superficial spreading adenocarcinoma of overlapping lesion of breast	ICDO Condition
36525619	8143/3-C50.2	Superficial spreading adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36546007	8143/3-C50.4	Superficial spreading adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
42512922	9043/3-C50.6	Synovial sarcoma, biphasic of axillary tail of breast	ICDO Condition
36517575	8190/3-C50.6	Trabecular adenocarcinoma of axillary tail of breast	ICDO Condition
36542321	8190/3-C50.9	Trabecular adenocarcinoma of breast, NOS	ICDO Condition
36527381	8190/3-C50.1	Trabecular adenocarcinoma of central portion of breast	ICDO Condition
36538087	8190/3-C50.3	Trabecular adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
36566305	8190/3-C50.5	Trabecular adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36566310	8190/3-C50.0	Trabecular adenocarcinoma of nipple	ICDO Condition
36537992	8190/3-C50.8	Trabecular adenocarcinoma of overlapping lesion of breast	ICDO Condition
36522979	8190/3-C50.2	Trabecular adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36545078	8190/3-C50.4	Trabecular adenocarcinoma of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
45768522	706970001	Triple-negative breast cancer	Clinical Finding
36568345	8001/3-C50.6	Tumor cells, malignant of axillary tail of breast	ICDO Condition
36525225	8001/3-C50.1	Tumor cells, malignant of central portion of breast	ICDO Condition
36568241	8001/3-C50.3	Tumor cells, malignant of lower-inner quadrant of breast	ICDO Condition
36568105	8001/3-C50.5	Tumor cells, malignant of lower-outer quadrant of breast	ICDO Condition
36563045	8001/3-C50.0	Tumor cells, malignant of nipple	ICDO Condition
36568186	8001/3-C50.2	Tumor cells, malignant of upper-inner quadrant of breast	ICDO Condition
36552586	8805/3-C50.6	Undifferentiated sarcoma of axillary tail of breast	ICDO Condition
36555488	8805/3-C50.9	Undifferentiated sarcoma of breast, NOS	ICDO Condition
36564559	8805/3-C50.1	Undifferentiated sarcoma of central portion of breast	ICDO Condition
36539759	8805/3-C50.3	Undifferentiated sarcoma of lower-inner quadrant of breast	ICDO Condition
36518149	8805/3-C50.5	Undifferentiated sarcoma of lower-outer quadrant of breast	ICDO Condition
36546372	8805/3-C50.0	Undifferentiated sarcoma of nipple	ICDO Condition
36521826	8805/3-C50.8	Undifferentiated sarcoma of overlapping lesion of breast	ICDO Condition
36533266	8805/3-C50.2	Undifferentiated sarcoma of upper-inner quadrant of breast	ICDO Condition
36531173	8805/3-C50.4	Undifferentiated sarcoma of upper-outer quadrant of breast	ICDO Condition
36533877	8051/3-C50.6	Verrucous carcinoma, NOS, of axillary tail of breast	ICDO Condition
36539011	8051/3-C50.9	Verrucous carcinoma, NOS, of breast, NOS	ICDO Condition
36525518	8051/3-C50.1	Verrucous carcinoma, NOS, of central portion of breast	ICDO Condition
36567953	8051/3-C50.3	Verrucous carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36523995	8051/3-C50.5	Verrucous carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36523688	8051/3-C50.0	Verrucous carcinoma, NOS, of nipple	ICDO Condition
36567489	8051/3-C50.8	Verrucous carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36549778	8051/3-C50.2	Verrucous carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36567316	8051/3-C50.4	Verrucous carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44502240	8480/3-C50.2	Mucinous adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
4247348	94012007	Primary malignant neoplasm of skin of breast	Clinical Finding
44501933	8140/3-C50.3	Adenocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36548529	8501/3-C50.4	Comedocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44502343	8522/3-C50.5	Infiltrating duct and lobular carcinoma of lower-outer quadrant of breast	ICDO Condition
44499675	8010/3-C50.0	Carcinoma, NOS, of nipple	ICDO Condition
44499922	8522/3-C50.1	Infiltrating duct and lobular carcinoma of central portion of breast	ICDO Condition
44502782	8510/3-C50.4	Medullary carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44500498	8140/3-C50.5	Adenocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
36535209	8523/3-C50.8	Infiltrating duct mixed with other types of carcinoma of overlapping lesion of breast	ICDO Condition
761170	15635761000119103	Infiltrating duct carcinoma of bilateral female breasts	Clinical Finding
44502180	8523/3-C50.4	Infiltrating duct mixed with other types of carcinoma of upper-outer quadrant of breast	ICDO Condition
36545747	8211/3-C50.8	Tubular adenocarcinoma of overlapping lesion of breast	ICDO Condition
44500305	8522/3-C50.2	Infiltrating duct and lobular carcinoma of upper-inner quadrant of breast	ICDO Condition
4157447	372095001	Malignant neoplasm of male breast	Clinical Finding
44501260	8140/3-C50.1	Adenocarcinoma, NOS, of central portion of breast	ICDO Condition
44500783	8140/3-C50.2	Adenocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44501150	8500/3-C50.6	Infiltrating duct carcinoma, NOS, of axillary tail of breast	ICDO Condition
36531101	8480/3-C50.8	Mucinous adenocarcinoma of overlapping lesion of breast	ICDO Condition
44502030	8480/3-C50.4	Mucinous adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
135489	93884005	Primary malignant neoplasm of male breast	Clinical Finding
44500352	8211/3-C50.4	Tubular adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
4188544	373080008	Malignant neoplasm of breast lower inner quadrant	Clinical Finding
44500425	8000/3-C50.1	Neoplasm, malignant of central portion of breast	ICDO Condition
36562616	8000/3-C50.0	Neoplasm, malignant of nipple	ICDO Condition
44501483	8140/3-C50.9	Adenocarcinoma, NOS, of breast, NOS	ICDO Condition
40492507	448952004	Infiltrating duct carcinoma of female breast	Clinical Finding
44500419	8520/3-C50.3	Lobular carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
44500599	8500/3-C50.0	Infiltrating duct carcinoma, NOS, of nipple	ICDO Condition
4187848	373081007	Malignant neoplasm of breast lower outer quadrant	Clinical Finding

Id	Code	Name	Class
36548839	8522/3-C50.8	Infiltrating duct and lobular carcinoma of overlapping lesion of breast	ICDO Condition
4091464	188147009	Malignant neoplasm of nipple and areola of female breast	Clinical Finding
36545478	8140/3-C50.8	Adenocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
37310457	1082701000112100	Locally advanced breast cancer	Clinical Finding
44500259	8522/3-C50.4	Infiltrating duct and lobular carcinoma of upper-outer quadrant of breast	ICDO Condition
40480651	444712000	Mucinous carcinoma of breast	Clinical Finding
432845	93745008	Primary malignant neoplasm of central portion of female breast	Clinical Finding
44501200	8140/3-C50.4	Adenocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
4187849	373082000	Malignant neoplasm of breast upper inner quadrant	Clinical Finding
44502958	8520/3-C50.5	Lobular carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
432263	93874009	Primary malignant neoplasm of lower inner quadrant of female breast	Clinical Finding
37208324	1080121000119101	Infiltrating ductal carcinoma of lower inner quadrant of left female breast	Clinical Finding
37208328	1080201000119101	Infiltrating ductal carcinoma of lower inner quadrant of right female breast	Clinical Finding
4113637	286894008	Carcinoma of breast - lower, inner quadrant	Clinical Finding
44498965	8520/3-C50.1	Lobular carcinoma, NOS, of central portion of breast	ICDO Condition
441513	372092003	Primary malignant neoplasm of axillary tail of breast	Clinical Finding
44501355	8520/3-C50.2	Lobular carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
441515	93876006	Primary malignant neoplasm of lower outer quadrant of female breast	Clinical Finding
37208325	1080131000119103	Infiltrating ductal carcinoma of lower outer quadrant of left female breast	Clinical Finding
37208329	1080211000119103	Infiltrating ductal carcinoma of lower outer quadrant of right female breast	Clinical Finding
4117852	286896005	Carcinoma breast - lower, outer quadrant	Clinical Finding
36717260	1080111000119108	Infiltrating ductal carcinoma of central portion of left female breast	Clinical Finding
36712721	1080191000119104	Infiltrating ductal carcinoma of central portion of right female breast	Clinical Finding
440956	94115006	Primary malignant neoplasm of upper inner quadrant of female breast	Clinical Finding
36542964	8520/3-C50.8	Lobular carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
4187851	373090000	Primary malignant neoplasm of breast lower inner quadrant	Clinical Finding
40486563	447782002	Carcinoma of female breast	Clinical Finding
36538743	8521/3-C50.2	Infiltrating ductular carcinoma of upper-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
44502447	8500/3-C50.3	Infiltrating duct carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
4188545	373091001	Primary malignant neoplasm of breast lower outer quadrant	Clinical Finding
44501944	8500/3-C50.1	Infiltrating duct carcinoma, NOS, of central portion of breast	ICDO Condition
4116071	254838004	Carcinoma of breast	Clinical Finding
44499818	8500/3-C50.5	Infiltrating duct carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
4160780	373083005	Malignant neoplasm of breast upper outer quadrant	Clinical Finding
133711	109886000	Overlapping malignant neoplasm of female breast	Clinical Finding
4158563	373089009	Primary malignant neoplasm of breast upper inner quadrant	Clinical Finding
44500600	8520/3-C50.4	Lobular carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44499972	8500/3-C50.2	Infiltrating duct carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
4080865	278054005	Infiltrating lobular carcinoma of breast	Clinical Finding
436353	94117003	Primary malignant neoplasm of upper outer quadrant of female breast	Clinical Finding
4092513	188157005	Malignant neoplasm, overlapping lesion of breast	Clinical Finding
36544992	8521/3-C50.4	Infiltrating ductular carcinoma of upper-outer quadrant of breast	ICDO Condition
36564848	8500/3-C50.8	Infiltrating duct carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
4187850	373088001	Primary malignant neoplasm of breast upper outer quadrant	Clinical Finding
36560612	8573/3-C50.1	Adenocarcinoma with apocrine metaplasia of central portion of breast	ICDO Condition
36562341	8573/3-C50.3	Adenocarcinoma with apocrine metaplasia of lower-inner quadrant of breast	ICDO Condition
36551249	8573/3-C50.8	Adenocarcinoma with apocrine metaplasia of overlapping lesion of breast	ICDO Condition
36567711	8573/3-C50.2	Adenocarcinoma with apocrine metaplasia of upper-inner quadrant of breast	ICDO Condition
36526667	8573/3-C50.4	Adenocarcinoma with apocrine metaplasia of upper-outer quadrant of breast	ICDO Condition
36517511	8571/3-C50.4	Adenocarcinoma with cartilaginous and osseous metaplasia of upper-outer quadrant of breast	ICDO Condition
44501025	8574/3-C50.9	Adenocarcinoma with neuroendocrine differentiation of breast, NOS	ICDO Condition
36527921	8574/3-C50.1	Adenocarcinoma with neuroendocrine differentiation of central portion of breast	ICDO Condition
36549156	8574/3-C50.3	Adenocarcinoma with neuroendocrine differentiation of lower-inner quadrant of breast	ICDO Condition
36550441	8574/3-C50.5	Adenocarcinoma with neuroendocrine differentiation of lower-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36544055	8574/3-C50.8	Adenocarcinoma with neuroendocrine differentiation of overlapping lesion of breast	ICDO Condition
36540326	8574/3-C50.2	Adenocarcinoma with neuroendocrine differentiation of upper-inner quadrant of breast	ICDO Condition
36564531	8574/3-C50.4	Adenocarcinoma with neuroendocrine differentiation of upper-outer quadrant of breast	ICDO Condition
36563732	8572/3-C50.5	Adenocarcinoma with spindle cell metaplasia of lower-outer quadrant of breast	ICDO Condition
36556994	8572/3-C50.8	Adenocarcinoma with spindle cell metaplasia of overlapping lesion of breast	ICDO Condition
36558786	8572/3-C50.4	Adenocarcinoma with spindle cell metaplasia of upper-outer quadrant of breast	ICDO Condition
36550405	8570/3-C50.9	Adenocarcinoma with squamous metaplasia of breast, NOS	ICDO Condition
36521206	8570/3-C50.8	Adenocarcinoma with squamous metaplasia of overlapping lesion of breast	ICDO Condition
44502182	8570/3-C50.4	Adenocarcinoma with squamous metaplasia of upper-outer quadrant of breast	ICDO Condition
36528339	8200/3-C50.9	Adenoid cystic carcinoma of breast, NOS	ICDO Condition
44499435	8200/3-C50.1	Adenoid cystic carcinoma of central portion of breast	ICDO Condition
44503085	8200/3-C50.3	Adenoid cystic carcinoma of lower-inner quadrant of breast	ICDO Condition
44500016	8200/3-C50.5	Adenoid cystic carcinoma of lower-outer quadrant of breast	ICDO Condition
36538949	8200/3-C50.0	Adenoid cystic carcinoma of nipple	ICDO Condition
36524717	8200/3-C50.8	Adenoid cystic carcinoma of overlapping lesion of breast	ICDO Condition
44502387	8200/3-C50.2	Adenoid cystic carcinoma of upper-inner quadrant of breast	ICDO Condition
42512712	8983/3-C50.8	Adenomyoepithelioma with carcinoma of overlapping lesion of breast	ICDO Condition
44502181	8560/3-C50.1	Adenosquamous carcinoma of central portion of breast	ICDO Condition
36538330	8560/3-C50.3	Adenosquamous carcinoma of lower-inner quadrant of breast	ICDO Condition
44501661	8560/3-C50.5	Adenosquamous carcinoma of lower-outer quadrant of breast	ICDO Condition
36523999	8560/3-C50.8	Adenosquamous carcinoma of overlapping lesion of breast	ICDO Condition
36520290	8560/3-C50.2	Adenosquamous carcinoma of upper-inner quadrant of breast	ICDO Condition
36567556	8560/3-C50.4	Adenosquamous carcinoma of upper-outer quadrant of breast	ICDO Condition
44500300	8401/3-C50.1	Apocrine adenocarcinoma of central portion of breast	ICDO Condition
36547894	8401/3-C50.3	Apocrine adenocarcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
44501085	8401/3-C50.5	Apocrine adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36554533	8401/3-C50.0	Apocrine adenocarcinoma of nipple	ICDO Condition
44501647	8401/3-C50.2	Apocrine adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
44501582	8513/3-C50.5	Atypical medullary carcinoma of lower-outer quadrant of breast	ICDO Condition
36531463	8513/3-C50.8	Atypical medullary carcinoma of overlapping lesion of breast	ICDO Condition
44500881	8513/3-C50.2	Atypical medullary carcinoma of upper-inner quadrant of breast	ICDO Condition
44501855	8513/3-C50.4	Atypical medullary carcinoma of upper-outer quadrant of breast	ICDO Condition
4113638	286897001	Carcinoma of breast - axillary tail	Clinical Finding
36564496	8010/3-C50.8	Carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44501060	8020/3-C50.9	Carcinoma, undifferentiated, NOS, of breast, NOS	ICDO Condition
36535775	8020/3-C50.8	Carcinoma, undifferentiated, NOS, of overlapping lesion of breast	ICDO Condition
44500185	8020/3-C50.4	Carcinoma, undifferentiated, NOS, of upper-outer quadrant of breast	ICDO Condition
36560691	8980/3-C50.3	Carcinosarcoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36560569	8980/3-C50.8	Carcinosarcoma, NOS, of overlapping lesion of breast	ICDO Condition
44499659	8980/3-C50.2	Carcinosarcoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44500664	8980/3-C50.4	Carcinosarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36542307	8310/3-C50.8	Clear cell adenocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36540590	8310/3-C50.4	Clear cell adenocarcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36536599	8501/3-C50.6	Comedocarcinoma, NOS, of axillary tail of breast	ICDO Condition
36568176	8501/3-C50.9	Comedocarcinoma, NOS, of breast, NOS	ICDO Condition
44500862	8201/3-C50.1	Cribriform carcinoma, NOS, of central portion of breast	ICDO Condition
36557108	8201/3-C50.3	Cribriform carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
44501848	8201/3-C50.5	Cribriform carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
44501792	8201/3-C50.2	Cribriform carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44501655	8504/3-C50.9	Encapsulated papillary carcinoma with invasion of breast, NOS	ICDO Condition
44500507	8504/3-C50.1	Encapsulated papillary carcinoma with invasion of central portion of breast	ICDO Condition
44500939	8504/3-C50.3	Encapsulated papillary carcinoma with invasion of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
44502828	8504/3-C50.5	Encapsulated papillary carcinoma with invasion of lower-outer quadrant of breast	ICDO Condition
36556821	8504/3-C50.0	Encapsulated papillary carcinoma with invasion of nipple	ICDO Condition
44502475	8504/3-C50.2	Encapsulated papillary carcinoma with invasion of upper-inner quadrant of breast	ICDO Condition
4110861	254843006	Familial cancer of breast	Clinical Finding
36554044	8315/3-C50.8	Glycogen-rich carcinoma of overlapping lesion of breast	ICDO Condition
36566227	8315/3-C50.4	Glycogen-rich carcinoma of upper-outer quadrant of breast	ICDO Condition
44500469	9120/3-C50.1	Hemangiosarcoma of central portion of breast	ICDO Condition
36523298	9120/3-C50.3	Hemangiosarcoma of lower-inner quadrant of breast	ICDO Condition
36550844	9120/3-C50.5	Hemangiosarcoma of lower-outer quadrant of breast	ICDO Condition
36553000	9120/3-C50.8	Hemangiosarcoma of overlapping lesion of breast	ICDO Condition
44502302	9120/3-C50.2	Hemangiosarcoma of upper-inner quadrant of breast	ICDO Condition
44501429	9120/3-C50.4	Hemangiosarcoma of upper-outer quadrant of breast	ICDO Condition
44499515	8522/3-C50.6	Infiltrating duct and lobular carcinoma of axillary tail of breast	ICDO Condition
44500940	8522/3-C50.0	Infiltrating duct and lobular carcinoma of nipple	ICDO Condition
44501658	8523/3-C50.6	Infiltrating duct mixed with other types of carcinoma of axillary tail of breast	ICDO Condition
44499753	8523/3-C50.0	Infiltrating duct mixed with other types of carcinoma of nipple	ICDO Condition
36552211	8521/3-C50.5	Infiltrating ductular carcinoma of lower-outer quadrant of breast	ICDO Condition
36537324	8521/3-C50.8	Infiltrating ductular carcinoma of overlapping lesion of breast	ICDO Condition
44502882	8524/3-C50.9	Infiltrating lobular mixed with other types of carcinoma of breast, NOS	ICDO Condition
44502881	8524/3-C50.1	Infiltrating lobular mixed with other types of carcinoma of central portion of breast	ICDO Condition
44501219	8524/3-C50.3	Infiltrating lobular mixed with other types of carcinoma of lower-inner quadrant of breast	ICDO Condition
44501277	8524/3-C50.5	Infiltrating lobular mixed with other types of carcinoma of lower-outer quadrant of breast	ICDO Condition
44503557	8524/3-C50.2	Infiltrating lobular mixed with other types of carcinoma of upper-inner quadrant of breast	ICDO Condition
36560657	8530/3-C50.8	Inflammatory carcinoma of overlapping lesion of breast	ICDO Condition
44502290	8530/3-C50.4	Inflammatory carcinoma of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
36559477	8503/3-C50.6	Intraductal papillary adenocarcinoma with invasion of axillary tail of breast	ICDO Condition
36522597	8503/3-C50.0	Intraductal papillary adenocarcinoma with invasion of nipple	ICDO Condition
42511727	8507/3-C50.6	Invasive micropapillary carcinoma of breast of axillary tail of breast	ICDO Condition
36403000	8507/3-C50.9	Invasive micropapillary carcinoma of breast of breast, NOS	ICDO Condition
42512849	8507/3-C50.0	Invasive micropapillary carcinoma of breast of nipple	ICDO Condition
36556824	8012/3-C50.9	Large cell carcinoma, NOS, of breast, NOS	ICDO Condition
36529026	8012/3-C50.1	Large cell carcinoma, NOS, of central portion of breast	ICDO Condition
36519248	8012/3-C50.8	Large cell carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36517860	8012/3-C50.2	Large cell carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44502155	8012/3-C50.4	Large cell carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36552672	8013/3-C50.8	Large cell neuroendocrine carcinoma of overlapping lesion of breast	ICDO Condition
36562803	8013/3-C50.4	Large cell neuroendocrine carcinoma of upper-outer quadrant of breast	ICDO Condition
36518864	8890/3-C50.8	Leiomyosarcoma, NOS, of overlapping lesion of breast	ICDO Condition
36561112	8890/3-C50.4	Leiomyosarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
4095741	188159008	Malignant neoplasm of ectopic site of female breast	Clinical Finding
36540345	8512/3-C50.3	Medullary carcinoma with lymphoid stroma of lower-inner quadrant of breast	ICDO Condition
36552782	8512/3-C50.5	Medullary carcinoma with lymphoid stroma of lower-outer quadrant of breast	ICDO Condition
36559593	8512/3-C50.8	Medullary carcinoma with lymphoid stroma of overlapping lesion of breast	ICDO Condition
36552805	8512/3-C50.2	Medullary carcinoma with lymphoid stroma of upper-inner quadrant of breast	ICDO Condition
44499974	8512/3-C50.4	Medullary carcinoma with lymphoid stroma of upper-outer quadrant of breast	ICDO Condition
36537741	8510/3-C50.6	Medullary carcinoma, NOS, of axillary tail of breast	ICDO Condition
36547774	8575/3-C50.6	Metaplastic carcinoma, NOS, of axillary tail of breast	ICDO Condition
44503559	8575/3-C50.1	Metaplastic carcinoma, NOS, of central portion of breast	ICDO Condition
44502039	8575/3-C50.3	Metaplastic carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36541476	8575/3-C50.0	Metaplastic carcinoma, NOS, of nipple	ICDO Condition
36559300	8481/3-C50.6	Mucin-producing adenocarcinoma of axillary tail of breast	ICDO Condition
36529114	8481/3-C50.1	Mucin-producing adenocarcinoma of central portion of breast	ICDO Condition
36551603	8481/3-C50.3	Mucin-producing adenocarcinoma of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36565495	8481/3-C50.5	Mucin-producing adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36540579	8481/3-C50.2	Mucin-producing adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
36551629	8480/3-C50.6	Mucinous adenocarcinoma of axillary tail of breast	ICDO Condition
36529298	8982/3-C50.5	Myoepithelial carcinoma of lower-outer quadrant of breast	ICDO Condition
36559943	8982/3-C50.8	Myoepithelial carcinoma of overlapping lesion of breast	ICDO Condition
36532825	8982/3-C50.4	Myoepithelial carcinoma of upper-outer quadrant of breast	ICDO Condition
44501141	8246/3-C50.9	Neuroendocrine carcinoma, NOS, of breast, NOS	ICDO Condition
44500728	8246/3-C50.4	Neuroendocrine carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44500739	8541/3-C50.3	Paget disease and infiltrating duct carcinoma of breast of lower-inner quadrant of breast	ICDO Condition
44501958	8541/3-C50.5	Paget disease and infiltrating duct carcinoma of breast of lower-outer quadrant of breast	ICDO Condition
44500308	8541/3-C50.2	Paget disease and infiltrating duct carcinoma of breast of upper-inner quadrant of breast	ICDO Condition
44503032	8543/3-C50.9	Paget disease and intraductal carcinoma of breast of breast, NOS	ICDO Condition
44500462	8543/3-C50.1	Paget disease and intraductal carcinoma of breast of central portion of breast	ICDO Condition
36543333	8543/3-C50.8	Paget disease and intraductal carcinoma of breast of overlapping lesion of breast	ICDO Condition
44500509	8540/3-C50.9	Paget disease, mammary of breast, NOS	ICDO Condition
36561815	8540/3-C50.8	Paget disease, mammary of overlapping lesion of breast	ICDO Condition
36555654	8260/3-C50.0	Papillary adenocarcinoma, NOS, of nipple	ICDO Condition
44499790	8050/3-C50.0	Papillary carcinoma, NOS, of nipple	ICDO Condition
36566234	8050/3-C50.8	Papillary carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36564388	9020/3-C50.1	Phyllodes tumor, malignant of central portion of breast	ICDO Condition
44500216	9020/3-C50.3	Phyllodes tumor, malignant of lower-inner quadrant of breast	ICDO Condition
44500551	9020/3-C50.5	Phyllodes tumor, malignant of lower-outer quadrant of breast	ICDO Condition
36518576	9020/3-C50.0	Phyllodes tumor, malignant of nipple	ICDO Condition
44501453	9020/3-C50.2	Phyllodes tumor, malignant of upper-inner quadrant of breast	ICDO Condition
36717175	721576006	Primary angiosarcoma of breast	Clinical Finding
433148	93680004	Primary malignant neoplasm of areola of female breast	Clinical Finding

Id	Code	Name	Class
442126	93925009	Primary malignant neoplasm of nipple of male breast	Clinical Finding
36536533	8033/3-C50.4	Pseudosarcomatous carcinoma of upper-outer quadrant of breast	ICDO Condition
36566810	8800/3-C50.4	Sarcoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44502696	8141/3-C50.1	Scirrhous adenocarcinoma of central portion of breast	ICDO Condition
44501788	8141/3-C50.5	Scirrhous adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
36534649	8141/3-C50.8	Scirrhous adenocarcinoma of overlapping lesion of breast	ICDO Condition
44503013	8141/3-C50.2	Scirrhous adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
44502932	8141/3-C50.4	Scirrhous adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36533292	8502/3-C50.4	Secretory carcinoma of upper-outer quadrant of breast	ICDO Condition
44501274	8490/3-C50.9	Signet ring cell carcinoma of breast, NOS	ICDO Condition
44500597	8490/3-C50.1	Signet ring cell carcinoma of central portion of breast	ICDO Condition
36555698	8490/3-C50.8	Signet ring cell carcinoma of overlapping lesion of breast	ICDO Condition
36553368	8490/3-C50.2	Signet ring cell carcinoma of upper-inner quadrant of breast	ICDO Condition
44500737	8490/3-C50.4	Signet ring cell carcinoma of upper-outer quadrant of breast	ICDO Condition
36551045	8041/3-C50.8	Small cell carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44502571	8041/3-C50.2	Small cell carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44501304	8041/3-C50.4	Small cell carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36547174	8230/3-C50.8	Solid carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44500354	8230/3-C50.2	Solid carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44500787	8230/3-C50.4	Solid carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
42512675	8509/3-C50.1	Solid papillary carcinoma with invasion of central portion of breast	ICDO Condition
42511627	8509/3-C50.3	Solid papillary carcinoma with invasion of lower-inner quadrant of breast	ICDO Condition
42512323	8509/3-C50.5	Solid papillary carcinoma with invasion of lower-outer quadrant of breast	ICDO Condition
42511797	8509/3-C50.8	Solid papillary carcinoma with invasion of overlapping lesion of breast	ICDO Condition
42512476	8509/3-C50.2	Solid papillary carcinoma with invasion of upper-inner quadrant of breast	ICDO Condition
42512171	8509/3-C50.4	Solid papillary carcinoma with invasion of upper-outer quadrant of breast	ICDO Condition
36532433	8032/3-C50.8	Spindle cell carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44500715	8070/3-C50.9	Squamous cell carcinoma, NOS, of breast, NOS	ICDO Condition

Id	Code	Name	Class
36553621	8070/3-C50.3	Squamous cell carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36548174	8070/3-C50.8	Squamous cell carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
44503198	8070/3-C50.4	Squamous cell carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44500133	8211/3-C50.6	Tubular adenocarcinoma of axillary tail of breast	ICDO Condition
36568261	8001/3-C50.9	Tumor cells, malignant of breast, NOS	ICDO Condition
36538058	8001/3-C50.8	Tumor cells, malignant of overlapping lesion of breast	ICDO Condition
36568134	8001/3-C50.4	Tumor cells, malignant of upper-outer quadrant of breast	ICDO Condition
44502548	8500/3-C50.4	Infiltrating duct carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
4112853	254837009	Malignant tumor of breast	Clinical Finding
137809	93796005	Primary malignant neoplasm of female breast	Clinical Finding
4157332	372064008	Malignant neoplasm of female breast	Clinical Finding
4237178	408643008	Infiltrating duct carcinoma of breast	Clinical Finding
3655521	865954003	Adenocarcinoma of breast	Clinical Finding
44500785	8200/3-C50.4	Adenoid cystic carcinoma of upper-outer quadrant of breast	ICDO Condition
36559699	8401/3-C50.8	Apocrine adenocarcinoma of overlapping lesion of breast	ICDO Condition
36566236	8501/3-C50.1	Comedocarcinoma, NOS, of central portion of breast	ICDO Condition
36549067	8501/3-C50.3	Comedocarcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36533221	8501/3-C50.5	Comedocarcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
44502795	9120/3-C50.9	Hemangiosarcoma of breast, NOS	ICDO Condition
44501023	8523/3-C50.9	Infiltrating duct mixed with other types of carcinoma of breast, NOS	ICDO Condition
36712724	1080261000119100	Infiltrating lobular carcinoma of left female breast	Clinical Finding
36712725	1080341000119105	Infiltrating lobular carcinoma of right female breast	Clinical Finding
4112074	254840009	Inflammatory carcinoma of breast	Clinical Finding
44502880	8503/3-C50.3	Intraductal papillary adenocarcinoma with invasion of lower-inner quadrant of breast	ICDO Condition
44503158	8503/3-C50.5	Intraductal papillary adenocarcinoma with invasion of lower-outer quadrant of breast	ICDO Condition
36403021	8507/3-C50.1	Invasive micropapillary carcinoma of breast of central portion of breast	ICDO Condition
36402998	8507/3-C50.3	Invasive micropapillary carcinoma of breast of lower-inner quadrant of breast	ICDO Condition

Id	Code	Name	Class
36403015	8507/3-C50.5	Invasive micropapillary carcinoma of breast of lower-outer quadrant of breast	ICDO Condition
36403045	8507/3-C50.2	Invasive micropapillary carcinoma of breast of upper-inner quadrant of breast	ICDO Condition
4095740	188153009	Malignant neoplasm of lower-inner quadrant of female breast	Clinical Finding
4091466	188155002	Malignant neoplasm of lower-outer quadrant of female breast	Clinical Finding
36546168	8510/3-C50.1	Medullary carcinoma, NOS, of central portion of breast	ICDO Condition
44503099	8575/3-C50.5	Metaplastic carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
44502449	8575/3-C50.2	Metaplastic carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
36518019	8481/3-C50.9	Mucin-producing adenocarcinoma of breast, NOS	ICDO Condition
44501894	8480/3-C50.0	Mucinous adenocarcinoma of nipple	ICDO Condition
4003684	109887009	Overlapping malignant neoplasm of male breast	Clinical Finding
44502883	8541/3-C50.4	Paget disease and infiltrating duct carcinoma of breast of upper-outer quadrant of breast	ICDO Condition
44500370	8543/3-C50.0	Paget disease and intraductal carcinoma of breast of nipple	ICDO Condition
44498941	8050/3-C50.9	Papillary carcinoma, NOS, of breast, NOS	ICDO Condition
36562784	9020/3-C50.8	Phyllodes tumor, malignant of overlapping lesion of breast	ICDO Condition
44503113	9020/3-C50.4	Phyllodes tumor, malignant of upper-outer quadrant of breast	ICDO Condition
36553183	8800/3-C50.8	Sarcoma, NOS, of overlapping lesion of breast	ICDO Condition
44499805	8211/3-C50.0	Tubular adenocarcinoma of nipple	ICDO Condition
44499497	8140/3-C50.6	Adenocarcinoma, NOS, of axillary tail of breast	ICDO Condition
44500439	8140/3-C50.0	Adenocarcinoma, NOS, of nipple	ICDO Condition
44499745	8401/3-C50.9	Apocrine adenocarcinoma of breast, NOS	ICDO Condition
44502950	8401/3-C50.4	Apocrine adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
36521663	8501/3-C50.2	Comedocarcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44500592	8201/3-C50.9	Cribriform carcinoma, NOS, of breast, NOS	ICDO Condition
36531967	8201/3-C50.8	Cribriform carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
36520959	8504/3-C50.8	Encapsulated papillary carcinoma with invasion of overlapping lesion of breast	ICDO Condition
44502955	8504/3-C50.4	Encapsulated papillary carcinoma with invasion of upper-outer quadrant of breast	ICDO Condition

Id	Code	Name	Class
44500148	8523/3-C50.1	Infiltrating duct mixed with other types of carcinoma of central portion of breast	ICDO Condition
44500205	8523/3-C50.5	Infiltrating duct mixed with other types of carcinoma of lower-outer quadrant of breast	ICDO Condition
36521814	8524/3-C50.8	Infiltrating lobular mixed with other types of carcinoma of overlapping lesion of breast	ICDO Condition
44501447	8524/3-C50.4	Infiltrating lobular mixed with other types of carcinoma of upper-outer quadrant of breast	ICDO Condition
44499973	8503/3-C50.9	Intraductal papillary adenocarcinoma with invasion of breast, NOS	ICDO Condition
44501352	8503/3-C50.1	Intraductal papillary adenocarcinoma with invasion of central portion of breast	ICDO Condition
44500801	8503/3-C50.2	Intraductal papillary adenocarcinoma with invasion of upper-inner quadrant of breast	ICDO Condition
44502959	8520/3-C50.6	Lobular carcinoma, NOS, of axillary tail of breast	ICDO Condition
4092511	188151006	Malignant neoplasm of central part of female breast	Clinical Finding
4092512	188152004	Malignant neoplasm of upper-inner quadrant of female breast	Clinical Finding
36556518	8510/3-C50.3	Medullary carcinoma, NOS, of lower-inner quadrant of breast	ICDO Condition
36529278	8510/3-C50.5	Medullary carcinoma, NOS, of lower-outer quadrant of breast	ICDO Condition
40480215	444604002	Mixed ductal and lobular carcinoma of breast	Clinical Finding
36522534	8481/3-C50.8	Mucin-producing adenocarcinoma of overlapping lesion of breast	ICDO Condition
44499557	8481/3-C50.4	Mucin-producing adenocarcinoma of upper-outer quadrant of breast	ICDO Condition
44502034	8541/3-C50.9	Paget disease and infiltrating duct carcinoma of breast of breast, NOS	ICDO Condition
44500307	8541/3-C50.1	Paget disease and infiltrating duct carcinoma of breast of central portion of breast	ICDO Condition
44499448	8541/3-C50.0	Paget disease and infiltrating duct carcinoma of breast of nipple	ICDO Condition
442127	93924008	Primary malignant neoplasm of nipple of female breast	Clinical Finding
4175531	278050001	Sarcoma of breast	Clinical Finding
4117850	286893002	Carcinoma of breast - upper, inner quadrant	Clinical Finding
44502033	8523/3-C50.3	Infiltrating duct mixed with other types of carcinoma of lower-inner quadrant of breast	ICDO Condition
44502956	8510/3-C50.9	Medullary carcinoma, NOS, of breast, NOS	ICDO Condition
36536634	8575/3-C50.8	Metaplastic carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
4301516	403946000	Paget's disease of nipple	Clinical Finding

Id	Code	Name	Class
36717587	722832009	Primary solid papillary carcinoma with invasion of breast	Clinical Finding
46270923	708921005	Carcinoma of central portion of breast	Clinical Finding
44500873	8201/3-C50.4	Cribriform carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
44502116	8523/3-C50.2	Infiltrating duct mixed with other types of carcinoma of upper-inner quadrant of breast	ICDO Condition
36520230	8503/3-C50.8	Intraductal papillary adenocarcinoma with invasion of overlapping lesion of breast	ICDO Condition
36402995	8507/3-C50.8	Invasive micropapillary carcinoma of breast of overlapping lesion of breast	ICDO Condition
36403018	8507/3-C50.4	Invasive micropapillary carcinoma of breast of upper-outer quadrant of breast	ICDO Condition
36523241	8510/3-C50.2	Medullary carcinoma, NOS, of upper-inner quadrant of breast	ICDO Condition
44498967	8575/3-C50.4	Metaplastic carcinoma, NOS, of upper-outer quadrant of breast	ICDO Condition
36684820	353501000119104	Primary malignant neoplasm of axillary tail of right female breast	Clinical Finding
44499540	8211/3-C50.1	Tubular adenocarcinoma of central portion of breast	ICDO Condition
44502389	8211/3-C50.3	Tubular adenocarcinoma of lower-inner quadrant of breast	ICDO Condition
44501344	8211/3-C50.5	Tubular adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
4112854	254844000	Malignant phyllodes tumor of breast	Clinical Finding
36525086	8000/3-C50.8	Neoplasm, malignant of overlapping lesion of breast	ICDO Condition
36564967	8541/3-C50.8	Paget disease and infiltrating duct carcinoma of breast of overlapping lesion of breast	ICDO Condition
36684817	353421000119109	Primary malignant neoplasm of axillary tail of left female breast	Clinical Finding
36544343	8501/3-C50.8	Comedocarcinoma, NOS, of overlapping lesion of breast	ICDO Condition
759932	1080101000119105	Infiltrating duct carcinoma of left female breast	Clinical Finding
759933	1080181000119102	Infiltrating duct carcinoma of right female breast	Clinical Finding
44502114	8503/3-C50.4	Intraductal papillary adenocarcinoma with invasion of upper-outer quadrant of breast	ICDO Condition
44500882	8520/3-C50.0	Lobular carcinoma, NOS, of nipple	ICDO Condition
4091467	188156001	Malignant neoplasm of axillary tail of female breast	Clinical Finding
36543936	8510/3-C50.8	Medullary carcinoma, NOS, of overlapping lesion of breast	ICDO Condition
4162253	372137005	Primary malignant neoplasm of breast	Clinical Finding
4117851	286895009	Carcinoma of breast - upper, outer quadrant	Clinical Finding

Id	Code	Name	Class
44500508	8522/3-C50.9	Infiltrating duct and lobular carcinoma of breast, NOS	ICDO Condition
4091469	188163001	Malignant neoplasm of nipple and areola of male breast	Clinical Finding
4091465	188154003	Malignant neoplasm of upper-outer quadrant of female breast	Clinical Finding
44501579	8480/3-C50.5	Mucinous adenocarcinoma of lower-outer quadrant of breast	ICDO Condition
44501721	8211/3-C50.9	Tubular adenocarcinoma of breast, NOS	ICDO Condition
44502022	8211/3-C50.2	Tubular adenocarcinoma of upper-inner quadrant of breast	ICDO Condition
44500306	8522/3-C50.3	Infiltrating duct and lobular carcinoma of lower-inner quadrant of breast	ICDO Condition
4089865	188050009	Malignant melanoma of breast	Clinical Finding
4155292	372094002	Malignant neoplasm of axillary tail of breast	Clinical Finding
35622134	763479005	Metaplastic carcinoma of breast	Clinical Finding
44501273	8480/3-C50.1	Mucinous adenocarcinoma of central portion of breast	ICDO Condition
44500301	8480/3-C50.3	Mucinous adenocarcinoma of lower-inner quadrant of breast	ICDO Condition

Table S2. Preliminary list of concepts for drugs of interest.

Id	Code	Name	Class	Domain	Vocabulary
1348265	84857	anastrozole	Ingredient	Drug	RxNorm
1315946	72965	letrozole	Ingredient	Drug	RxNorm
1436678	10324	tamoxifen	Ingredient	Drug	RxNorm

Table S3. List of concepts used for the outcomes of interest.

Code	Name	Domain	Vocabulary
193570009	Cataract	Condition	SNOMED
5888003	Keratitis	Condition	SNOMED
42059000	Retinal detachment	Condition	SNOMED
57534004	Retinal vascular disorder	Condition	SNOMED
28998008	Retinal hemorrhage	Condition	SNOMED
128473001	Uveitis	Condition	SNOMED
232035005	Retinal artery occlusion	Condition	SNOMED
232006002	Macular hole	Condition	SNOMED
397540003	Visual impairment	Condition	SNOMED
95690009	Retinal tear	Condition	SNOMED
312901001	Vitreomacular traction syndrome	Condition	SNOMED
95695004	Degeneration of retina	Condition	SNOMED
4134440	Visual system disorder	Condition	SNOMED

Table S4. List of concepts for co-morbidities.

Code	Name	Domain	Vocabulary
201820	Diabetes mellitus	Condition	SNOMED
320128	Essential hypertension	Condition	SNOMED
432867	Hyperlipidemia	Condition	SNOMED
433736	Obesity	Condition	SNOMED
140168	Psoriasis	Condition	SNOMED
434621	Autoimmune disease	Condition	SNOMED

Annex III. Sensitivity analyses

Table S1. Incidence rates of vitreomacular traction syndrome per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	18 to 54	Anastrozole	0	501	1,156	0
		Letrozole	0	752	1,507	0
		Tamoxifen	0	2,488	4,797	0
	≥55	Anastrozole	0	5,822	14,077	0
		Letrozole	0	3,738	8,006	0
		Tamoxifen	0	826	1,358	0
FinOMOP-THL	18 to 54	Anastrozole	0	120	20	0
		Letrozole	0	2,107	363	0
		Tamoxifen	0	5,811	996	0
	≥55	Anastrozole	0	2,209	412	0
		Letrozole	0	26,841	4,786	0
		Tamoxifen	0	2,260	405	0
IQVIA DA Germany	18 to 54	Anastrozole	0	230	368	0
		Letrozole	0	411	625	0
		Tamoxifen	0	3,350	6,091	0
	≥55	Anastrozole	0	2,100	3,316	0
		Letrozole	0	3,778	5,322	0
		Tamoxifen	0	4,311	6,503	0
BIFAP	18 to 54	Anastrozole	0	829	2,705	0
		Letrozole	0	4,842	12,915	0
		Tamoxifen	0	17,139	45,661	0
	≥55	Anastrozole	<5	6,056	19,702	Not applicable
		Letrozole	0	27,962	85,196	0
		Tamoxifen	0	4,224	10,458	0
CPRD GOLD	18 to 54	Anastrozole	0	502	1,141	0
		Letrozole	0	1,290	3,251	0
		Tamoxifen	0	7,350	21,002	0
	≥55	Anastrozole	<5	5,206	13,649	Not applicable
		Letrozole	<5	14,366	40,366	Not applicable
		Tamoxifen	<5	5,203	13,008	Not applicable

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CI= Confidence interval; CPRD GOLD= Clinical Practice Research Datalink GOLD; DA=Disease Analyzer Germany; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System; py= person-years.

Table S2. Incidence rates of keratitis per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole or tamoxifen

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
NAJS	Anastrozole	55 to 64	9	1,952	5,037	179 (82–339)
		65 to 74	16	2,291	5,684	281 (161–457)
		75 to 84	8	1,283	2,740	292 (126–575)
		≥85	<5	227	408	Not applicable
	Letrozole	55 to 64	6	1,244	2,863	210 (77–456)
		65 to 74	5	1,472	3,220	155 (50–362)
		75 to 84	6	780	1,487	404 (148–878)
		≥85	<5	192	290	Not applicable
	Tamoxifen	55 to 64	0	332	598	0
		65 to 74	0	263	448	0
		75 to 84	<5	168	242	Not applicable
		≥85	0	52	59	0
FinOMOP-THL	Anastrozole	55 to 64	0	681	119	0
		65 to 74	0	719	131	0
		75 to 84	0	569	112	0
		≥85	0	226	48	0
	Letrozole	55 to 64	<5	9,050	1,561	Not applicable
		65 to 74	<5	9,630	1,695	Not applicable
		75 to 84	<5	5,912	1,091	Not applicable
		≥85	<5	1,980	391	Not applicable
	Tamoxifen	55 to 64	0	809	139	0
		65 to 74	<5	671	117	Not applicable
		75 to 84	0	524	99	0
		≥85	0	233	46	0
IQVIA DA Germany	Anastrozole	55 to 64	0	633	1,147	0
		65 to 74	0	697	1,096	0
		75 to 84	0	628	919	0
		≥85	0	141	153	0
	Letrozole	55 to 64	0	1,180	1,860	0
		65 to 74	0	1,197	1,706	0
		75 to 84	0	1,106	1,451	0
		≥85	0	291	299	0
	Tamoxifen	55 to 64	0	1,699	2,686	0
		65 to 74	0	1,425	2,240	0
		75 to 84	0	958	1,319	0
		≥85	0	226	255	0

Data source	Treatment	Age group	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)
BIFAP	Anastrozole	55 to 64	26	2,259	7,760	335 (219–491)
		65 to 74	17	1,958	6,410	265 (155–425)
		75 to 84	10	1,243	3,812	262 (126–482)
		≥85	<5	432	1,101	Not applicable
	Letrozole	55 to 64	108	10,426	33,000	327 (268–395)
		65 to 74	86	8,649	27,047	318 (254–393)
		75 to 84	66	5,995	17,309	381 (295–485)
		≥85	13	2,156	5,093	255 (136–436)
	Tamoxifen	55 to 64	14	2,034	5,155	272 (148–456)
		65 to 74	10	1,103	2,873	348 (167–640)
		75 to 84	6	687	1,538	390 (143–849)
		≥85	0	306	619	0
CPRD GOLD	Anastrozole	55 to 64	<5	1,703	4,584	Not applicable
		65 to 74	<5	1,906	5,238	Not applicable
		75 to 84	<5	1,144	2,875	Not applicable
		≥85	<5	400	795	Not applicable
	Letrozole	55 to 64	14	4,174	12,952	108 (59–181)
		65 to 74	12	4,650	13,962	86 (44–150)
		75 to 84	<5	3,504	9,210	Not applicable
		≥85	<5	1,928	3,860	Not applicable
	Tamoxifen	55 to 64	<5	2,011	5,217	Not applicable
		65 to 74	<5	1,864	5,005	Not applicable
		75 to 84	0	902	2,107	0
		≥85	0	387	601	0

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Table S3. Median time to onset of eye disorders in years in FinOMOP-THL.

Outcome	Treatment	Patient	Median, years (IQR)
All visual system disorders	Anastrozole	18	0.07 (0.03–0.1)
	Letrozole	232	0.08 (0.04–0.13)
	Tamoxifen	17	0.07 (0.04–0.08)
Selected eye disorders combined	Anastrozole	10	0.11 (0.03–0.16)
	Letrozole	136	0.09 (0.04–0.13)
	Tamoxifen	14	0.08 (0.06–0.12)
Cataract	Anastrozole	7	0.15 (0.09–0.21)
	Letrozole	119	0.08 (0.05–0.12)
	Tamoxifen	12	0.08 (0.07–0.12)
Degeneration of retina	Letrozole	27	0.08 (0.03–0.12)

Outcome	Treatment	Patient	Median, years (IQR)
	Tamoxifen	5	0.08 (0.03–0.1)
Keratitis	Letrozole	9	0.12 (0.09–0.16)
Uveitis	Letrozole	8	0.12 (0.05–0.15)

Table S4. Median time to onset of eye disorders in years in IQVIA DA Germany.

Outcome	Treatment	Patient	Median (IQR)
All visual system disorders	Anastrozole	29	0.43 (0.31–1.44)
	Letrozole	47	0.71 (0.19–1.1)
	Tamoxifen	56	0.31 (0.16–0.79)
Selected eye disorders combined	Anastrozole	13	0.37 (0.09–1.67)
	Letrozole	13	0.75 (0.3–1.07)
	Tamoxifen	28	0.48 (0.12–1.39)
Cataract	Anastrozole	15	0.52 (0.23–1.6)
	Letrozole	11	0.77 (0.37–1.25)
	Tamoxifen	21	0.46 (0.12–1.87)
Visual impairment	Tamoxifen	7	0.54 (0.33–1.09)

Table S5. Sensitivity analysis: incidence rates of all visual system disorders per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole, or tamoxifen, with different time windows to build follow-up time.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
NAJS	18 to 54	Anastrozole	88	258	684	12,860 (10,314–15,843)	90
		Anastrozole	62	258	476	13,025 (9,986–16,698)	30
		Letrozole	93	366	796	11,677 (9,425–14,306)	90
		Letrozole	66	366	603	10,944 (8,464–13,923)	30
		Tamoxifen	348	1,224	2,792	12,464 (11,189–13,845)	90
		Tamoxifen	246	1,224	1,968	12,499 (10,986–14,163)	30
	≥55	Anastrozole	666	1,983	5,259	12,664 (11,720–13,663)	90
		Anastrozole	481	1,983	3,750	12,827 (11,706–14,026)	30
		Letrozole	358	1,301	3,030	11,814 (10,622–13,104)	90
		Letrozole	279	1,301	2,280	12,237 (10,843–13,760)	30
		Tamoxifen	63	270	518	12,154 (9,340–15,551)	90
		Tamoxifen	43	270	389	11,061 (8,005–14,899)	30
FinOMOP-THL	18 to 54	Anastrozole	<5	104	41	Not applicable	90
		Anastrozole	<5	104	18	Not applicable	30
		Letrozole	37	1,668	654	5,657 (3,983–7,797)	90
		Letrozole	15	1,668	286	5,247 (2,937–8,654)	30

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
		Tamoxifen	87	4,837	1,870	4,652 (3,726–5,739)	90
		Tamoxifen	47	4,837	826	5,693 (4,183–7,571)	30
	≥55	Anastrozole	52	1,575	713	7,290 (5,445–9,560)	90
		Anastrozole	18	1,575	291	6,180 (3,663–9,767)	30
		Letrozole	558	17,541	7,311	7,632 (7,012–8,292)	90
		Letrozole	232	17,541	3,095	7,496 (6,562–8,525)	30
		Tamoxifen	46	1,548	647	7,105 (5,202–9,477)	90
		Tamoxifen	17	1,548	272	6,246 (3,638–10,000)	30
IQVIA DA Germany	18 to 54	Anastrozole	<5	223	592	Not applicable	90
		Anastrozole	<5	223	359	Not applicable	30
		Letrozole	7	388	876	799 (321–1,646)	90
		Letrozole	<5	388	596	Not applicable	30
		Tamoxifen	48	3,204	9,435	509 (375–675)	90
		Tamoxifen	32	3,204	5,876	545 (372–769)	30
	≥55	Anastrozole	43	1,853	4,539	947 (686–1,276)	90
		Anastrozole	29	1,853	3,050	951 (637–1,366)	30
		Letrozole	76	3,295	7,203	1,055 (831–1,321)	90
		Letrozole	47	3,295	4,795	980 (720–1,303)	30
		Tamoxifen	92	3,898	9,322	987 (796–1,210)	90
		Tamoxifen	56	3,898	6,004	933 (705–1,211)	30
BIFAP	18 to 54	Anastrozole	105	556	1,791	5,864 (4,796–7,098)	90
		Anastrozole	95	556	1,621	5,860 (4,741–7,163)	30
		Letrozole	518	3,282	8,864	5,844 (5,351–6,369)	90
		Letrozole	460	3,282	7,668	5,999 (5,463–6,573)	30
		Tamoxifen	1725	11,708	36,275	4,755 (4,534–4,985)	90
		Tamoxifen	1371	11,708	28,279	4,848 (4,595–5,112)	30
	≥55	Anastrozole	859	3,099	9,411	9,128 (8,527–9,759)	90
		Anastrozole	770	3,099	8,287	9,292 (8,647–9,972)	30
		Letrozole	3525	14,464	42,654	8,264 (7,994–8,541)	90
		Letrozole	3160	14,464	37,585	8,408 (8,117–8,706)	30
		Tamoxifen	455	2,252	6,139	7,412 (6,747–8,125)	90
		Tamoxifen	363	2,252	4,872	7,451 (6,704–8,258)	30
CPRD GOLD	18 to 54	Anastrozole	23	373	942	2,441 (1,548–3,663)	90
		Anastrozole	21	373	789	2,661 (1,647–4,067)	30
		Letrozole	71	1,033	2,964	2,395 (1,871–3,022)	90
		Letrozole	67	1,033	2,508	2,672 (2,071–3,393)	30
		Tamoxifen	317	5,756	20,127	1,575 (1,406–1,758)	90

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
		Tamoxifen	256	5,756	16,116	1,588 (1,400–1,795)	30
	≥55	Anastrozole	360	3,112	8,520	4,225 (3,800–4,685)	90
		Anastrozole	332	3,112	7,540	4,403 (3,942–4,903)	30
		Letrozole	1030	8,915	26,677	3,861 (3,629–4,104)	90
		Letrozole	909	8,915	23,699	3,836 (3,590–4,093)	30
		Tamoxifen	329	3,425	9,904	3,322 (2,973–3,701)	90
		Tamoxifen	288	3,425	8,336	3,455 (3,067–3,878)	30

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Table S6. Sensitivity analysis: incidence rates of selected eye disorders combined per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole, or tamoxifen, with different time windows to build follow-up time.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
NAJS	18 to 54	Anastrozole	13	483	1,559	834 (444–1,426)	90
		Anastrozole	10	483	1,091	917 (440–1,686)	30
		Letrozole	14	730	2,051	682 (373–1,145)	90
		Letrozole	8	730	1,454	550 (238–1,084)	30
		Tamoxifen	38	2,414	6,816	558 (395–765)	90
		Tamoxifen	28	2,414	4,631	605 (402–874)	30
	≥55	Anastrozole	574	4,521	14,316	4,009 (3,688–4,351)	90
		Anastrozole	413	4,521	10,117	4,082 (3,698–4,495)	30
		Letrozole	300	2,986	8,179	3,668 (3,265–4,107)	90
		Letrozole	223	2,986	6,056	3,682 (3,215–4,199)	30
		Tamoxifen	55	659	1,457	3,774 (2,843–4,912)	90
		Tamoxifen	37	659	1,061	3,488 (2,456–4,807)	30
FinOMOP-THL	18 to 54	Anastrozole	<5	114	45	Not applicable	90
		Anastrozole	0	114	19	0	30
		Letrozole	6	2,045	803	747 (274–1,626)	90
		Letrozole	<5	2,045	352	Not applicable	30
		Tamoxifen	17	5,663	2,230	762 (444–1,221)	90
		Tamoxifen	7	5,663	971	721 (290–1,485)	30
	≥55	Anastrozole	35	1,883	863	4,054 (2,824–5,638)	90
		Anastrozole	10	1,883	349	2,869 (1,376–5,277)	30
		Letrozole	374	22,185	9,293	4,025 (3,627–4,454)	90
		Letrozole	136	22,185	3,925	3,465 (2,907–4,099)	30

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
		Tamoxifen	35	1,884	795	4,405 (3,068–6,126)	90
		Tamoxifen	14	1,884	333	4,201 (2,296–7,048)	30
IQVIA DA Germany	18 to 54	Anastrozole	<5	229	602	Not applicable	90
		Anastrozole	0	229	368	0	30
		Letrozole	<5	409	912	Not applicable	90
		Letrozole	<5	409	612	Not applicable	30
		Tamoxifen	10	3,327	9,778	102 (49–188)	90
		Tamoxifen	8	3,327	6,059	132 (57–260)	30
	≥55	Anastrozole	15	1,992	4,839	310 (174–511)	90
		Anastrozole	13	1,992	3,215	404 (215–691)	30
		Letrozole	27	3,571	7,706	350 (231–510)	90
		Letrozole	13	3,571	5,095	255 (136–436)	30
		Tamoxifen	45	4,139	9,848	457 (333–611)	90
		Tamoxifen	28	4,139	6,305	444 (295–642)	30
BIFAP	18 to 54	Anastrozole	15	813	2,927	512 (287–845)	90
		Anastrozole	13	813	2,620	496 (264–849)	30
		Letrozole	97	4,733	14,335	677 (549–826)	90
		Letrozole	86	4,733	12,440	691 (553–854)	30
		Tamoxifen	243	16,832	57,488	423 (371–479)	90
		Tamoxifen	180	16,832	44,528	404 (347–468)	30
	≥55	Anastrozole	596	4,963	17,159	3,473 (3,200–3,764)	90
		Anastrozole	528	4,963	15,143	3,487 (3,196–3,797)	30
		Letrozole	2348	22,995	75,347	3,116 (2,991–3,245)	90
		Letrozole	2068	22,995	66,547	3,108 (2,975–3,244)	30
		Tamoxifen	296	3,627	10,817	2,736 (2,434–3,067)	90
		Tamoxifen	228	3,627	8,637	2,640 (2,308–3,005)	30
CPRD GOLD	18 to 54	Anastrozole	<5	499	1,334	Not applicable	90
		Anastrozole	<5	499	1,133	Not applicable	30
		Letrozole	10	1,278	3,781	264 (127–486)	90
		Letrozole	10	1,278	3,186	314 (151–577)	30
		Tamoxifen	50	7,244	25,783	194 (144–256)	90
		Tamoxifen	34	7,244	20,680	164 (114–230)	30
	≥55	Anastrozole	227	4,576	13,074	1,736 (1,518–1,977)	90
		Anastrozole	203	4,576	11,602	1,750 (1,517–2,008)	30
		Letrozole	725	12,467	38,672	1,875 (1,741–2,016)	90
		Letrozole	641	12,467	34,427	1,862 (1,721–2,012)	30
		Tamoxifen	213	4,677	13,659	1,559 (1,357–1,783)	90

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
		Tamoxifen	179	4,677	11,505	1,556 (1,336–1,801)	30

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Table S7. Sensitivity analysis: incidence rates of cataract per 100,000 person-years in women with breast cancer treated with anastrozole, letrozole, or tamoxifen, with different time windows to build follow-up time.

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
NAJS	18 to 54	Anastrozole	7	491	1,601	437 (176–901)	90
		Anastrozole	<5	491	1,126	Not applicable	30
		Letrozole	9	745	2,106	427 (195–811)	90
		Letrozole	<5	745	1,489	Not applicable	30
		Tamoxifen	19	2,467	6,992	272 (164–424)	90
		Tamoxifen	14	2,467	4,741	295 (161–495)	30
	≥55	Anastrozole	528	4,717	15,145	3,486 (3,195–3,797)	90
		Anastrozole	383	4,717	10,702	3,579 (3,229–3,956)	30
		Letrozole	270	3,100	8,582	3,146 (2,782–3,545)	90
		Letrozole	194	3,100	6,340	3,060 (2,645–3,522)	30
		Tamoxifen	56	683	1,513	3,701 (2,795–4,806)	90
		Tamoxifen	39	683	1,099	3,549 (2,524–4,852)	30
FinOMOP-THL	18 to 54	Anastrozole	0	119	47	0	90
		Anastrozole	0	119	20	0	30
		Letrozole	<5	2,093	823	Not applicable	90
		Letrozole	0	2,093	360	0	30
		Tamoxifen	<5	5,781	2,277	Not applicable	90
		Tamoxifen	<5	5,781	991	Not applicable	30
	≥55	Anastrozole	28	1,963	905	3,093 (2,055–4,470)	90
		Anastrozole	7	1,963	364	1,925 (774–3,967)	30
		Letrozole	314	23,260	9,777	3,212 (2,866–3,587)	90
		Letrozole	119	23,260	4,120	2,888 (2,393–3,456)	30
		Tamoxifen	28	1,964	829	3,376 (2,243–4,879)	90
		Tamoxifen	12	1,964	348	3,446 (1,781–6,020)	30
IQVIA DA Germany	18 to 54	Anastrozole	0	229	603	0	90
		Anastrozole	0	229	368	0	30
		Letrozole	<5	411	922	Not applicable	90
		Letrozole	<5	411	621	Not applicable	30
		Tamoxifen	<5	3,347	9,818	Not applicable	90

Data source	Age group	Treatment	Events	Patients	Person-years	Incidence per 100,000 py (95% CI)	Time window
		Tamoxifen	<5	3,347	6,082	Not applicable	30
	≥55	Anastrozole	16	2,032	4,888	327 (187–532)	90
		Anastrozole	15	2,032	3,248	462 (259–762)	30
		Letrozole	26	3,633	7,804	333 (218–488)	90
		Letrozole	11	3,633	5,151	214 (107–382)	30
		Tamoxifen	36	4,196	9,939	362 (254–501)	90
		Tamoxifen	21	4,196	6,357	330 (204–505)	30
BIFAP	18 to 54	Anastrozole	8	819	2,974	269 (116–530)	90
		Anastrozole	6	819	2,662	225 (83–491)	30
		Letrozole	71	4,795	14,574	487 (380–614)	90
		Letrozole	61	4,795	12,654	482 (369–619)	30
		Tamoxifen	145	17,041	58,327	249 (210–293)	90
		Tamoxifen	99	17,041	45,197	219 (178–267)	30
	≥55	Anastrozole	544	5,122	17,863	3,045 (2,795–3,312)	90
		Anastrozole	479	5,122	15,740	3,043 (2,777–3,328)	30
		Letrozole	2137	23,762	78,388	2,726 (2,612–2,844)	90
		Letrozole	1878	23,762	69,225	2,713 (2,592–2,838)	30
		Tamoxifen	265	3,723	11,178	2,371 (2,094–2,674)	90
		Tamoxifen	203	3,723	8,917	2,276 (1,974–2,612)	30
CPRD GOLD	18 to 54	Anastrozole	<5	502	1,348	Not applicable	90
		Anastrozole	<5	502	1,141	Not applicable	30
		Letrozole	5	1,288	3,832	130 (42–304)	90
		Letrozole	5	1,288	3,236	155 (50–361)	30
		Tamoxifen	24	7,330	26,104	92 (59–137)	90
		Tamoxifen	18	7,330	20,919	86 (51–136)	30
	≥55	Anastrozole	178	4,775	13,724	1,297 (1,113–1,502)	90
		Anastrozole	164	4,775	12,199	1,344 (1,147–1,567)	30
		Letrozole	591	12,962	40,365	1,464 (1,348–1,587)	90
		Letrozole	525	12,962	35,914	1,462 (1,339–1,592)	30
		Tamoxifen	179	4,828	14,125	1,267 (1,088–1,467)	90
		Tamoxifen	148	4,828	11,880	1,246 (1,053–1,463)	30

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CI= Confidence interval; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System; py= person-years.

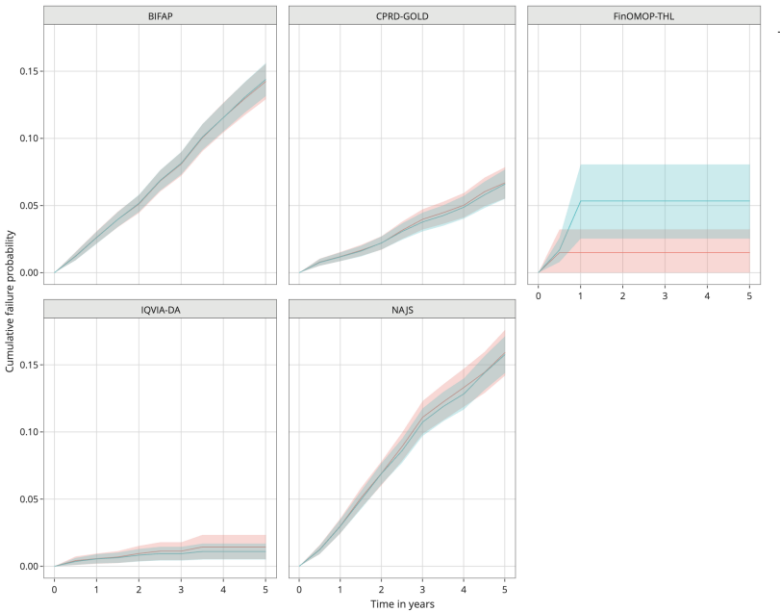

Figure S1. Cumulative incidence of cataract among postmenopausal women with breast cancer treated with anastrozole when drug era was constructed using 30-day (red line) and 90-day (green line) gaps.

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 month up to 5 years.

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

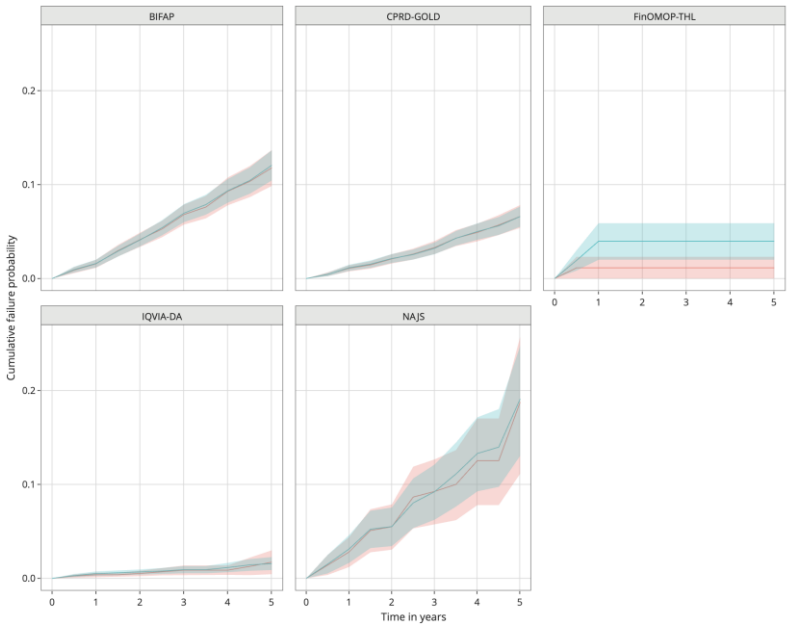

Figure S2. Cumulative incidence of cataract among postmenopausal women with breast cancer treated with tamoxifen when drug era was constructed using 30-day (red line) and 90-day (green line) gaps.

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 month up to 5 years.

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

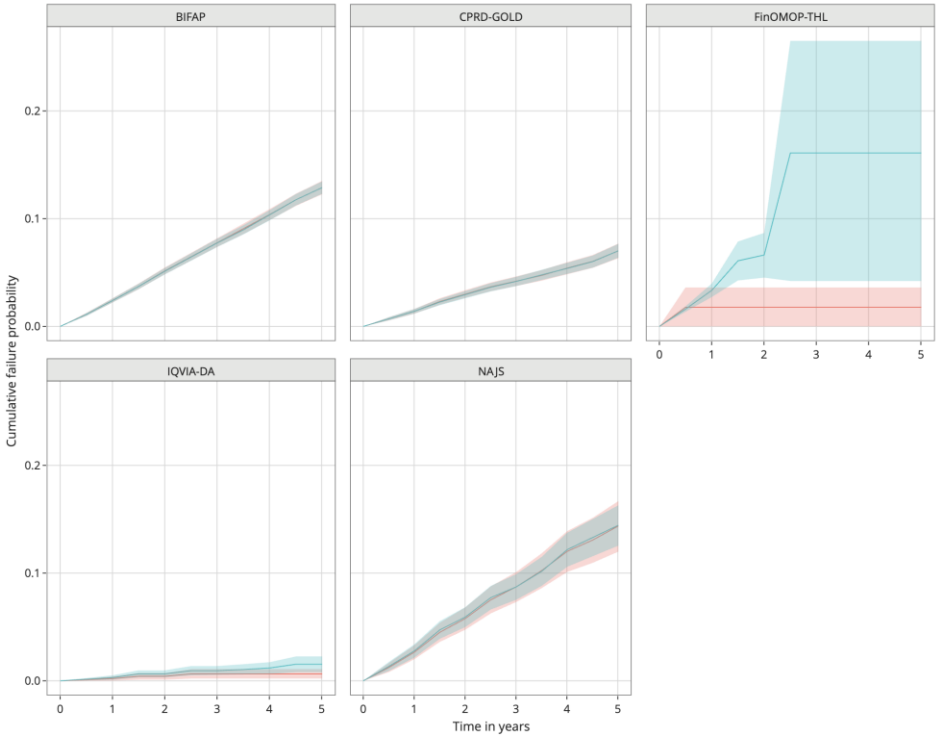

Figure S3. Cumulative incidence of cataract among postmenopausal women with breast cancer treated with letrozole when drug era was constructed using 30-day (red line) and 90-day (green line) gaps.

Shading represents 95% confidence interval for the probabilities of eye disorders, calculated using Kaplan-Meier methods for every 6 month up to 5 years.

BIFAP= Base de Datos para la Investigación Farmacoepidemiológica en el Ámbito Público; CPRD GOLD= Clinical Practice Research Datalink GOLD; IQVIA DA Germany= IQVIA Disease Analyzer; FinOMOP-THL= Finnish Care Register for Health Care; NAJS= Croatian National Public Health Information System.

Annex IV. Glossary

Additional definitions are available in the EMA Glossary of terms https://www.ema.europa.eu/en/about-us/glossaries.

Aggregated Data

Data collected and combined from multiple sources to generate summary information, typically anonymised.

Benefit-Risk Assessment

Evaluation of the positive therapeutic effects of a medicine compared to its risks (e.g., side effects).

Common Data Model (CDM)

A standardized data structure that enables data from multiple sources to be harmonized, making analysis consistent and reproducible. DARWIN EU utilizes the OMOP CDM maintained by the OHDSI community.

Complex Studies (C3)

Studies requiring the development or customization of specific study designs, protocols, and Statistical Analysis Plans (SAPs), with extensive collection or extraction of data. Examples include etiological studies measuring the strength and determinants of an association between an exposure and the occurrence of a health outcome in a defined population considering sources of bias, potential confounding factors, and effect modifiers.

Coordination Centre (CC)

The central hub responsible for managing and overseeing the activities within DARWIN EU®. It is based at Erasmus University Medical Centre in Rotterdam, the Netherlands.

Data Access

The process of obtaining permission to use specific datasets for regulatory or scientific studies.

Data Quality Framework

A set of standards and procedures to ensure accuracy, completeness, timeliness, and consistency of data used in DARWIN EU.

Data Source

A database or repository of structured health-related data, such as electronic health records (EHRs), insurance claims, or registries.

DARWIN EU®

The European Medicines Agency's (EMA) federated network of real-world data sources designed to generate evidence to support regulatory decision-making.

EMA (European Medicines Agency)

The regulatory body responsible for the evaluation and supervision of medicinal products in the EU, overseeing DARWIN EU.

Evidence Generation

The process of analysing real-world data to produce scientific information that can inform healthcare or regulatory decisions.

Federated Network

A data infrastructure where data remain at their original location but can be analysed in a harmonized way across multiple partners using a common model and tools.

GDPR (General Data Protection Regulation)

The EU regulation governing the protection of personal data and privacy, crucial to how DARWIN EU handles health data.

Health Technology Assessment (HTA)

A systematic evaluation of properties and impacts of health technology, often using DARWIN EU data to support assessments.

Metadata

Descriptive information about a data source (e.g., its content, quality, and structure), essential for identifying relevant databases in DARWIN EU studies.

Off-the-Shelf Studies (OTS)

Studies for which a standard protocol per study/analysis type and standardized analytics may be developed and applied or adapted, typically relating to a descriptive research question. This includes studies on disease epidemiology, for example, the estimation of the prevalence or incidence of health outcomes in defined time periods and population groups, or drug utilization studies at the population or patient level.

OHDSI (Observational Health Data Sciences and Informatics)

An open-science collaborative community that develops tools and standards (including the OMOP CDM) to enable large-scale analytics of observational health data. OHDSI provides the technical and scientific foundation for DARWIN EU's analytical ecosystem.

Patient-Level Data

Data related to individual patients, often de-identified, used for longitudinal or detailed analyses.

OMOP (Observational Medical Outcomes Partnership)

A common data model (CDM) that standardizes the structure and content of observational healthcare data, enabling systematic analysis across disparate datasets. DARWIN EU uses the OMOP CDM to ensure interoperability and consistency in real-world evidence generation.

Real-World Data (RWD)

Data relating to patient health status or healthcare delivery that is collected from routine clinical practice rather than from randomized controlled trials.

Real-World Evidence (RWE)

Clinical evidence derived from the analysis of RWD, used to inform decisions by regulators, payers, or clinicians.

Regulatory Decision-Making

The process by which authorities like EMA assess data to authorize, monitor, or modify the use of medicines in the EU.

Routine Repeated Studies (RR)

Studies that are either Off-the-Shelf or Complex studies repeated on a regular basis, following the same protocol and study code, but with updated data and/or different data partners.

Study Protocol

A detailed plan describing how a specific real-world study will be conducted, including objectives, design, data sources, and analyses.

Very Complex Studies (C4)

Studies which cannot rely only on electronic health care databases, or which would require complex methodological work, for example, due to the occurrence of events that cannot be defined by existing diagnosis codes, including events that do not yet have a diagnosis code, where it may be necessary to combine a diagnosis code with other data such as results of laboratory investigations. These studies might require the collection of data prospectively, or the inclusion of new (not previously onboarded) data sources.