



androgenetic alopecia

Androgenetic alopecia is a common form of hair loss in both men and women. In men, this condition is also known as male-pattern baldness. Hair is lost in a well-defined pattern, beginning above both temples. Over time, the hairline recedes to form a characteristic "M" shape. Hair also thins at the crown (near the top of the head), often progressing to partial or complete baldness.

The pattern of hair loss in women differs from male-pattern baldness. In women, the hair becomes thinner all over the head, and the hairline does not recede. Androgenetic alopecia in women rarely leads to total baldness.

Androgenetic alopecia in men has been associated with several other medical conditions including coronary heart disease and enlargement of the prostate. Additionally, prostate cancer, disorders of insulin resistance (such as diabetes and obesity), and high blood pressure (hypertension) have been related to androgenetic alopecia. In women, this form of hair loss is associated with an increased risk of polycystic ovary syndrome (PCOS). PCOS is characterized by a hormonal imbalance that can lead to irregular menstruation, acne, excess hair elsewhere on the body (hirsutism), and weight gain.

Frequency

Androgenetic alopecia is a frequent cause of hair loss in both men and women. This form of hair loss affects an estimated 50 million men and 30 million women in the United States. Androgenetic alopecia can start as early as a person's teens and risk increases with age; more than 50 percent of men over age 50 have some degree of hair loss. In women, hair loss is most likely after menopause.

Genetic Changes

A variety of genetic and environmental factors likely play a role in causing androgenetic alopecia. Although researchers are studying risk factors that may contribute to this condition, most of these factors remain unknown. Researchers have determined that this form of hair loss is related to hormones called androgens, particularly an androgen called dihydrotestosterone. Androgens are important for normal male sexual development before birth and during puberty. Androgens also have other important functions in both males and females, such as regulating hair growth and sex drive.

Hair growth begins under the skin in structures called follicles. Each strand of hair normally grows for 2 to 6 years, goes into a resting phase for several months, and then falls out. The cycle starts over when the follicle begins growing a new hair. Increased levels of androgens in hair follicles can lead to a shorter cycle of hair growth and the

growth of shorter and thinner strands of hair. Additionally, there is a delay in the growth of new hair to replace strands that are shed.

Although researchers suspect that several genes play a role in androgenetic alopecia, variations in only one gene, *AR*, have been confirmed in scientific studies. The *AR* gene provides instructions for making a protein called an androgen receptor. Androgen receptors allow the body to respond appropriately to dihydrotestosterone and other androgens. Studies suggest that variations in the *AR* gene lead to increased activity of androgen receptors in hair follicles. It remains unclear, however, how these genetic changes increase the risk of hair loss in men and women with androgenetic alopecia.

Researchers continue to investigate the connection between androgenetic alopecia and other medical conditions, such as coronary heart disease and prostate cancer in men and polycystic ovary syndrome in women. They believe that some of these disorders may be associated with elevated androgen levels, which may help explain why they tend to occur with androgen-related hair loss. Other hormonal, environmental, and genetic factors that have not been identified also may be involved.

Inheritance Pattern

The inheritance pattern of androgenetic alopecia is unclear because many genetic and environmental factors are likely to be involved. This condition tends to cluster in families, however, and having a close relative with patterned hair loss appears to be a risk factor for developing the condition.

Other Names for This Condition

- androgenic alopecia
- female pattern baldness
- male pattern alopecia
- male pattern baldness
- pattern baldness

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Alopecia, androgenetic, 1
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0162311/>
- Genetic Testing Registry: Alopecia, androgenetic, 2
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2678038/>
- Genetic Testing Registry: Alopecia, androgenetic, 3
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2676272/>

Other Diagnosis and Management Resources

- MedlinePlus Encyclopedia: Female Pattern Baldness
<https://medlineplus.gov/ency/article/001173.htm>
- MedlinePlus Encyclopedia: Hair Loss
<https://medlineplus.gov/ency/article/003246.htm>
- MedlinePlus Encyclopedia: Male Pattern Baldness
<https://medlineplus.gov/ency/article/001177.htm>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Female Pattern Baldness
<https://medlineplus.gov/ency/article/001173.htm>
- Encyclopedia: Hair Loss
<https://medlineplus.gov/ency/article/003246.htm>
- Encyclopedia: Male Pattern Baldness
<https://medlineplus.gov/ency/article/001177.htm>
- Health Topic: Hair Loss
<https://medlineplus.gov/hairloss.html>

Genetic and Rare Diseases Information Center

- Androgenetic alopecia
<https://rarediseases.info.nih.gov/diseases/9269/androgenetic-alopecia>

Educational Resources

- American Academy of Dermatology
<https://www.aad.org/public/diseases/hair-and-scalp-problems/hair-loss>
- British Association of Dermatologists
<http://www.bad.org.uk/shared/get-file.ashx?id=153&itemtype=document>
- Disease InfoSearch: Androgenetic Alopecia
<http://www.diseaseinfosearch.org/Androgenetic+Alopecia/440>
- Merck Manual Consumer Version
<http://www.merckmanuals.com/home/skin-disorders/hair-disorders/alopecia-hair-loss>

Patient Support and Advocacy Resources

- International Society of Hair Restoration Surgery
<http://www.ishrs.org/>

ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22androgenetic+alopecia%22+OR+%22female+pattern+baldness%22+OR+%22male+pattern+baldness%22>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Alopecia%5BMAJR%5D%29+AND+%28%28androgenetic+alopecia%5BTIAB%5D%29+OR+%28androgenic+alopecia%5BTIAB%5D%29+OR+%28female+pattern+baldness%5BTIAB%5D%29+OR+%28male+pattern+alopecia%5BTIAB%5D%29+OR+%28male+pattern+baldness%5BTIAB%5D%29+OR+%28pattern+baldness%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D>

OMIM

- ALOPECIA, ANDROGENETIC, 1
<http://omim.org/entry/109200>
- ALOPECIA, ANDROGENETIC, 2
<http://omim.org/entry/300710>
- ALOPECIA, ANDROGENETIC, 3
<http://omim.org/entry/612421>

MedGen

- Male pattern baldness
<https://www.ncbi.nlm.nih.gov/medgen/904995>
- Postmenopausal androgenetic alopecia
<https://www.ncbi.nlm.nih.gov/medgen/698021>

Sources for This Summary

- Amoretti A, Laydner H, Bergfeld W. Androgenetic alopecia and risk of prostate cancer: a systematic review and meta-analysis. *J Am Acad Dermatol*. 2013 Jun;68(6):937-43. doi: 10.1016/j.jaad.2012.11.034. Epub 2013 Feb 8. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/23395589>
- Hillmer AM, Hanneken S, Ritzmann S, Becker T, Freudenberg J, Brockschmidt FF, Flaquer A, Freudenberg-Hua Y, Jamra RA, Metzen C, Heyn U, Schweiger N, Betz RC, Blaumeiser B, Hampe J, Schreiber S, Schulze TG, Hennies HC, Schumacher J, Propping P, Ruzicka T, Cichon S, Wienker TF, Kruse R, Nothen MM. Genetic variation in the human androgen receptor gene is the major determinant of common early-onset androgenetic alopecia. *Am J Hum Genet*. 2005 Jul;77(1):140-8. Epub 2005 May 18.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15902657>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1226186/>
- Levy-Nissenbaum E, Bar-Natan M, Frydman M, Pras E. Confirmation of the association between male pattern baldness and the androgen receptor gene. *Eur J Dermatol*. 2005 Sep-Oct;15(5):339-40.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/16172040>
- Quinn M, Shinkai K, Pasch L, Kuzmich L, Cedars M, Huddleston H. Prevalence of androgenic alopecia in patients with polycystic ovary syndrome and characterization of associated clinical and biochemical features. *Fertil Steril*. 2014 Apr;101(4):1129-34. doi: 10.1016/j.fertnstert.2014.01.003. Epub 2014 Feb 15.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/24534277>
- Schweiger ES, Boychenko O, Bernstein RM. Update on the pathogenesis, genetics and medical treatment of patterned hair loss. *J Drugs Dermatol*. 2010 Nov;9(11):1412-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/21061765>
- Yazdan P. Update on the genetics of androgenetic alopecia, female pattern hair loss, and alopecia areata: implications for molecular diagnostic testing. *Semin Cutan Med Surg*. 2012 Dec;31(4):258-66. doi: 10.1016/j.sder.2012.08.003. Review. Retraction in: *Semin Cutan Med Surg*. 2015 Mar;34(1):48.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/23174496>
- Zhuo FL, Xu W, Wang L, Wu Y, Xu ZL, Zhao JY. Androgen receptor gene polymorphisms and risk for androgenetic alopecia: a meta-analysis. *Clin Exp Dermatol*. 2012 Mar;37(2):104-11. doi: 10.1111/j.1365-2230.2011.04186.x. Epub 2011 Oct 10. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/21981665>

Reprinted from Genetics Home Reference:

<https://ghr.nlm.nih.gov/condition/androgenetic-alopecia>

Reviewed: August 2015
Published: December 12, 2017

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services