

Rheumatoid arthritis

Description

Rheumatoid arthritis is a disease that causes chronic abnormal inflammation, primarily affecting the joints. The most common signs and symptoms are pain, swelling, and stiffness of the joints. Small joints in the hands and feet are involved most often, although larger joints (such as the shoulders, hips, and knees) may become involved later in the disease. Joints are typically affected in a symmetrical pattern; for example, if joints in the hand are affected, both hands tend to be involved. People with rheumatoid arthritis often report that their joint pain and stiffness is worse when getting out of bed in the morning or after a long rest.

Rheumatoid arthritis can also cause inflammation of other tissues and organs, including the eyes, lungs, and blood vessels. Additional signs and symptoms of the condition can include a loss of energy, a low fever, weight loss, and a shortage of red blood cells (anemia). Some affected individuals develop rheumatoid nodules, which are firm lumps of noncancerous tissue that can grow under the skin and elsewhere in the body.

The signs and symptoms of rheumatoid arthritis usually appear in mid- to late adulthood. Many affected people have episodes of symptoms (flares) followed by periods with no symptoms (remissions) for the rest of their lives. In severe cases, affected individuals have continuous health problems related to the disease for many years. The abnormal inflammation can lead to severe joint damage, which limits movement and can cause significant disability.

Frequency

Rheumatoid arthritis affects about 1.3 million adults in the United States. Worldwide, it is estimated to occur in up to 1 percent of the population. The disease is two to three times more common in women than in men, which may be related to hormonal factors.

Causes

Rheumatoid arthritis probably results from a combination of genetic and environmental factors, many of which are unknown.

Rheumatoid arthritis is classified as an autoimmune disorder, one of a large group of conditions that occur when the immune system attacks the body's own tissues and organs. In people with rheumatoid arthritis, the immune system triggers abnormal

inflammation in the membrane that lines the joints (the synovium). When the synovium is inflamed, it causes pain, swelling, and stiffness of the joint. In severe cases, the inflammation also affects the bone, cartilage, and other tissues within the joint, causing more serious damage. Abnormal immune reactions also underlie the features of rheumatoid arthritis affecting other parts of the body.

Variations in dozens of genes have been studied as risk factors for rheumatoid arthritis. Most of these genes are known or suspected to be involved in immune system function. The most significant genetic risk factors for rheumatoid arthritis are variations in human leukocyte antigen (HLA) genes, especially the *HLA-DRB1* gene. The proteins produced from HLA genes help the immune system distinguish the body's own proteins from proteins made by foreign invaders (such as viruses and bacteria). Changes in other genes appear to have a smaller impact on a person's overall risk of developing the condition.

Other, nongenetic factors are also believed to play a role in rheumatoid arthritis. These factors may trigger the condition in people who are at risk, although the mechanism is unclear. Potential triggers include changes in sex hormones (particularly in women), occupational exposure to certain kinds of dust or fibers, and viral or bacterial infections. Long-term smoking is a well-established risk factor for developing rheumatoid arthritis; it is also associated with more severe signs and symptoms in people who have the disease.

Learn more about the genes associated with Rheumatoid arthritis

- HLA-B
- HLA-DPB1
- HLA-DRB1
- IRF5
- PTPN22
- RBPJ
- RUNX1
- STAT4

Additional Information from NCBI Gene:

- AFF3
- ARID5B
- BLK
- C5
- CCL21
- CCR6
- CD2

- CD28
- CD40
- CD5
- CD58
- CTLA4
- FCGR2A
- FCGR2B
- GATA3
- IKZF3
- IL2
- IL21
- IL2RA
- IL2RB
- IL6R
- IL6ST
- IRAK1
- IRF8
- KIF5A
- NFKBIL1
- PADI4
- PIP4K2C
- POU3F1
- PRDM1
- PRKCQ
- PTPRC
- PXK
- RASGRP1
- RCAN1
- REL
- SPRED2
- TAGAP
- TLE3
- TNFAIP3
- TNFRSF14
- TRAF1
- TRAF6
- TYK2

Inheritance

The inheritance pattern of rheumatoid arthritis is unclear because many genetic and environmental factors appear to be involved. However, having a close relative with rheumatoid arthritis likely increases a person's risk of developing the condition.

Other Names for This Condition

- Arthritis, rheumatoid
- RA

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Rheumatoid arthritis (<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0003873/>)

Patient Support and Advocacy Resources

- Disease InfoSearch (<https://www.diseaseinfosearch.org/>)
- National Organization for Rare Disorders (NORD) (<https://rarediseases.org/>)

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov ([https://clinicaltrials.gov/ct2/results?cond="Rheumatoid arthritis"](https://clinicaltrials.gov/ct2/results?cond="Rheumatoid+arthritis");)

Catalog of Genes and Diseases from OMIM

- RHEUMATOID ARTHRITIS (<https://omim.org/entry/180300>)

Scientific Articles on PubMed

- PubMed (<https://pubmed.ncbi.nlm.nih.gov/?term=%28Arthritis,+Rheumatoid%5BMAJR%5D%29+AND+%28rheumatoid+arthritis%5BTI%5D%29+AND+%28%28gene%5BTIAB%5D%29+OR+%28genetic%5BTIAB%5D%29%29+AND+review%5Bpt%5D+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1080+days%22%5Bdp%5D>)

References

- Carmona L, Cross M, Williams B, Lassere M, March L. Rheumatoid arthritis. *Best Pract Res Clin Rheumatol*. 2010 Dec;24(6):733-45. doi: 10.1016/j.berh.2010.10.001. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/21665122>)
- Diogo D, Kurreeman F, Stahl EA, Liao KP, Gupta N, Greenberg JD, Rivas MA, Hickey B, Flannick J, Thomson B, Guiducci C, Ripke S, Adzhubey I, Barton A, Kremer JM, Alfredsson L; Consortium of Rheumatology Researchers of North America; Rheumatoid Arthritis Consortium International; Sunyaev S, Martin J, Zhernakova A, Bowes J, Eyre S, Siminovitch KA, Gregersen PK, Worthington J, Klareskog L, Padyukov L, Raychaudhuri S, Plenge RM. Rare, low-frequency, and common variants in the protein-coding sequence of biological candidate genes from GWASs contribute to risk of rheumatoid arthritis. *Am J Hum Genet*. 2013 Jan 10;92(1):15-27. doi: 10.1016/j.ajhg.2012.11.012. Epub 2012 Dec 20. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23261300>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3542467/>)
- Eyre S, Bowes J, Diogo D, Lee A, Barton A, Martin P, Zhernakova A, Stahl E, Viatte S, McAllister K, Amos CI, Padyukov L, Toes RE, Huizinga TW, Wijmenga C, Trynka G, Franke L, Westra HJ, Alfredsson L, Hu X, Sandor C, de Bakker PI, Davila S, Khor CC, Heng KK, Andrews R, Edkins S, Hunt SE, Langford C, Symmons D; Biologics in Rheumatoid Arthritis Genetics and Genomics Study Syndicate; Wellcome Trust Case Control Consortium; Concannon P, Onengut-Gumuscu S, Rich SS, Deloukas P, Gonzalez-Gay MA, Rodriguez-Rodriguez L, Arlsetig L, Martin J, Rantapaa-Dahlqvist S, Plenge RM, Raychaudhuri S, Klareskog L, Gregersen PK, Worthington J. High-density genetic mapping identifies new susceptibility loci for rheumatoid arthritis. *Nat Genet*. 2012 Dec;44(12):1336-40. doi:10.1038/ng.2462. Epub 2012 Nov 11. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23143596>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3605761/>)
- Raychaudhuri S, Sandor C, Stahl EA, Freudenberg J, Lee HS, Jia X, Alfredsson L, Padyukov L, Klareskog L, Worthington J, Siminovitch KA, Bae SC, Plenge RM, Gregersen PK, de Bakker PI. Five amino acids in three HLA proteins explain most of the association between MHC and seropositive rheumatoid arthritis. *Nat Genet*. 2012 Jan 29;44(3):291-6. doi: 10.1038/ng.1076. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/22286218>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3288335/>)
- Stahl EA, Raychaudhuri S, Remmers EF, Xie G, Eyre S, Thomson BP, Li Y, Kurreeman FA, Zhernakova A, Hinks A, Guiducci C, Chen R, Alfredsson L, Amos CI, Ardlie KG; BIRAC Consortium; Barton A, Bowes J, Brouwer E, Burtt NP, Catanese JJ, Coblyn J, Coenen MJ, Costenbader KH, Criswell LA, Crusius JB, Cui J, de Bakker PI, De Jager PL, Ding B, Emery P, Flynn E, Harrison P, Hocking LJ, Huizinga TW, Kastner DL, Ke X, Lee AT, Liu X, Martin P, Morgan AW, Padyukov L, Posthumus MD, Radstake TR, Reid DM, Seielstad M, Seldin MF, Shadick NA, Steer S, Tak PP, Thomson W, van der Helm-van Mil AH, van der Horst-Bruinsma IE, van der Schoot CE, van Riel PL, Weinblatt ME, Wilson AG, Wolbink GJ, Wordsworth BP; YEAR Consortium; Wijmenga C, Karlson EW, Toes RE, de Vries N, Begovich AB, Worthington J, Siminovitch KA, Gregersen PK, Klareskog L, Plenge RM. Genome-wide association study meta-analysis identifies seven new rheumatoid arthritis risk

loci. *NatGenet.* 2010 Jun;42(6):508-14. doi: 10.1038/ng.582. Epub 2010 May 9. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/20453842>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4243840/>)

- Viatte S, Plant D, Raychaudhuri S. Genetics and epigenetics of rheumatoidarthritis. *Nat Rev Rheumatol.* 2013 Mar;9(3):141-53. doi:10.1038/nrrheum.2012.237. Epub 2013 Feb 5. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23381558>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3694322/>)

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