

What are diuretics?

Diuretics, also called water-pills, are a class of medications used to treat high blood pressure, heart failure and other diseases that cause fluid buildup in the body. Diuretics reduce the amount of fluid in the body by stimulating your kidneys to get rid of excess water and salt as urine. This lowers the amount of blood in the blood vessels, which in turn lowers blood pressure. Strain on the heart muscle is also decreased because there is less fluid to pump.

There are three main kinds of diuretic medications that work in slightly different ways. Women with heart failure may receive more than one type at a time to control symptoms while minimizing medication side effects.

- **Loop diuretics** work by making the kidneys get rid of more sodium and potassium than normal. When these substances leave the body as urine, water goes along with them. Of all the types of diuretics, these produce the greatest increase in urine flow.
- **Thiazide diuretics** cause more salt to be excreted than other diuretics, and are the most commonly used diuretic to treat high blood pressure.
- **Potassium-sparing diuretics** are less powerful at getting rid of water and lowering blood pressure than other types of diuretics, but they have the advantage of preventing your body from losing too much potassium. They are often prescribed together with another type of diuretic.

Loop Diuretics

Generic Names:	Furosemide	Bumetanide	Torsemide
Brand Names:	Lasix	Bumex	Demadex
How it is given:	Oral (tablet), intravenous (IV), intramuscular (muscle injection)		
What it is used for:	- Treatment of heart failure to improve symptoms - Treatment of high blood pressure		

- Treatment of diseases that cause fluid buildup in the body (examples: liver disease, kidney disease)

You should not be treated with it if:

- You have had an allergic reaction to these medications in the past
- You are allergic to sulfonamide drugs (certain kinds of diabetes, blood pressure, and antibacterial)
- You are unable to produce urine

Pregnancy/nursing: Furosemide crosses the placenta, but it is not clear how the drug affects a

Thiazide Diuretics

Generic Names: Hydrochlorothiazide Chlorothiazide Metolazone

Brand Names: HydroDIURIL Diuril Zaroxolyn

How it is given: Oral (tablet or capsule), intravenous (IV)

What it is used for:

- Treatment of heart failure to improve symptoms
- Treatment of high blood pressure
- Treatment of diseases that cause fluid buildup in the body (examples: liver disease, kidney disease)

You should not be treated with it if:

- You have had an allergic reaction to these medications in the past
- You are allergic to sulfonamide drugs (certain kinds of diabetes, blood pressure, and antibacterial)
- You are unable to produce urine

Pregnancy/nursing: Thiazide diuretics cross the placenta and can also enter breast milk, but th

Potassium-Sparing Diuretics

Generic Names:	Triamterene	Amiloride
Brand Names:	Dyrenium	Midamor
How it is given:	Oral (tablet or capsule)	
What it is used for:		

- These medications are often used in combination with other diuretics to increase the effects of other diuretics.
- Heart failure symptoms
- High blood pressure
- Diseases that cause fluid buildup in the body (examples: liver disease, kidney disease)

You should not be treated with it if:

- You have had an allergic reaction to these medications in the past
- You have high blood potassium levels
- You are taking other medications/supplements to increase your potassium levels
- You are unable to produce urine

Pregnancy/nursing: The effects of these diuretics in women who are pregnant or nursing are not known.

What are they used for?

Diuretics are a mainstay of heart failure therapy because of their ability to rapidly improve symptoms such as leg swelling and shortness of breath.¹ When women begin to suffer from heart failure symptoms, taking diuretics can relieve their symptoms and increase their ability to perform basic daily tasks. By decreasing the amount of fluid in the bloodstream, diuretics also decrease the heart's workload, possibly slowing the progression of heart failure.

Who should receive diuretics to prevent or treat heart failure?

Diuretics lower the risk of developing heart failure when used to treat high blood pressure in women who do not yet have heart failure.^{2,3} They are a cornerstone of heart failure treatment in patients with both [systolic heart failure](#) (blood pumping problems) and [diastolic heart failure](#) (blood filling problems) who have any of the symptoms of fluid buildup. In these women, diuretics relieve heart failure symptoms and improve a person's ability to perform daily physical tasks.

4-9

They also have the advantage of working more quickly than other heart failure medications such as ACE-inhibitors or beta-blockers.

10, 11

There are very few studies that look at the effectiveness of diuretics in women specifically. In the trials that found decreased survival rates in patients taking diuretics, only 20% to 25% of the patients studied were women.¹²⁻¹⁵ Results of these studies did not change when gender was taken into account, and for now diuretics should be used to manage heart failure in the same manner in women as in men.

Most women with heart failure who start taking diuretics will need to continue taking them even after their symptoms improve. In a study that looked at the effects of stopping diuretic therapy in 41 heart failure patients with resolved symptoms, 71% of these patients had to start taking the drugs again after only 15 days because of worsening heart failure symptoms.¹⁶

Who should NOT receive diuretics?

Diuretics are not recommended for women who have not developed [symptoms of heart failure](#) unless the diuretics are being used to treat [high blood pressure](#)

;

1

Women who are unable to produce urine or who have developed an allergic reaction to these medications in the past should not be started on diuretic therapy. Symptoms of an allergic drug reaction include hives, rash, itching of the skin or eyes, swelling of the lips or tongue, and wheezing. Symptoms of

anaphylaxis

, a life-threatening allergic reaction, include abdominal pain or cramping, confusion, diarrhea, difficulty breathing, dizziness or fainting, hives, nausea or vomiting, a rapid pulse, and a

sensation of feeling the heart beat (palpitations).

If you have high blood potassium levels or if you are taking other medications to increase your blood potassium levels, you should not be started on potassium-sparing diuretics.

The effects of diuretics on the fetus or baby in women who are pregnant or nursing are not known, so if you are breastfeeding or considering pregnancy be sure to discuss the risks and benefits of this medication with your doctor.

Are women missing out on diuretic therapy?

It appears that women with heart failure are just as likely to receive diuretics as are men.¹⁷⁻²⁰ In a large study that looked at medical records of 105,388 heart failure patients 75% of both women and men were prescribed diuretics.

¹⁸

In some large trials, women were actually slightly more likely than men to receive diuretics.^{12,21}

Women and men appear to receive similar doses of diuretics as well.

¹⁵

How do diuretics work?

In heart failure, a weakened heart has difficulty pumping blood to the rest of your body, including your kidneys. This causes your kidneys to hold onto more water, raising blood pressure and leading to fluid buildup in the legs and lungs that causes heart failure symptoms like swelling and shortness of breath. Diuretics increase the amount of water your kidneys get rid of in urine and reduce the amount of liquid that your kidneys absorb into your body. Less fluid in your body means lower blood pressure and less work for your heart.

The three main types of diuretic medications (loop diuretics, thiazide diuretics, and potassium-sparing diuretics) all accomplish the same task, but do it in slightly different ways by affecting different parts of the kidney.

What are the side effects of diuretics?

The most common side effects of diuretics are dehydration and low blood pressure (caused by your body getting rid of too much fluid) and electrolyte imbalances (abnormal levels of simple molecules in your blood). These side effects can usually be controlled by adjusting your medication dose or switching to a different type of medication.

About 10% to 15% of patients taking loop or thiazide diuretics will develop low blood potassium levels.^{22,23} Women may be more likely than men to develop low potassium levels while taking diuretics. In one study of 193 patients (more than half were women), 25% of women developed low blood potassium on the drug compared with only 12% of men.²⁴ It is not known why women are more prone to this side effect than men. The sex difference remained even after controlling for differences in age, body weight, kidney function, other medications, and how well the person stuck to their medication schedule.

Potassium-sparing diuretics, on the other hand, cause your body to hold onto potassium which cause your potassium levels to rise too high. Abnormal potassium levels (whether too low or too high) increase your risk of developing abnormal heart rhythms, so your doctor will monitor your potassium levels with regular blood tests and you may be instructed to consume or avoid potassium-rich food like bananas (or to take potassium supplements). Loop diuretics can also decrease blood calcium and magnesium levels, which also raises the risk of developing heart rhythm problems as well as a hormone problem called *hyperparathyroidism* that reduces bone density.^{25,26}

Some women develop allergic reactions to diuretics and can develop a rash or a more serious allergic reaction (*anaphylaxis*). Rarely, loop diuretics can cause hearing loss that can sometimes be relieved by switching to a different medication.

If I cannot take a diuretic, what are some alternatives?

Depending on why you are unable to take a diuretic, your doctor may want to switch you to a different type of diuretic or may add another medication or supplement to your regimen. In

women who have heart failure symptoms caused by fluid buildup but are not responding to diuretics, dialysis may be required to remove excess fluid from the blood.

My doctor has prescribed a diuretic. What should I watch out for?

When taking a diuretic, it is important to follow the doses prescribed to you carefully. Patients respond differently to diuretic therapy, and your doctor will work with you to find the right dosage that relieves your symptoms without making you dehydrated. To strike this balance, your doctor may start you on a lower dosage and then slowly increase the dosage with time. Under a doctor's instruction, some women are able to adjust their own diuretic therapy by measuring their weight daily to estimate how much fluid their body is storing, and changing their dose when their weight goes outside a certain range.¹ If you have not been instructed to do so, never change your own dose without talking to your doctor first. Over time, your dose may need to be gradually increased as your body grows accustomed to the medication or your heart failure symptoms get worse.

Diuretics work best when you maintain a low sodium diet, so you may be instructed to limit your salt intake.²⁷ They also cause you to urinate more frequently; you may want to take your medication early in the day to minimize sleep disruptions. Frequent urination can lead to dehydration and low blood pressure; talk to your doctor if you experience fatigue or dizziness when sitting up or standing up quickly to see if your dose can be adjusted.

Notify your doctor if you experience muscle fatigue or aches or leg cramps; these can be signs of low potassium and magnesium in your blood, the most common side effect of diuretics. This can be corrected by changing medication doses or by taking nutritional supplements.

Although rare, some women develop allergic reactions to diuretic medications and may develop a rash or anaphylactic reaction.

Women who have allergies to sulfonamide drugs (certain kinds of diabetes, blood pressure, and antibacterial medications) are more likely to be allergic to loop and thiazide diuretics.²⁸ If you have known allergy to sulfonamide drugs or develop a rash while on diuretic therapy, be sure to notify your doctor because you may need to switch to a different type of medication.

Rarely, loop diuretics may cause hearing loss; if you notice any changes or experience a ringing in your ears, let your doctor know. This hearing loss is often reversible if you are switched to a

different medication.²²

References

1. Hunt SA, Abraham WT, Chin MH, et al. 2009 Focused update incorporated into the ACC/AHA 2005 Guidelines for the Diagnosis and Management of Heart Failure in Adults A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines Developed in Collaboration With the International Society for Heart and Lung Transplantation. *J Am Coll Cardiol.* Apr 14 2009;53(15):e1-e90.
2. Staessen JA, Wang JG, Thijs L. Cardiovascular prevention and blood pressure reduction: a quantitative overview updated until 1 March 2003. *J Hypertens.* Jun 2003;21(6):1055-1076.
3. Psaty BM, Lumley T, Furberg CD, et al. Health Outcomes Associated With Various Antihypertensive Therapies Used as First-Line Agents: A Network Meta-analysis. *JAMA.* May 21, 2003 2003;289(19):2534-2544.
4. Patterson JH, Adams KF, Jr., Applefeld MM, Corder CN, Masse BR. Oral torsemide in patients with chronic congestive heart failure: effects on body weight, edema, and electrolyte excretion. Torsemide Investigators Group. *Pharmacotherapy* . Sep-Oct 1994;14(5):514-521.
5. Muller K, Gamba G, Jaquet F, Hess B. Torasemide vs. furosemide in primary care patients with chronic heart failure NYHA II to IV--efficacy and quality of life. *Eur J Heart Fail.* Dec 2003;5(6):793-801.
6. Anand IS, Kalra GS, Harris P, et al. Diuretics as initial and sole treatment in chronic cardiac failure. *Cardioscience* Dec 1991;2(4):273-278.
7. Cosin J, Diez J. Torasemide in chronic heart failure: results of the TORIC study. *Eur J Heart Fail.* Aug 2002;4(4):507-513.
8. Bayliss J, Norell M, Canepa-Anson R, Sutton G, Poole-Wilson P. Untreated heart failure: clinical and neuroendocrine effects of introducing diuretics. *Br Heart J.* Jan 1987;57(1):17-22.
9. Faris R, Flather M, Purcell H, Henein M, Poole-Wilson P, Coats A. Current evidence supporting the role of diuretics in heart failure: a meta analysis of randomised controlled trials. *Int J Cardiol.* Feb 2002;82(2):149-158.
10. Cowley AJ, Stainer K, Wynne RD, Rowley JM, Hampton JR. Symptomatic assessment of patients with heart failure: double-blind comparison of increasing doses of diuretics and captopril in moderate heart failure. *Lancet* . Oct 4 1986;2(8510):770-772.
11. Hall SA, Cigarroa CG, Marcoux L, Risser RC, Grayburn PA, Eichhorn EJ. Time course of improvement in left ventricular function, mass and geometry in patients with congestive heart failure treated with beta-adrenergic blockade. *J Am Coll Cardiol.* Apr 1995;25(5):1154-1161.
12. Domanski M, Tian X, Haigney M, Pitt B. Diuretic use, progressive heart failure, and death in patients in the DIG study. *J Card Fail.* Jun 2006;12(5):327-332.
13. Ahmed A, Young JB, Love TE, Levesque R, Pitt B. A propensity-matched study of the effects of chronic diuretic therapy on mortality and hospitalization in older adults with heart failure. *Int J Cardiol.* Apr 10 2008;125(2):246-253.
14. Ahmed A, Husain A, Love TE, et al. Heart failure, chronic diuretic use, and increase in mortality and hospitalization: an observational study using propensity score methods. *Eur Heart J.* Jun 2006;27(12):1431-1439.
15. Eshaghian S, Horwich TB, Fonarow GC. Relation of loop diuretic dose to mortality in advanced heart failure. *Am J Cardiol.* Jun 15 2006;97(12):1759-1764.
16. Grinstead WC, Francis MJ, Marks GF, Tawa CB, Zoghbi WA, Young JB. Discontinuation of chronic diuretic therapy in stable congestive heart failure secondary to coronary artery disease or to idiopathic dilated cardiomyopathy. *Am J Cardiol.* May 1 1994;73(12):881-886.
17. Harjai KJ, Nunez E, Stewart Humphrey J, Turgut T, Shah M, Newman J. Does gender bias exist in the

medical management of heart failure?

Int J Cardiol. Aug 2000;75(1):65-69.

18. Galvao M, Kalman J, DeMarco T, et al. Gender differences in in-hospital management and outcomes in patients with decompensated heart failure: analysis from the Acute Decompensated Heart Failure National Registry (ADHERE). *J Card Fail.* Mar 2006;12(2):100-107.

19. Rusinaru D, Mahjoub H, Goissen T, Massy Z, Peltier M, Tribouilloy C. Clinical features and prognosis of heart failure in women. A 5-year prospective study. *Int J Cardiol.* Apr 17 2009;133(3):327-335.

20. Nieminen MS, Harjola VP, Hochadel M, et al. Gender related differences in patients presenting with acute heart failure. Results from EuroHeart Failure Survey II. *Eur J Heart Fail.* Feb 2008;10(2):140-148.

21. Domanski M, Norman J, Pitt B, Haigney M, Hanlon S, Peyster E. Diuretic use, progressive heart failure, and death in patients in the Studies Of Left Ventricular Dysfunction (SOLVD). *J Am Coll Cardiol.* Aug 20 2003;42(4):705-708.

22. Cody RJ, Pickworth KK. Approaches to diuretic therapy and electrolyte imbalance in congestive heart failure. *Cardiol Clin.* Feb 1994;12(1):37-50.

23. Clayton JA, Rodgers S, Blakey J, Avery A, Hall IP. Thiazide diuretic prescription and electrolyte abnormalities in primary care. *Br J Clin Pharmacol.* Jan 2006;61(1):87-95.

24. Toner JM, Ramsay LE. Thiazide-induced hypokalaemia; prevalence higher in women. *Br J Clin Pharmacol.* Sep 1984;18(3):449-452.

25. Cooper HA, Dries DL, Davis CE, Shen YL, Domanski MJ. Diuretics and risk of arrhythmic death in patients with left ventricular dysfunction. *Circulation.* Sep 21 1999;100(12):1311-1315.

26. Weber KT. Furosemide in the long-term management of heart failure: the good, the bad, and the uncertain. *J Am Coll Cardiol.* Sep 15 2004;44(6):1308-1310.

27. Wilcox CS, Mitch WE, Kelly RA, et al. Response of the kidney to furosemide. I. Effects of salt intake and renal compensation. *J Lab Clin Med.* Sep 1983;102(3):450-458.

28. Strom BL, Schinnar R, Apter AJ, et al. Absence of cross-reactivity between sulfonamide antibiotics and sulfonamide nonantibiotics. *N Engl J Med.* Oct 23 2003;349(17):1628-1635.

[SEO](#) by [AceSEF](#)