

Anastrozole

Dosage form: tablet

Drug classes: Aromatase inhibitors, Hormones / antineoplastics

Medically reviewed by Drugs.com. Last updated on Jan 1, 2022.

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Indications and Usage for Anastrozole

Adjuvant Treatment

Anastrozole is indicated for adjuvant treatment of postmenopausal women with hormone receptor-positive early breast cancer.

First-Line Treatment

Anastrozole is indicated for the first-line treatment of postmenopausal women with hormone receptor-positive or hormone receptor unknown locally advanced or metastatic breast cancer.

Second-Line Treatment

Anastrozole is indicated for the treatment of advanced breast cancer in postmenopausal women with disease progression following tamoxifen therapy. Patients with ER-negative disease and patients who did not respond to previous tamoxifen therapy rarely responded to Anastrozole.

Anastrozole Dosage and Administration

Recommended Dose

The dose of Anastrozole is one 1 mg tablet taken once a day. For patients with advanced breast cancer, Anastrozole Tablets should be continued until tumor progression. Anastrozole Tablets can be taken with or without food.

For adjuvant treatment of early breast cancer in postmenopausal women, the optimal duration of therapy is unknown. In the ATAC trial, Anastrozole was administered for five years [see Clinical Studies (14.1)].

No dosage adjustment is necessary for patients with renal impairment or for elderly patients [see Use in Specific Populations (8.6)].

Patients with Hepatic Impairment

No changes in dose are recommended for patients with mild-to-moderate hepatic impairment. Anastrozole Tablets have not been studied in patients with severe hepatic impairment [see Use in Specific Populations (8.7)].

Dosage Forms and Strengths

Anastrozole Tablets, USP 1 mg are white, circular, biconvex tablets, debossed with 'YL' on one side, and '111' on the other side.

Contraindications

Hypersensitivity

Anastrozole is contraindicated in any patient who has shown a hypersensitivity reaction to the drug or to any of the excipients. Observed reactions include anaphylaxis, angioedema, and urticaria [see Adverse Reactions (6.2)].

Warnings and Precautions

Ischemic Cardiovascular Events

In women with pre-existing ischemic heart disease, an increased incidence of ischemic cardiovascular events was observed with Anastrozole in the ATAC trial (17% of patients on Anastrozole and 10% of patients on tamoxifen). Consider risk and benefits of Anastrozole therapy in patients with pre-existing ischemic heart disease [see Adverse Reactions (6.1)].

Bone Effects

Results from the ATAC trial bone substudy at 12 and 24 months demonstrated that patients receiving Anastrozole had a mean decrease in both lumbar spine and total hip bone mineral density (BMD) compared to baseline. Patients receiving tamoxifen had a mean increase in both lumbar

spine and total hip BMD compared to baseline. Consider bone mineral density monitoring in patients treated with Anastrozole Tablets [see Adverse Reactions (6.1)].

Cholesterol

During the ATAC trial, more patients receiving Anastrozole were reported to have elevated serum cholesterol compared to patients receiving tamoxifen (9% versus 3.5%, respectively) [see Adverse Reactions (6.1)].

Embryo-Fetal Toxicity

Based on findings from animal studies and its mechanism of action, Anastrozole can cause fetal harm when administered to a pregnant woman. Anastrozole caused embryo-fetal toxicities in rats at maternal exposure that were 9 times the human clinical exposure, based on area under the curve (AUC). In rabbits, Anastrozole caused pregnancy failure at doses equal to or greater than 16 times the recommended human dose on a mg/m² basis. Advise pregnant women and females of reproductive potential of the potential risk to a fetus. Advise females of reproductive potential to use effective contraception during therapy with Anastrozole and for at least 3 weeks after the last dose [see Use in Specific Populations (8.1, 8.3) and Clinical Pharmacology (12.1)].

Adverse Reactions

Serious adverse reactions with Anastrozole occurring in less than 1 in 10,000 patients, are: 1) skin reactions such as lesions, ulcers, or blisters; 2) allergic reactions with swelling of the face, lips, tongue, and/or throat. This may cause difficulty in swallowing and/or breathing; and 3) changes in blood tests of the liver function, including inflammation of the liver with symptoms that may include a general feeling of not being well, with or without jaundice, liver pain or liver swelling [see Adverse Reactions (6.2)].

Common adverse reactions (occurring with an incidence of ≥10%) in women taking Anastrozole included: hot flashes, asthenia, arthritis, pain, arthralgia, hypertension, depression, nausea and vomiting, rash, osteoporosis, fractures, back pain, insomnia, headache, bone pain, peripheral edema, increased cough, dyspnea, pharyngitis and lymphedema.

In the ATAC trial, the most common reported adverse reaction (>0.1%) leading to discontinuation of therapy for both treatment groups was hot flashes, although there were fewer patients who discontinued therapy as a result of hot flashes in the Anastrozole group.

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

Clinical Trials Experience

Adjuvant Therapy

Adverse reaction data for adjuvant therapy are based on the ATAC trial [see Clinical Studies (14.1)]. The median duration of adjuvant treatment for safety evaluation was 59.8 months and 59.6 months for patients receiving Anastrozole 1 mg and tamoxifen 20 mg, respectively.

Adverse reactions occurring with an incidence of at least 5% in either treatment group during treatment or within 14 days of the end of treatment are presented in Table 1.

Table 1 — Adverse reactions occurring with an incidence of at least 5% in either treatment group during treatment, or within 14 days of the end of treatment in the ATAC trial *

Body system and adverse reactions by COSTART † preferred term †	Anastrozole 1 mg (N §= 3092)	Tamoxifen 20 mg (N § = 3094)
Body as a whole		
Asthenia	575 (19)	544 (18)
Pain	533 (17)	485 (16)
Back pain	321 (10)	309 (10)
Headache	314 (10)	249 (8)
Abdominal pain	271 (9)	276 (9)
Infection	285 (9)	276 (9)
Accidental injury	311 (10)	303 (10)
Flu syndrome	175 (6)	195 (6)
Chest pain	200 (7)	150 (5)
Neoplasm	162 (5)	144 (5)
Cyst	138 (5)	162 (5)
Cardiovascular		
Vasodilatation	1104 (36)	1264 (41)
Hypertension	402 (13)	349 (11)

Digestive		
Nausea	343 (11)	335 (11)
Constipation	249 (8)	252 (8)
Diarrhea	265 (9)	216 (7)
Dyspepsia	206 (7)	169 (6)
Gastrointestinal disorder	210 (7)	158 (5)
Hemic and lymphatic		
Lymphedema	304 (10)	341 (11)
Anemia	113 (4)	159 (5)
Metabolic and nutritional		
Peripheral edema	311 (10)	343 (11)
Weight gain	285 (9)	274 (9)
Hypercholesterolemia	278 (9)	108 (3.5)
Musculoskeletal		
Arthritis	512 (17)	445 (14)
Arthralgia	467 (15)	344 (11)
Osteoporosis	325 (11)	226 (7)
Fracture	315 (10)	209 (7)
Bone pain	201 (7)	185 (6)
Arthrosis	207 (7)	156 (5)
Joint Disorder	184 (6)	160 (5)
Myalgia	179 (6)	160 (5)
Nervous system		

Depression	413 (13)	382 (12)
Insomnia	309 (10)	281 (9)
Dizziness	236 (8)	234 (8)
Anxiety	195 (6)	180 (6)
Paresthesia	215 (7)	145 (5)
Respiratory		
Pharyngitis	443 (14)	422 (14)
Cough increased	261 (8)	287 (9)
Dyspnea	234 (8)	237 (8)
Sinusitis	184 (6)	159 (5)
Bronchitis	167 (5)	153 (5)
Skin and appendages		
Rash	333 (11)	387 (13)
Sweating	145 (5)	177 (6)
Special Senses		
Cataract Specified	182 (6)	213 (7)
Urogenital		
Leukorrhea	86 (3)	286 (9)
Urinary tract infection	244 (8)	313 (10)
Breast pain	251 (8)	169 (6)
Breast Neoplasm	164 (5)	139 (5)
Vulvovaginitis	194 (6)	150 (5)
Vaginal Hemorrhage ¶	122 (4)	180 (6)

Vaginitis	125 (4)	158 (5)
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*The combination arm was discontinued due to lack of efficacy benefit at 33 months of follow-up.
†COSTART Coding Symbols for Thesaurus of Adverse Reaction Terms.
‡A patient may have had more than 1 adverse reaction, including more than 1 adverse reaction in the same body system.
§N=Number of patients receiving the treatment.
¶Vaginal Hemorrhage without further diagnosis.

Certain adverse reactions and combinations of adverse reactions were prospectively specified for analysis, based on the known pharmacologic properties and side effect profiles of the two drugs (see Table 2).

Table 2 — Number of Patients with Pre-specified Adverse Reactions in ATAC Trial *

	Anastrozole N= 3092 (%)	Tamoxifen N=3094(%)	Odds- ratio	95% CI
Hot Flashes	1104 (36)	1264 (41)	0.80	0.73 - 0.89
Musculoskeletal Events †	1100 (36)	911 (29)	1.32	1.19 - 1.47
Fatigue/Asthenia	575 (19)	544 (18)	1.07	0.94 - 1.22
Mood Disturbances	597 (19)	554 (18)	1.10	0.97 - 1.25
Nausea and Vomiting	393 (13)	384 (12)	1.03	0.88 - 1.19
All Fractures	315 (10)	209 (7)	1.57	1.30 - 1.88
Fractures of Spine, Hip, or Wrist	133 (4)	91 (3)	1.48	1.13 - 1.95
Wrist/Colles' fractures	67 (2)	50 (2)		
Spine fractures	43 (1)	22 (1)		
Hip fractures	28 (1)	26 (1)		
Cataracts	182 (6)	213 (7)	0.85	0.69 - 1.04
Vaginal Bleeding	167 (5)	317 (10)	0.50	0.41 - 0.61
Ischemic Cardiovascular Disease	127 (4)	104 (3)	1.23	0.95 - 1.60

Vaginal Discharge	109 (4)	408 (13)	0.24	0.19 - 0.30
Venous Thromboembolic events	87 (3)	140 (5)	0.61	0.47 - 0.80
Deep Venous Thromboembolic Events	48 (2)	74 (2)	0.64	0.45 - 0.93
Ischemic Cerebrovascular Event	62 (2)	88 (3)	0.70	0.50 - 0.97
Endometrial Cancer ‡	4 (0.2)	13 (0.6)	0.31	0.10 - 0.94
<p>*Patients with multiple events in the same category are counted only once in that category. †Refers to joint symptoms, including joint disorder, arthritis, arthrosis and arthralgia. ‡Percentages calculated based upon the numbers of patients with an intact uterus at baseline</p>				

Ischemic Cardiovascular Events

Between treatment arms in the overall population of 6186 patients, there was no statistical difference in ischemic cardiovascular events (4% Anastrozole vs. 3% tamoxifen). In the overall population, angina pectoris was reported in 71/3092 (2.3%) patients in the Anastrozole arm and 51/3094 (1.6%) patients in the tamoxifen arm; myocardial infarction was reported in 37/3092 (1.2%) patients in the Anastrozole arm and 34/3094 (1.1%) patients in the tamoxifen arm.

In women with pre-existing ischemic heart disease 465/6186 (7.5%), the incidence of ischemic cardiovascular events was 17% in patients on Anastrozole and 10% in patients on tamoxifen. In this patient population, angina pectoris was reported in 25/216 (11.6%) patients receiving Anastrozole and 13/249 (5.2%) patients receiving tamoxifen; myocardial infarction was reported in 2/216 (0.9%) patients receiving Anastrozole and 8/249 (3.2%) patients receiving tamoxifen.

Bone Mineral Density Findings

Results from the ATAC trial bone substudy at 12 and 24 months demonstrated that patients receiving Anastrozole had a mean decrease in both lumbar spine and total hip bone mineral density (BMD) compared to baseline. Patients receiving tamoxifen had a mean increase in both lumbar spine and total hip BMD compared to baseline.

Because Anastrozole lowers circulating estrogen levels it may cause a reduction in bone mineral density.

A post-marketing trial assessed the combined effects of Anastrozole and the bisphosphonate risedronate on changes from baseline in BMD and markers of bone resorption and formation in postmenopausal women with hormone receptor-positive early breast cancer. All patients received

calcium and vitamin D supplementation. At 12 months, small reductions in lumbar spine bone mineral density were noted in patients not receiving bisphosphonates. Bisphosphonate treatment preserved bone density in most patients at risk of fracture.

Postmenopausal women with early breast cancer scheduled to be treated with Anastrozole should have their bone status managed according to treatment guidelines already available for postmenopausal women at similar risk of fragility fracture.

Cholesterol

During the ATAC trial, more patients receiving Anastrozole were reported to have an elevated serum cholesterol compared to patients receiving tamoxifen (9% versus 3.5%, respectively).

A post-marketing trial also evaluated any potential effects of Anastrozole on lipid profile. In the primary analysis population for lipids (Anastrozole alone), there was no clinically significant change in LDL-C from baseline to 12 months and HDL-C from baseline to 12 months.

In secondary population for lipids (Anastrozole + risedronate), there also was no clinically significant change in LDL-C and HDL-C from baseline to 12 months.

In both populations for lipids, there was no clinically significant difference in total cholesterol (TC) or serum triglycerides (TG) at 12 months compared with baseline.

In this trial, treatment for 12 months with Anastrozole alone had a neutral effect on lipid profile. Combination treatment with Anastrozole and risedronate also had a neutral effect on lipid profile.

The trial provides evidence that postmenopausal women with early breast cancer scheduled to be treated with Anastrozole should be managed using the current National Cholesterol Education Program guidelines for cardiovascular risk-based management of individual patients with LDL elevations.

Other Adverse Reactions

Patients receiving Anastrozole had an increase in joint disorders (including arthritis, arthrosis and arthralgia) compared with patients receiving tamoxifen. Patients receiving Anastrozole had an increase in the incidence of all fractures (specifically fractures of spine, hip and wrist) [315 (10%)] compared with patients receiving tamoxifen [209 (7%)].

Patients receiving Anastrozole had a higher incidence of carpal tunnel syndrome [78 (2.5%)] compared with patients receiving tamoxifen [22 (0.7%)].

Vaginal bleeding occurred more frequently in the tamoxifen-treated patients versus the Anastrozole-treated patients 317 (10%) versus 167 (5%), respectively.

Patients receiving Anastrozole had a lower incidence of hot flashes, vaginal bleeding, vaginal discharge, endometrial cancer, venous thromboembolic events and ischemic cerebrovascular events compared with patients receiving tamoxifen.

10-year median follow-up Safety Results from the ATAC Trial

Results are consistent with the previous analyses.

Serious adverse reactions were similar between Anastrozole (50%) and tamoxifen (51%).

- Cardiovascular events were consistent with the known safety profiles of Anastrozole and tamoxifen.
- The cumulative incidences of all first fractures (both serious and non-serious, occurring either during or after treatment) was higher in the Anastrozole group (15%) compared to the tamoxifen group (11%). This increased first fracture rate during treatment did not continue in the post-treatment follow-up period.
- The cumulative incidence of new primary cancers was similar in the Anastrozole group (13.7%) compared to the tamoxifen group (13.9%). Consistent with the previous analyses, endometrial cancer was higher in the tamoxifen group (0.8%) compared to the Anastrozole group (0.2%).
- The overall number of deaths (during or off-trial treatment) was similar between the treatment groups. There were more deaths related to breast cancer in the tamoxifen than in the Anastrozole treatment group.

First-Line Therapy

Adverse reactions occurring with an incidence of at least 5% in either treatment group of trials 0030 and 0027 during or within 2 weeks of the end of treatment are shown in Table 3.

Table 3 – Adverse Reactions Occurring with an Incidence of at Least 5% in Trials 0030 and 0027

Body system Adverse Reaction *	Number (%) of subjects
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	Anastrozole (N=506)	Tamoxifen (N=511)
Whole body		
Asthenia	83 (16)	81 (16)
Pain	70 (14)	73 (14)
Back pain	60 (12)	68 (13)
Headache	47 (9)	40 (8)
Abdominal pain	40 (8)	38 (7)
Chest pain	37 (7)	37 (7)
Flu syndrome	35 (7)	30 (6)
Pelvic pain	23 (5)	30 (6)
Cardiovascular		
Vasodilation	128 (25)	106 (21)
Hypertension	25 (5)	36 (7)
Digestive		
Nausea	94 (19)	106 (21)
Constipation	47 (9)	66 (13)
Diarrhea	40 (8)	33 (6)
Vomiting	38 (8)	36 (7)
Anorexia	26 (5)	46 (9)
Metabolic and Nutritional		
Peripheral edema	51 (10)	41 (8)
Musculoskeletal		

Bone pain	54 (11)	52 (10)
Nervous		
Dizziness	30 (6)	22 (4)
Insomnia	30 (6)	38 (7)
Depression	23 (5)	32 (6)
Hypertonia	16 (3)	26 (5)
Respiratory		
Cough increased	55 (11)	52 (10)
Dyspnea	51 (10)	47 (9)
Pharyngitis	49 (10)	68 (13)
Skin and appendages		
Rash	38 (8)	34 (8)
Urogenital		
Leukorrhea	9 (2)	31 (6)
* A patient may have had more than 1 adverse event.		

Less frequent adverse experiences reported in patients receiving Anastrozole 1 mg in either Trial 0030 or Trial 0027 were similar to those reported for second-line therapy.

Based on results from second-line therapy and the established safety profile of tamoxifen, the incidences of 9 pre-specified adverse event categories potentially causally related to one or both of the therapies because of their pharmacology were statistically analyzed. No significant differences were seen between treatment groups.

Table 4 – Number of Patients with Pre-specified Adverse Reactions in Trials 0030 and 0027

	Number (n) and Percentage of Patients	
Adverse Reaction *	Anastrozole	NOLVADEX

	1 mg (N=506) n (%)	20 mg (N=511) n (%)
Depression	23 (5)	32 (6)
Tumor Flare	15 (3)	18 (4)
Thromboembolic Disease †	18 (4)	33 (6)
Venous †	5	15
Coronary and Cerebral ‡	13	19
Gastrointestinal Disturbance	170 (34)	196 (38)
Hot Flushes	134 (26)	118 (23)
Vaginal Dryness	9 (2)	3 (1)
Lethargy	6 (1)	15 (3)
Vaginal Bleeding	5 (1)	11 (2)
Weight Gain	11 (2)	8 (2)

* A patient may have had more than 1 adverse reaction.

†Includes pulmonary embolus, thrombophlebitis, retinal vein thrombosis.

‡Includes myocardial infarction, myocardial ischemia, angina pectoris, cerebrovascular accident, cerebral ischemia and cerebral infarct.

Second-Line Therapy

Anastrozole was tolerated in two controlled clinical trials (i.e., Trials 0004 and 0005), with less than 3.3% of the Anastrozole-treated patients and 4.0% of the megestrol acetate-treated patients withdrawing due to an adverse reaction.

The principal adverse reaction more common with Anastrozole than megestrol acetate was diarrhea. Adverse reactions reported in greater than 5% of the patients in any of the treatment groups in these two controlled clinical trials, regardless of causality, are presented below:

Table 5 – Number (n) and Percentage of Patients with Adverse Reactions in Trials 0004 and 0005

Adverse Reaction *	Anastrozole		Anastrozole		Megestrol Acetate	
	1 mg		10 mg		160 mg	
	(N=262)		(N=246)		(N=253)	
	n	%	n	%	n	%
Asthenia	42	(16)	33	(13)	47	(19)
Nausea	41	(16)	48	(20)	28	(11)
Headache	34	(13)	44	(18)	24	(9)
Hot Flashes	32	(12)	29	(11)	21	(8)
Pain	28	(11)	38	(15)	29	(11)
Back Pain	28	(11)	26	(11)	19	(8)
Dyspnea	24	(9)	27	(11)	53	(21)
Vomiting	24	(9)	26	(11)	16	(6)
Cough Increased	22	(8)	18	(7)	19	(8)
Diarrhea	22	(8)	18	(7)	7	(3)
Constipation	18	(7)	18	(7)	21	(8)
Abdominal Pain	18	(7)	14	(6)	18	(7)
Anorexia	18	(7)	19	(8)	11	(4)
Bone Pain	17	(6)	26	(12)	19	(8)
Pharyngitis	16	(6)	23	(9)	15	(6)
Dizziness	16	(6)	12	(5)	15	(6)
Rash	15	(6)	15	(6)	19	(8)
Dry Mouth	15	(6)	11	(4)	13	(5)
Peripheral Edema	14	(5)	21	(9)	28	(11)

Pelvic Pain	14	(5)	17	(7)	13	(5)
Depression	14	(5)	6	(2)	5	(2)
Chest Pain	13	(5)	18	(7)	13	(5)
Paresthesia	12	(5)	15	(6)	9	(4)
Vaginal Hemorrhage	6	(2)	4	(2)	13	(5)
Weight Gain	4	(2)	9	(4)	30	(12)
Sweating	4	(2)	3	(1)	16	(6)
Increased Appetite	0	(0)	1	(0)	13	(5)
* A patient may have had more than one adverse reaction.						

Other less frequent (2% to 5%) adverse reactions reported in patients receiving Anastrozole 1 mg in either Trial 0004 or Trial 0005 are listed below. These adverse experiences are listed by body system and are in order of decreasing frequency within each body system regardless of assessed causality.

Body as a Whole: Flu syndrome; fever; neck pain; malaise; accidental injury; infection

Cardiovascular: Hypertension; thrombophlebitis

Hepatic: Gamma GT increased; SGOT increased; SGPT increased

Hematologic: Anemia; leukopenia

Metabolic and Nutritional: Alkaline phosphatase increased; weight loss

Mean serum total cholesterol levels increased by 0.5 mmol/L among patients receiving Anastrozole. Increases in LDL cholesterol have been shown to contribute to these changes.

Musculoskeletal: Myalgia; arthralgia; pathological fracture

Nervous: Somnolence; confusion; insomnia; anxiety; nervousness

Respiratory: Sinusitis; bronchitis; rhinitis

Skin and Appendages: Hair thinning (alopecia); pruritus

Urogenital: Urinary tract infection; breast pain

The incidences of the following adverse reaction groups potentially causally related to one or both of the therapies because of their pharmacology, were statistically analyzed: weight gain, edema, thromboembolic disease, gastrointestinal disturbance, hot flushes, and vaginal dryness. These six groups, and the adverse reactions captured in the groups, were prospectively defined. The results are shown in the table below.

Table 6 — Number (n) and Percentage of Patients with Pre-specified Adverse Reactions in Trials 0004 and 0005

Adverse Reaction Group	Anastrozole		Anastrozole		Megestrol Acetate	
	1 mg		10 mg		160 mg	
	(N=262)		(N=246)		(N=253)	
	n	(%)	n	(%)	n	(%)
Gastrointestinal Disturbance	77	(29)	81	(33)	54	(21)
Hot Flushes	33	(13)	29	(12)	35	(14)
Edema	19	(7)	28	(11)	35	(14)
Thromboembolic Disease	9	(3)	4	(2)	12	(5)
Vaginal Dryness	5	(2)	3	(1)	2	(1)
Weight Gain	4	(2)	10	(4)	30	(12)

Post-Marketing Experience

These adverse reactions are reported voluntarily from a population of uncertain size. Therefore, it is not always possible to estimate reliably their frequency or establish a causal relationship to drug exposure. The following have been reported in post-approval use of Anastrozole:

- Hepatobiliary events including increases in alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, gamma-GT, and bilirubin; hepatitis
- Rash including cases of mucocutaneous disorders such as erythema multiforme and Stevens-Johnson syndrome
- Cases of allergic reactions including angioedema, urticaria and anaphylaxis [see Contraindications (4)]
- Myalgia, trigger finger and hypercalcemia (with or without an increase in parathyroid hormone)

Drug Interactions

Tamoxifen

Co-administration of Anastrozole and tamoxifen in breast cancer patients reduced Anastrozole plasma concentration by 27%. However, the co-administration of Anastrozole and tamoxifen did not affect the pharmacokinetics of tamoxifen or N-desmethyltamoxifen. At a median follow-up of 33 months, the combination of Anastrozole and tamoxifen did not demonstrate any efficacy benefit when compared with tamoxifen in all patients as well as in the hormone receptor-positive subpopulation. This treatment arm was discontinued from the trial [see Clinical Studies (14.1)]. Based on clinical and pharmacokinetic results from the ATAC trial, tamoxifen should not be administered with Anastrozole.

Estrogen

Estrogen-containing therapies should not be used with Anastrozole as they may diminish its pharmacological action.

Warfarin

In a study conducted in 16 male volunteers, Anastrozole did not alter the exposure (as measured by C_{max} and AUC) and anticoagulant activity (as measured by prothrombin time, activated partial thromboplastin time, and thrombin time) of both R- and S-warfarin.

Cytochrome P450

Based on in vitro and in vivo results, it is unlikely that co-administration of Anastrozole 1 mg will affect other drugs as a result of inhibition of cytochrome P450 [see Clinical Pharmacology (12.3)].

USE IN SPECIFIC POPULATIONS

Pregnancy

Risk Summary

Based on findings from animal studies and its mechanism of action, Anastrozole may cause fetal harm when administered to a pregnant woman [see Clinical Pharmacology (12.1)]. There are no

studies of Anastrozole use in pregnant women. Anastrozole caused embryo-fetal toxicities in rats at maternal exposure that were 9 times the human clinical exposure, based on area under the curve (AUC). In rabbits, Anastrozole caused pregnancy failure at doses equal to or greater than 16 times the recommended human dose on a mg/m^2 basis. Advise pregnant women and females of reproductive potential of the potential risk to a fetus. The background risk of major birth defects and miscarriage for the indicated population is unknown. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

Data

Animal Data

In animal reproduction studies, pregnant rats and rabbits received Anastrozole during organogenesis at doses equal to or greater than 0.1 and 0.02 $\text{mg}/\text{kg}/\text{day}$, respectively, (about 1 and 1/3 the recommended human dose on a mg/m^2 basis, respectively). In both species, Anastrozole crossed the placenta, and there was increased pregnancy loss (increased pre- and/or post-implantation loss, increased resorption, and decreased numbers of live fetuses). In rats, these effects were dose related, and placental weights were significantly increased at doses equal to or greater than 0.1 $\text{mg}/\text{kg}/\text{day}$. Fetotoxicity, including delayed fetal development (i.e., incomplete ossification and depressed fetal body weights), occurred in rats at Anastrozole doses of 1 $\text{mg}/\text{kg}/\text{day}$ that produced peak plasma levels 19 times higher than serum levels in humans at the therapeutic dose (AUC_{0-24hr} 9 times higher). In rabbits, Anastrozole caused pregnancy failure at doses equal to or greater than 1.0 $\text{mg}/\text{kg}/\text{day}$ (about 16 times the recommended human dose on a mg/m^2 basis).

Lactation

Risk Summary

There are no data on the presence of Anastrozole or its metabolites in human milk, or its effects on the breast-fed child or on milk production. Because many drugs are excreted in human milk and because of the tumorigenicity shown for Anastrozole in animal studies, or the potential for serious adverse reactions in the breast-fed child from Anastrozole, advise lactating women not to breastfeed during treatment with Anastrozole and for 2 weeks after the last dose.

Females and Males of Reproductive Potential

Pregnancy Testing

Verify the pregnancy status of females of reproductive potential prior to initiation of Anastrozole.

Contraception

Females

Based on animal studies, Anastrozole can cause fetal harm when administered to a pregnant woman [see Use in Specific Populations (8.1)]. Advise females of reproductive potential to use effective contraception during treatment with Anastrozole Tablets and for at least 3 weeks after the last dose.

Infertility

Females

Based on studies in female animals, Anastrozole may impair fertility in females of reproductive potential [see Nonclinical Toxicology (13.1)].

Pediatric Use

Clinical studies in pediatric patients included a placebo-controlled trial in pubertal boys of adolescent age with gynecomastia and a single-arm trial in girls with McCune-Albright Syndrome and progressive precocious puberty. The efficacy of Anastrozole Tablets in the treatment of pubertal gynecomastia in adolescent boys and in the treatment of precocious puberty in girls with McCune-Albright Syndrome has not been demonstrated.

Gynecomastia Study

A randomized, double-blind, placebo-controlled, multi-center study enrolled 80 boys with pubertal gynecomastia aged 11 to 18 years. Patients were randomized to a daily regimen of either Anastrozole tablets 1 mg or placebo. After 6 months of treatment there was no statistically significant difference in the percentage of patients who experienced a $\geq 50\%$ reduction in gynecomastia (primary efficacy analysis). Secondary efficacy analyses (absolute change in breast volume, the percentage of patients who had any reduction in the calculated volume of gynecomastia, breast pain resolution) were consistent with the primary efficacy analysis. Serum estradiol concentrations at Month 6 of treatment were reduced by 15.4% in the Anastrozole group and 4.5% in the placebo group.

Adverse reactions that were assessed as treatment-related by the investigators occurred in 16.3% of the Anastrozole-treated patients and 8.1% of the placebo-treated patients with the most frequent being acne (7% Anastrozole and 2.7% placebo) and headache (7% Anastrozole and 0% placebo); all other adverse reactions showed small differences between treatment groups. One patient treated with Anastrozole tablets discontinued the trial because of testicular enlargement. The mean baseline-subtracted change in testicular volume after 6 months of treatment was $+ 6.6 \pm 7.9 \text{ cm}^3$ in the Anastrozole-treated patients and $+ 5.2 \pm 8.0 \text{ cm}^3$ in the placebo group.

McCune-Albright Syndrome Study

A multi-center, single-arm, open-label study was conducted in 28 girls with McCune-Albright Syndrome and progressive precocious puberty aged 2 to <10 years. All patients received a 1 mg daily dose of Anastrozole tablets. The trial duration was 12 months. Patients were enrolled on the basis of a diagnosis of typical (27/28) or atypical (1/27) McCune-Albright Syndrome, precocious

puberty, history of vaginal bleeding, and/or advanced bone age. Patients' baseline characteristics included the following: a mean chronological age of 5.9 ± 2.0 years, a mean bone age of 8.6 ± 2.6 years, a mean growth rate of 7.9 ± 2.9 cm/year and a mean Tanner stage for breast of 2.7 ± 0.81 . Compared to pre-treatment data there were no on-treatment statistically significant reductions in the frequency of vaginal bleeding days, or in the rate of increase of bone age (defined as a ratio between the change in bone age over the change of chronological age). There were no clinically significant changes in Tanner staging, mean ovarian volume, mean uterine volume and mean predicted adult height. A small but statistically significant reduction of growth rate from 7.9 ± 2.9 cm/year to 6.5 ± 2.8 cm/year was observed but the absence of a control group precludes attribution of this effect to treatment or to other confounding factors such as variations in endogenous estrogen levels commonly seen in McCune-Albright Syndrome patients.

Five patients (18%) experienced adverse reactions that were considered possibly related to Anastrozole tablets. These were nausea, acne, pain in an extremity, increased alanine transaminase and aspartate transaminase, and allergic dermatitis.

Pharmacokinetics in Pediatric Patients

Following 1 mg once daily multiple administration in pediatric patients, the mean time to reach the maximum Anastrozole concentration was 1 hr. The mean (range) disposition parameters of Anastrozole in pediatric patients were described by a CL/F of 1.54 L/h (0.77-4.53 L/h) and V/F of 98.4 L (50.7-330.0 L). The terminal elimination half-life was 46.8 h, which was similar to that observed in postmenopausal women treated with Anastrozole for breast cancer. Based on a population pharmacokinetic analysis, the pharmacokinetics of Anastrozole was similar in boys with pubertal gynecomastia and girls with McCune-Albright Syndrome.

Geriatric Use

In studies 0030 and 0027, about 50% of patients were 65 or older. Patients ≥ 65 years of age had moderately better tumor response and time to tumor progression than patients < 65 years of age regardless of randomized treatment. In studies 0004 and 0005, 50% of patients were 65 or older. Response rates and time to progression were similar for the over 65 and younger patients.

In the ATAC study, 45% of patients were 65 years of age or older. The efficacy of Anastrozole compared to tamoxifen in patients who were 65 years or older (N=1413 for Anastrozole and N=1410 for tamoxifen, the hazard ratio for disease-free survival was 0.93 [95% CI: 0.80, 1.08]) was less than efficacy observed in patients who were less than 65 years of age (N=1712 for Anastrozole and N=1706 for tamoxifen, the hazard ratio for disease-free survival was 0.79 [95% CI: 0.67, 0.94]).

The pharmacokinetics of Anastrozole are not affected by age.

Renal Impairment

Since only about 10% of Anastrozole is excreted unchanged in the urine, the renal impairment does not influence the total body clearance. Dosage adjustment in patients with renal impairment is not necessary [see Dosage and Administration (2.1) and Clinical Pharmacology (12.3)] .

Hepatic Impairment

The plasma Anastrozole concentrations in the subjects with hepatic cirrhosis were within the range of concentrations seen in normal subjects across all clinical trials. Therefore, dosage adjustment is also not necessary in patients with stable hepatic cirrhosis. Anastrozole has not been studied in patients with severe hepatic impairment [see Dosage and Administration (2.2) and Clinical Pharmacology (12.3)].

Overdosage

Clinical trials have been conducted with Anastrozole, up to 60 mg in a single dose given to healthy male volunteers and up to 10 mg daily given to postmenopausal women with advanced breast cancer; these dosages were tolerated. A single dose of Anastrozole that results in life-threatening symptoms has not been established. There is no specific antidote to overdosage and treatment must be symptomatic. In the management of an overdose, consider that multiple agents may have been taken. Vomiting may be induced if the patient is alert. Dialysis may be helpful because Anastrozole is not highly protein bound. General supportive care, including frequent monitoring of vital signs and close observation of the patient, is indicated.

Anastrozole Description

Anastrozole Tablets, USP for oral administration contain 1 mg of Anastrozole, a non-steroidal aromatase inhibitor. It is chemically described as 1,3-Benzenediacetonitrile, a, a, a', a'-tetramethyl-5-(1H-1,2,4-triazol-1-ylmethyl). Its molecular formula is C₁₇H₁₉N₅ and its structural formula is:

Anastrozole, USP is an off-white powder with a molecular weight of 293.4. Anastrozole, USP has moderate aqueous solubility (0.5 mg/mL at 25°C); solubility is independent of pH in the physiological range. Anastrozole, USP is freely soluble in methanol, acetone, ethanol, and tetrahydrofuran, and very soluble in acetonitrile.

Each tablet contains as inactive ingredients: colloidal silicon dioxide, hypromellose, lactose monohydrate, magnesium stearate, microcrystalline cellulose, polyethylene glycol/macrogol sodium starch glycolate, and titanium dioxide.

Anastrozole - Clinical Pharmacology

Mechanism of Action

The growth of many cancers of the breast is stimulated or maintained by estrogens. In postmenopausal women, estrogens are mainly derived from the action of the aromatase enzyme, which converts adrenal androgens (primarily androstenedione and testosterone) to estrone and estradiol. The suppression of estrogen biosynthesis in peripheral tissues and in the cancer tissue itself can therefore be achieved by specifically inhibiting the aromatase enzyme. Anastrozole is a selective non-steroidal aromatase inhibitor. It significantly lowers serum estradiol concentrations and has no detectable effect on formation of adrenal corticosteroids or aldosterone.

Pharmacodynamics

Effect on Estradiol

Mean serum concentrations of estradiol were evaluated in multiple daily dosing trials with 0.5, 1, 3, 5, and 10 mg of Anastrozole in postmenopausal women with advanced breast cancer. Clinically significant suppression of serum estradiol was seen with all doses. Doses of 1 mg and higher resulted in suppression of mean serum concentrations of estradiol to the lower limit of detection (3.7 pmol/L). The recommended daily dose, Anastrozole 1 mg, reduced estradiol by approximately 70% within 24 hours and by approximately 80% after 14 days of daily dosing. Suppression of serum estradiol was maintained for up to 6 days after cessation of daily dosing with Anastrozole 1 mg. The effect of Anastrozole in premenopausal women with early or advanced breast cancer has not been studied. Because aromatization of adrenal androgens is not a significant source of estradiol in premenopausal women, Anastrozole would not be expected to lower estradiol levels in premenopausal women.

Effect on Corticosteroids

In multiple daily dosing trials with 3, 5, and 10 mg, the selectivity of Anastrozole was assessed by examining effects on corticosteroid synthesis. For all doses, Anastrozole did not affect cortisol or aldosterone secretion at baseline or in response to ACTH. No glucocorticoid or mineralocorticoid replacement therapy is necessary with Anastrozole.

Other Endocrine Effects

In multiple daily dosing trials with 5 and 10 mg, thyroid stimulating hormone (TSH) was measured; there was no increase in TSH during the administration of Anastrozole. Anastrozole does not possess direct progestogenic, androgenic, or estrogenic activity in animals, but does perturb the circulating levels of progesterone, androgens, and estrogens.

Pharmacokinetics

Absorption

Inhibition of aromatase activity is primarily due to Anastrozole, the parent drug. Absorption of Anastrozole is rapid and maximum plasma concentrations typically occur within 2 hours of dosing under fasted conditions. Studies with radiolabeled drug have demonstrated that orally administered Anastrozole is well absorbed into the systemic circulation. Food reduces the rate but not the overall extent of Anastrozole absorption. The mean C_{max} of Anastrozole decreased by 16% and the median T_{max} was delayed from 2 to 5 hours when Anastrozole was administered 30 minutes after food. The pharmacokinetics of Anastrozole are linear over the dose range of 1 to 20 mg, and do not change with repeated dosing. The pharmacokinetics of Anastrozole were similar in patients and healthy volunteers.

Distribution

Steady-state plasma levels are approximately 3- to 4-fold higher than levels observed after a single dose of Anastrozole. Plasma concentrations approach steady-state levels at about 7 days of once daily dosing. Anastrozole is 40% bound to plasma proteins in the therapeutic range.

Metabolism

Metabolism of Anastrozole occurs by N-dealkylation, hydroxylation and glucuronidation. Three metabolites of Anastrozole (triazole, a glucuronide conjugate of hydroxy-Anastrozole, and a glucuronide conjugate of Anastrozole itself) have been identified in human plasma and urine. The major circulating metabolite of Anastrozole, triazole, lacks pharmacologic activity.

Anastrozole inhibited reactions catalyzed by cytochrome P450 1A2, 2C8/9, and 3A4 in vitro with K_i values which were approximately 30 times higher than the mean steady-state C_{max} values observed following a 1 mg daily dose. Anastrozole had no inhibitory effect on reactions catalyzed by cytochrome P450 2A6 or 2D6 in vitro. Administration of a single 30 mg/kg or multiple 10 mg/kg doses of Anastrozole to healthy subjects had no effect on the clearance of antipyrine or urinary recovery of antipyrine metabolites.

Excretion

Eighty-five percent of radiolabeled Anastrozole was recovered in feces and urine. Hepatic metabolism accounts for approximately 85% of Anastrozole elimination. Renal elimination accounts for approximately 10% of total clearance. The mean elimination half-life of Anastrozole is 50 hours.

Effect of Gender and Age

Anastrozole pharmacokinetics have been investigated in postmenopausal female volunteers and patients with breast cancer. No age related effects were seen over the range <50 to >80 years.

Effect of Race

Estradiol and estrone sulfate serum levels were similar between Japanese and Caucasian postmenopausal women who received 1 mg of Anastrozole daily for 16 days. Anastrozole mean steady-state minimum plasma concentrations in Caucasian and Japanese postmenopausal women were 25.7 and 30.4 ng/mL, respectively.

Effect of Renal Impairment

Anastrozole pharmacokinetics have been investigated in subjects with renal impairment. Anastrozole renal clearance decreased proportionally with creatinine clearance and was approximately 50% lower in volunteers with severe renal impairment (creatinine clearance < 30 mL/min/1.73m²) compared to controls. Total clearance was only reduced 10%. No dosage adjustment is needed for renal impairment [see Dosage and Administration (2.1) and Use in Specific Populations (8.6)].

Effect of Hepatic Impairment

Anastrozole pharmacokinetics have been investigated in subjects with hepatic cirrhosis related to alcohol abuse. The apparent oral clearance (CL/F) of Anastrozole was approximately 30% lower in subjects with stable hepatic cirrhosis than in control subjects with normal liver function. However, these plasma concentrations were still within the range of values observed in normal subjects. The effect of severe hepatic impairment was not studied. No dose adjustment is necessary for stable hepatic cirrhosis [see Dosage and Administration (2.2) and Use in Specific Populations (8.7)].

Nonclinical Toxicology

Carcinogenesis, Mutagenesis, Impairment of Fertility

A conventional carcinogenesis study in rats at doses of 1.0 to 25 mg/kg/day (about 10 to 243 times the daily maximum recommended human dose on a mg/m² basis) administered by oral gavage for up to 2 years revealed an increase in the incidence of hepatocellular adenoma and carcinoma and uterine stromal polyps in females and thyroid adenoma in males at the high dose. A dose-related increase was observed in the incidence of ovarian and uterine hyperplasia in females. At 25 mg/kg/day, plasma AUC_{0-24hr} levels in rats were 110 to 125 times higher than the level exhibited in postmenopausal volunteers at the recommended dose. A separate carcinogenicity study in mice at oral doses of 5 to 50 mg/kg/day (about 24 to 243 times the daily maximum recommended human dose on a mg/m² basis) for up to 2 years produced an increase in the incidence of benign ovarian stromal, epithelial and granulosa cell tumors at all dose levels. A dose-related increase in the incidence of ovarian hyperplasia was also observed in female mice. These ovarian changes are considered to be rodent-specific effects of aromatase inhibition and are of questionable significance to humans. The incidence of lymphosarcoma was increased in males and females at the high dose. At 50 mg/kg/day, plasma AUC levels in mice were 35 to 40 times higher than the level exhibited in postmenopausal volunteers at the recommended dose.

Anastrozole has not been shown to be mutagenic in in vitro tests (Ames and E. coli bacterial tests, CHO-K1 gene mutation assay) or clastogenic either in vitro (chromosome aberrations in human lymphocytes) or in vivo (micronucleus test in rats).

Oral administration of Anastrozole to female rats (from 2 weeks before mating to pregnancy day 7) produced significant incidence of infertility and reduced numbers of viable pregnancies at 1 mg/kg/day (about 10 times the recommended human dose on a mg/m² basis and 9 times higher than the AUC_{0-24hr} found in postmenopausal volunteers at the recommended dose). Pre-implantation loss of ova or fetus was increased at doses equal to or greater than 0.02 mg/kg/day (about one-fifth the recommended human dose on a mg/m² basis). Recovery of fertility was observed following a 5-week non-dosing period which followed 3 weeks of dosing. It is not known whether these effects observed in female rats are indicative of impaired fertility in humans.

Multiple-dose studies in rats administered Anastrozole for 6 months at doses equal to or greater than 1 mg/kg/day (which produced plasma Anastrozole C_{ssmax} and AUC_{0-24hr} that were 19 and 9 times higher than the respective values found in postmenopausal volunteers at the recommended dose) resulted in hypertrophy of the ovaries and the presence of follicular cysts. In addition, hyperplastic uteri were observed in 6-month studies in female dogs administered doses equal to or greater than 1 mg/kg/day (which produced plasma Anastrozole C_{ssmax} and AUC_{0-24hr} that were 22 times and 16 times higher than the respective values found in postmenopausal women at the recommended dose). It is not known whether these effects on the reproductive organs of animals are associated with impaired fertility in premenopausal women.

Clinical Studies

Adjuvant Treatment of Breast Cancer in Postmenopausal Women

A multicenter, double-blind trial (ATAC) randomized 9,366 postmenopausal women with operable breast cancer to adjuvant treatment with Anastrozole 1 mg daily, tamoxifen 20 mg daily, or a combination of the two treatments for five years or until recurrence of the disease.

The primary endpoint of the trial was disease-free survival (i.e., time to occurrence of a distant or local recurrence, or contralateral breast cancer or death from any cause). Secondary endpoints of the trial included distant disease-free survival, the incidence of contralateral breast cancer and overall survival. At a median follow-up of 33 months, the combination of Anastrozole and tamoxifen did not demonstrate any efficacy benefit when compared with tamoxifen in all patients as well as in the hormone receptor positive subpopulation. This treatment arm was discontinued from the trial. Based on clinical and pharmacokinetic results from the ATAC trial, tamoxifen should not be administered with Anastrozole [see Drug Interactions (7.1)].

Demographic and other baseline characteristics were similar among the three treatment groups (see Table 7).

Table 7 - Demographic and Baseline Characteristics for ATAC Trial

Demographic Characteristic	Anastrozole 1 mg (N[*]=3125)	Tamoxifen 20 mg (N[*]=3116)	Anastrozole1 mg plus Tamoxifen[†] 20 mg (N[*]=3125)
Mean age (yrs.)	64.1	64.1	64.3
Age Range (yrs.)	38.1 - 92.8	32.8 - 94.9	37.0 - 92.2
Age Distribution (%)			
<45 yrs.	0.7	0.4	0.5
45-60 yrs.	34.6	35.0	34.5
>60 <70 yrs.	38.0	37.1	37.7
>70 yrs.	26.7	27.4	27.3
Mean Weight (kg)	70.8	71.1	71.3
Receptor Status (%)			
Positive [‡]	83.5	83.1	84.0
Negative [§]	7.4	8.0	7.0
Other [¶]	8.8	8.6	9.0
Other Treatment (%) prior to Randomization			
Mastectomy	47.8	47.3	48.1
Breast conservation #	52.3	52.8	51.9
Axillary surgery	95.5	95.7	95.2
Radiotherapy	63.3	62.5	61.9
Chemotherapy	22.3	20.8	20.8

Neoadjuvant Tamoxifen	1.6	1.6	1.7
Primary Tumor Size (%)			
T1 (≤ 2 cm)	63.9	62.9	64.1
T2 (> 2 cm and ≤ 5 cm)	32.6	34.2	32.9
T3 (> 5 cm)	2.7	2.2	2.3
Nodal Status (%)			
Node positive	34.9	33.6	33.5
1-3 (# of nodes)	24.4	24.4	24.3
4-9	7.5	6.4	6.8
> 9	2.9	2.7	2.3
Tumor Grade (%)			
Well-differentiated	20.8	20.5	21.2
Moderately differentiated	46.8	47.8	46.5
Poorly/undifferentiated	23.7	23.3	23.7
Not assessed/recorded	8.7	8.4	8.5

*N=Number of patients randomized to the treatment

†The combination arm was discontinued due to lack of efficacy benefit at 33 months of follow-up

‡Includes patients who were estrogen receptor (ER) positive or progesterone receptor (PgR) positive, or both positive

§Includes patients with both ER negative and PgR negative receptor status

¶Includes all other combinations of ER and PgR receptor status unknown

#Among the patients who had breast conservation, radiotherapy was administered to 95.0% of patients in the Anastrozole arm, 94.1% in the tamoxifen arm and 94.5% in the Anastrozole plus tamoxifen arm.

Patients in the two monotherapy arms of the ATAC trial were treated for a median of 60 months (5 years) and followed for a median of 68 months. Disease-free survival in the intent-to-treat population was statistically significantly improved [Hazard Ratio (HR) = 0.87, 95% CI: 0.78, 0.97,

p=0.0127] in the Anastrozole arm compared to the tamoxifen arm. In the hormone receptor-positive subpopulation representing about 84% of the trial patients, disease-free survival was also statistically significantly improved (HR = 0.83, 95% CI: 0.73, 0.94, p=0.0049) in the Anastrozole arm compared to the tamoxifen arm.

Figure 1 — Disease-Free Survival Kaplan Meier Survival Curve for all Patients Randomized to Anastrozole or Tamoxifen Monotherapy in the ATAC trial (Intent-to-Treat)

Figure 2 — Disease-free Survival for Hormone Receptor-Positive Subpopulation of Patients Randomized to Anastrozole or Tamoxifen Monotherapy in the ATAC Trial

The survival data with 68 months follow-up is presented in Table 9.

In the group of patients who had previous adjuvant chemotherapy (N=698 for Anastrozole and N=647 for tamoxifen), the hazard ratio for disease-free survival was 0.91 (95% CI: 0.73 to 1.13) in the Anastrozole arm compared to the tamoxifen arm.

The frequency of individual events in the intent-to-treat population and the hormone receptor-positive subpopulation are described in Table 8.

Table 8 - All Recurrence and Death Events *

	Intent-To-Treat Population ‡		Hormone Receptor-Positive Subpopulation†	
	Anastrozole 1 mg (N ‡=3125)	Tamoxifen 20 mg (N ‡=3116)	Anastrozole 1 mg (N ‡=2618)	Tamoxifen 20 mg (N ‡=2598)
Median Duration of Therapy (mo)	60	60	60	60
Median Efficacy Follow-up (mo)	68	68	68	68
Loco-regional recurrence	119 (3.8)	149 (4.8)	76 (2.9)	101 (3.9)
Contralateral breast cancer	35 (1.1)	59 (1.9)	26 (1.0)	54 (2.1)

Invasive	27 (0.9)	52 (1.7)	21 (0.8)	48 (1.8)
Ductal carcinoma in situ	8 (0.3)	6 (0.2)	5 (0.2)	5 (0.2)
Unknown	0	1 (<0.1)	0	1 (<0.1)
Distant recurrence	324 (10.4)	375 (12.0)	226 (8.6)	265 (10.2)
Death from Any Cause	411 (13.2)	420 (13.5)	296 (11.3)	301 (11.6)
Death breast cancer	218 (7.0)	248 (8.0)	138 (5.3)	160 (6.2)
Death other reason (including unknown)	193 (6.2)	172 (5.5)	158 (6.0)	141 (5.4)

*The combination arm was discontinued due to lack of efficacy benefit at 33 months of follow-up.
†Patients may fall into more than one category.
‡N=Number of patients randomized

A summary of the study efficacy results is provided in Table 9.

Table 9 - ATAC Efficacy Summary *

	Intent-To-Treat Population		Hormone Receptor-Positive Subpopulation	
	Anastrozole 1 mg (N=3125)	Tamoxifen 20 mg (N=3116)	Anastrozole 1 mg (N=2618)	Tamoxifen 20 mg (N=2598)
	Number of Events		Number of Events	
Disease-free Survival	575	651	424	497
Hazard ratio	0.87		0.83	
2-sided 95% CI	0.78 to 0.97		0.73 to 0.94	
p-value	0.0127		0.0049	
Distant Disease-free	500	530	370	394

Survival				
Hazard ratio	0.94		0.93	
2-sided 95% CI	0.83 to 1.06		0.80 to 1.07	
Overall Survival	411	420	296	301
Hazard ratio	0.97		0.97	
2-sided 95% CI	0.85 to 1.12		0.83 to 1.14	
*The combination arm was discontinued due to lack of efficacy benefit at 33 months of follow-up				

10-year median follow-up Efficacy Results from the ATAC Trial

In a subsequent analysis of the ATAC trial, patients in the two monotherapy arms were followed for a median of 120 months (10years). Patients received study treatment for a median of 60 months (5 years) (see Table 10).

Table 10 - Efficacy Summary

	Intent-To-Treat Population		Hormone Receptor-Positive Subpopulation	
	Anastrozole 1 mg (N=3125)	Tamoxifen 20 mg (N=3116)	Anastrozole 1 mg (N=2618)	Tamoxifen 20 mg (N=2598)
	Number of Events		Number of Events	
Disease-free Survival	953	1022	735	924
Hazard ratio	0.91		0.86	
2-sided 95% CI	0.83 to 0.99		0.78 to 0.95	
p-value	0.0365		0.0027	

Overall Survival	734	747	563	586
Hazard ratio	0.97		0.95	
2-sided 95% CI	0.88 to 1.08		0.84 to 1.06	

Figure 3 - Disease-Free Survival Kaplan Meier Survival Curve for all Patients Randomized to Anastrozole or Tamoxifen Monotherapy in the ATAC Trial (Intent-to-Treat) (a)

^a The proportion of patients with 120 months' follow-up was 29.4%.

Figure 4 - Disease-Free Survival for Hormone Receptor-Positive Subpopulation of Patients Randomized to Anastrozole or Tamoxifen Monotherapy in the ATAC Trial (b)

^bThe proportion of patients with 120 months' follow-up was 29.8%.

First-Line Therapy in Postmenopausal Women with Advanced Breast Cancer

Two double-blind, controlled clinical studies of similar design (0030, a North American study and 0027, a predominately European study) were conducted to assess the efficacy of Anastrozole compared with tamoxifen as first-line therapy for hormone receptor positive or hormone receptor unknown locally advanced or metastatic breast cancer in postmenopausal women. A total of 1021 patients between the ages of 30 and 92 years old were randomized to receive trial treatment. Patients were randomized to receive 1 mg of Anastrozole once daily or 20 mg of tamoxifen once daily. The primary endpoints for both trials were time to tumor progression, objective tumor response rate, and safety.

Demographics and other baseline characteristics, including patients who had measurable and no measurable disease, patients who were given previous adjuvant therapy, the site of metastatic disease and ethnic origin were similar for the two treatment groups for both trials. The following table summarizes the hormone receptor status at entry for all randomized patients in trials 0030 and 0027.

Table 11 — Demographic and Other Baseline Characteristics

	Number (%) of subjects	

	Trial 0030		Trial 0027	
Receptor status	Anastrozole 1 mg (N=171)	Tamoxifen 20 mg (N=182)	Anastrozole 1 mg (N=340)	Tamoxifen 20 mg (N=328)
ER * and/or PgR †	151 (88.3)	162 (89.0)	154 (45.3)	144 (43.9)
ER * unknown, PgR † Unknown	19 (11.1)	20 (11.0)	185 (54.4)	183 (55.8)
*ER=Estrogen receptor †PgR=Progesterone receptor				

For the primary endpoints, trial 0030 showed that Anastrozole had a statistically significant advantage over tamoxifen (p=0.006) for time to tumor progression; objective tumor response rates were similar for Anastrozole and tamoxifen. Trial 0027 showed that Anastrozole and tamoxifen had similar objective tumor response rates and time to tumor progression (see Table 12 and Figures 5 and 6).

Table 12 below summarizes the results of trial 0030 and trial 0027 for the primary efficacy endpoints.

Table 12 – Efficacy Results of First-line Treatment

Endpoint	Trial 0030		Trial 0027	
	Anastrozole 1 mg (N=171)	Tamoxifen 20 mg (N=182)	Anastrozole 1 mg (N=340)	Tamoxifen 20 mg (N=328)
Time to progression (TTP)				
Median TTP (months)	11.1	5.6	8.2	8.3
Number (%) of subjects Who progressed	114 (67%)	138 (76%)	249 (73%)	247 (75%)
Hazard ratio (LCL *) †	1.42 (1.15)		1.01 (0.87)	
2-sided 95% CI ‡	(1.11, 1.82)		(0.85, 1.20)	
p-value §	0.006		0.920	

Best objective response rate				
Number (%) of subjects With CR † + PR #	36 (21.1%)	31 (17.0%)	112 (32.9%)	107 (32.6%)
Odds Ratio (LCL *) ‡	1.30 (0.83)		1.01 (0.77)	
* LCL=Lower Confidence Limit † Tamoxifen : Anastrozole ‡ CI=Confidence Interval § Two-sided Log Rank ¶ CR=Complete Response # PR=Partial Response ‡ Anastrozole : Tamoxifen				

Figure 5 - Kaplan-Meier probability of time to disease progression for all randomized patients (intent-to-treat) in Trial 0030

Figure 6 - Kaplan-Meier probability of time to progression for all randomized patients (intent-to-treat) in Trial 0027

Results from the secondary endpoints were supportive of the results of the primary efficacy endpoints. There were too few deaths occurring across treatment groups of both trials to draw conclusions on overall survival differences.

Second-Line Therapy in Postmenopausal Women with Advanced Breast Cancer who had Disease Progression following Tamoxifen Therapy

Anastrozole was studied in two controlled clinical trials (0004, a North American study; 0005, a predominately European study) in postmenopausal women with advanced breast cancer who had disease progression following tamoxifen therapy for either advanced or early breast cancer. Some of the patients had also received previous cytotoxic treatment. Most patients were ER-positive; a smaller fraction were ER-unknown or ER-negative; the ER-negative patients were eligible only if they had a positive response to tamoxifen. Eligible patients with measurable and non-measurable disease were randomized to receive either a single daily dose of 1 mg or 10 mg of Anastrozole or megestrol acetate 40 mg four times a day. The studies were double-blinded with respect to Anastrozole. Time to progression and objective response (only patients with measurable disease could be considered partial responders) rates were the primary efficacy variables. Objective

response rates were calculated based on the Union Internationale Contre le Cancer (UICC) criteria. The rate of prolonged (more than 24 weeks) stable disease, the rate of progression, and survival were also calculated.

Both trials included over 375 patients; demographics and other baseline characteristics were similar for the three treatment groups in each trial. Patients in the 0005 trial had responded better to prior tamoxifen treatment. Of the patients entered who had prior tamoxifen therapy for advanced disease (58% in Trial 0004; 57% in Trial 0005), 18% of these patients in Trial 0004 and 42% in Trial 0005 were reported by the primary investigator to have responded. In Trial 0004, 81% of patients were ER-positive, 13% were ER-unknown, and 6% were ER-negative. In Trial 0005, 58% of patients were ER-positive, 37% were ER-unknown, and 5% were ER-negative. In Trial 0004, 62% of patients had measurable disease compared to 79% in Trial 0005. The sites of metastatic disease were similar among treatment groups for each trial. On average, 40% of the patients had soft tissue metastases; 60% had bone metastases; and 40% had visceral (15% liver) metastases.

Efficacy results from the two studies were similar as presented in Table 13. In both studies there were no significant differences between treatment arms with respect to any of the efficacy parameters listed in the table below.

Table 13 – Efficacy Results of Second-line Treatment

	Anastrozole 1 mg	Anastrozole 10 mg	Megestrol Acetate 160 mg
Trial 0004			
(N. America)	(N=128)	(N=130)	(N=128)
Median Follow-up (months) *	31.3	30.9	32.9
Median Time to Death (months)	29.6	25.7	26.7
2 Year Survival Probability (%)	62.0	58.0	53.1
Median Time to Progression (months)	5.7	5.3	5.1
Objective Response (all patients) (%)	12.5	10.0	10.2
Stable Disease for >24 weeks (%)	35.2	29.2	32.8

Progression (%)	86.7	85.4	90.6
Trial 0005			
(Europe, Australia, S. Africa)	(N=135)	(N=118)	(N=125)
Median Follow-up (months) *	31.0	30.9	31.5
Median Time to Death (months)	24.3	24.8	19.8
2 Year Survival Probability (%)	50.5	50.9	39.1
Median Time to Progression (months)	4.4	5.3	3.9
Objective Response (all patients) (%)	12.6	15.3	14.4
Stable Disease for >24 weeks (%)	24.4	25.4	23.2
Progression (%)	91.9	89.8	92.0

*Surviving Patients

When data from the two controlled trials are pooled, the objective response rates and median times to progression and death were similar for patients randomized to Anastrozole 1 mg and megestrol acetate. There is, in this data, no indication that Anastrozole 10 mg is superior to Anastrozole 1 mg

Table 14 – Pooled Efficacy Results of Second-line Treatment

Trials 0004 & 0005 (Pooled Data)	Anastrozole 1 mg N=263	Anastrozole 10 mg N=248	Megestrol Acetate 160 mg N=253
Median Time to Death (months)	26.7	25.5	22.5
2 Year Survival Probability (%)	56.1	54.6	46.3
Median Time to Progression	4.8	5.3	4.6

Objective Response (all patients) (%)	12.5	12.5	12.3
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How Supplied/Storage and Handling

Anastrozole Tablets, USP 1 mg are supplied in bottles of 30 tablets (NDC 62135-490-30) and bottles of 90 tablets (NDC 62135-490-90).

Storage

Store at 20° to 25°C (68° to 77°F) [see USP Controlled Room Temperature].

Patient Counseling Information

See FDA Approved Patient Labeling (Patient Information).

Hypersensitivity Reactions

Inform patients of the possibility of serious allergic reactions with swelling of the face, lips, tongue and/or throat (angioedema) which may cause difficulty in swallowing and/or breathing and to seek medical attention immediately [see Contraindications (4)].

Ischemic Cardiovascular Events

Patients with pre-existing ischemic heart disease should be informed that an increased incidence of cardiovascular events has been observed with Anastrozole use compared to tamoxifen use. Advise patients if new or worsening chest pain or shortness of breath occurs to seek medical attention immediately [see Warnings and Precautions (5.1)] .

Bone Effects

Inform patients that Anastrozole lowers the level of estrogen. This may lead to a loss of the mineral content of bones, which might decrease bone strength. A possible consequence of decreased mineral content of bones is an increase in the risk of fractures [see Warnings and Precautions (5.2)].

Cholesterol

Inform patients that an increased level of cholesterol might be seen while receiving Anastrozole [see Warnings and Precautions (5.3)].

Carpal Tunnel

Patients should be informed that if they experience tickling, tingling, or numbness they should notify their health care provider [see Adverse Reactions (6.1)].

Tamoxifen

Patients should be advised not to take Anastrozole with Tamoxifen [see Clinical Studies (14.1)].

Missed Doses

Inform patients that if they miss a dose, take it as soon as they remember. If it is almost time for their next dose, skip the missed dose and take the next regularly scheduled dose. Patients should not take two doses at the same time.

Embryo-Fetal Toxicity

Advise females of reproductive potential of the potential risk to a fetus and to use effective contraception during Anastrozole therapy and for at least 3 weeks after the last dose. Advise females to contact their healthcare provider if they become pregnant, or if pregnancy is suspected, during treatment with Anastrozole [see Warning and Precautions (5.4) and Use in Specific Populations (8.1, 8.3)].

Lactation

Advise women not to breastfeed during Anastrozole treatment and for at least 2 weeks after the last dose [see Use in Specific Population (8.2)].

Manufactured by:

Beijing Yiling Bio-engineering Technology Co., Ltd.

No. 23 Keji Road, Industrial Park, Miyun, Beijing, China, 101500

Manufactured For:

Chartwell RX, LLC

Congers, NY 10920

Revised: 01/2022

Patient Information

Anastrozole (an as' troe zole) Tablets

- **What is the most important information I should know about Anastrozole Tablets?**

Anastrozole Tablets may cause serious side effects including:

- **Heart disease.** Women with early breast cancer, who have a history of blockage in their heart arteries (ischemic heart disease) and who take Anastrozole Tablets, may have an increase in symptoms of decreased blood flow to their heart compared to similar women who take tamoxifen.

Get medical help right away if you have new or worsening chest pain or shortness of breath during treatment with Anastrozole Tablets.

- **What are Anastrozole Tablets?**

Anastrozole Tablets are a prescription medicine used in women after menopause (“the change of life”) for:

- treatment of early breast cancer
 - after surgery
 - in women whose breast cancer is hormone receptor-positive
- the first treatment of breast cancer that has spread to nearby tissue or lymph nodes (locally advanced) or has spread to other parts of the body (metastatic), in women whose breast cancer is hormone receptor-positive or the hormone receptors are not known.
- treatment of advanced breast cancer, if the cancer has grown, or the disease has spread after tamoxifen therapy

Anastrozole Tablets do not work in women with breast cancer who have not gone through menopause (premenopausal women).

- **Who should not take Anastrozole Tablets?**

Do not take Anastrozole Tablets if you:

- have had a severe allergic reaction to Anastrozole or any of the ingredients in Anastrozole Tablets. See the end of this leaflet for a complete list of ingredients in Anastrozole Tablets. Symptoms of a severe allergic reaction to Anastrozole Tablets include: swelling of the face, lips, tongue, or throat, trouble breathing or swallowing, hives and itching.

- **What should I tell my healthcare provider before taking Anastrozole Tablets?**

Before you take Anastrozole Tablets, tell your healthcare provider if you:

- are still having menstrual periods (are not past menopause). Talk to your healthcare provider if you are not sure.
- have or had a heart problem
- have been told you have bone thinning or weakness (osteoporosis)
- have high cholesterol
- have any other medical conditions
- are pregnant or plan to become pregnant. Taking Anastrozole Tablets during pregnancy or within 3 weeks of becoming pregnant may harm your unborn baby.
- Females who are able to become pregnant should have a pregnancy test before starting treatment with Anastrozole Tablets.
- Females who are able to become pregnant should use effective birth control (contraceptive) during treatment with Anastrozole Tablets and for 3 weeks after your last dose of Anastrozole Tablets. Tell your healthcare provider right away if you become pregnant or think you may be pregnant.
- are breastfeeding or plan to breastfeed. It is not known if Anastrozole Tablets passes into breast milk. Do not breastfeed during treatment with Anastrozole Tablets and for 2 weeks after your last dose of Anastrozole Tablets.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. Especially tell your healthcare provider if you take:

- **Tamoxifen.** You should not take **Anastrozole Tablets** if you take tamoxifen. Taking Anastrozole Tablets with tamoxifen may lower the amount of Anastrozole Tablets in your blood and may cause Anastrozole Tablets not to work as well.
- **Medicines that contain estrogen.** Anastrozole Tablets may not work if taken with any of these

medicines:

- ° hormone replacement therapy
- ° birth control pills
- ° estrogen creams
- ° vaginal rings
- ° vaginal suppositories

Know the medicines you take. Keep a list of them to show your healthcare provider and pharmacist when you get a new medicine.

- **How should I take Anastrozole Tablets?**

- Take Anastrozole Tablets exactly as your healthcare provider tells you to take it.
- Continue taking Anastrozole Tablets until your healthcare provider tells you to stop.
- Anastrozole Tablets can be taken with or without food.
- If you miss a dose, take it as soon as you remember. If it is almost time for your next dose, skip the missed dose. Take your next regularly scheduled dose. Do not take two doses at the same time.

If you take too much Anastrozole Tablets, call your healthcare provider or go to the nearest hospital emergency room right away.

- **What are the possible side effects of Anastrozole Tablets?**

Anastrozole Tablets may cause serious side effects including:

- See “**What is the most important information I should know about Anastrozole Tablets?**”
- **bone thinning or weakness (osteoporosis)**. Anastrozole Tablets lower estrogen in your body, which may cause your bones to become thinner and weaker. This may increase your risk of fractures, especially of your spine, hip and wrist. Your healthcare provider may order a bone mineral density test before you start and during treatment with Anastrozole Tablets to check you for bone changes.

- **increased blood cholesterol (fat in the blood).** Your healthcare provider may do blood tests to check your cholesterol while you are taking Anastrozole Tablets.
- **skin reactions.** Stop taking Anastrozole Tablets and call your healthcare provider right away if you get any skin lesions, ulcers, or blisters.
- **severe allergic reactions.** Get medical help right away if you get:
 - swelling of your face, lips, tongue, or throat
 - trouble swallowing or breathing
- **liver problems.** Anastrozole Tablets can cause inflammation of your liver and changes in liver function blood tests. Your healthcare provider may check you for this.

Stop taking Anastrozole Tablets and call your healthcare provider right away if you have any of these signs or symptoms of a liver problem:

- a general feeling of not being well
- yellowing of your skin or whites of your eyes
- pain on the right side of your stomach-area (abdomen)

Common side effects in women taking Anastrozole Tablets include:

- hot flashes
- weakness
- joint aches
- joint pain, stiffness or swelling (arthritis)
- pain
- sore throat

- high blood pressure
- depression
- nausea and vomiting
- rash
- back pain
- sleep problems
- bone pain
- headache
- swelling of your legs, ankles, or feet
- increased cough
- shortness of breath
- build up of lymph fluid in the tissues of your affected arm (lymphedema)

Anastrozole tablets may also cause you to have tickling, tingling or numbness of your skin.

Tell your healthcare provider if you have any side effect that bothers you or that does not go away.

These are not all the possible side effects of Anastrozole Tablets. For more information, ask your healthcare provider or pharmacist.

Call your healthcare provider for medical advice about side effects. You may report side effects to Chartwell RX, LLC. at 1-845-232-1683 or FDA at 1-800-FDA-1088.

- **How should I store Anastrozole Tablets?**

- Store Anastrozole Tablets at room temperature between 68°F to 77°F (20°C to 25°C).
- **Keep Anastrozole Tablets and all medicines out of the reach of children.**

- **General information about the safe and effective use of Anastrozole Tablets.**

Medicines are sometimes prescribed for purposes other than those listed in a Patient Information leaflet. Do not take Anastrozole Tablets for a condition for which it was not prescribed. Do not give Anastrozole Tablets to other people, even if they have the same symptoms that you have. It may harm them.

If you would like more information, talk with your healthcare provider. You can ask your pharmacist or healthcare provider for information about Anastrozole Tablets that is written for health professionals. For more information call 1-845-262-1683.

- **What are the ingredients in Anastrozole Tablets?**

Active ingredient: Anastrozole

Inactive ingredients: colloidal silicon dioxide, hypromellose, lactose monohydrate, magnesium stearate, microcrystalline cellulose, polyethylene glycol/macrogol sodium starch glycolate, and titanium dioxide.

This Patient Information has been approved by the U.S. Food and Drug Administration.

Revised: 01/2022

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PACKAGE LABEL.PRINCIPAL DISPLAY PANEL

Anastrozole Tablets, USP - NDC 62135-490-30 - 30 Tablets Bottle Label

Anastrozole Tablets, USP - NDC 62135-490-90 - 90 Tablets Bottle Label

Anastrozole

Anastrozole tablet

Product Information

Product Type	HUMAN PRESCRIPTION DRUG LABEL	Item Code (Source)	NDC:62135- 490
Route of Administration	ORAL	DEA Schedule	

Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
Anastrozole (Anastrozole)	Anastrozole	1 mg

Inactive Ingredients

Ingredient Name	Strength
POLYETHYLENE GLYCOL, UNSPECIFIED	
LACTOSE MONOHYDRATE	
MAGNESIUM STEARATE	
HYPROMELLOSES	
CELLULOSE, MICROCRYSTALLINE	
SODIUM STARCH GLYCOLATE TYPE A POTATO	
TITANIUM DIOXIDE	
SILICON DIOXIDE	

Product Characteristics

Color	white	Score	no score
Shape	ROUND	Size	6mm

Flavor		Imprint Code	YL;111
Contains			

Packaging		
#	Item Code	Package Description
1	NDC:62135-490-30	30 TABLET in 1 BOTTLE
2	NDC:62135-490-90	90 TABLET in 1 BOTTLE

Marketing Information			
Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA206037	02/28/2019	

Labeler - Chartwell RX, LLC (079394054)

Chartwell RX, LLC

Frequently asked questions

- What happens when you stop taking Arimidex?
- Does anastrozole cause weight gain?
- How soon do the side effects of Arimidex start?
- Does anastrozole cause hair loss?
- How long do side effects last after stopping Arimidex?
- How much does Arimidex increase survival?
- What does anastrozole do to your body?

[View more FAQ...](#)