

Resource

# Genes and immune system affected by seasonal changes

A study in the UK has shown that there are changes in genetic and immune system activity depending on the season.

[Print](#)

2014

A study in the UK has shown that there are changes in genetic and immune system activity depending on the season. This could explain why the symptoms of diseases such as rheumatoid arthritis vary depending on the time of year.

Study co-author, Chris Wallace, a genetic statistician at the University of Cambridge, says:

“Our results indicate that, in the modern environment, the increase in the pro-inflammatory status of the immune system in winter helps explain the peak of incidences of diseases that are caused by inflammation, by making people more susceptible to inflammations effects.”

In the study, blood from more than 16,000 people from both the northern and southern hemispheres was looked at. The results, published in the medical journal “Nature Communications”, indicated that the activity of almost a quarter of the genes tested (5,136 from 22,822 tested) varied according to the time of year. Some were shown to be more active in the winter and others more active in the summer.

Immune cells and fat tissue and the composition of the blood were also changed.

During the winter, the immune systems of people had pro-inflammatory profiles and raised levels of proteins linked to cardiovascular and autoimmune diseases compared to the summer. One inflammation-suppressing gene, ARNTL, was found to be more active in the summer and less active in winter. Previous studies on mice have shown that this gene suppresses inflammation and so this may help to explain why people’s levels of inflammation tend to be higher in the winter.

This seasonal variation may have evolutionary roots says, Wallace.

Evolutionarily, humans have been primed to promote a pro-inflammatory environment in our bodies in seasons when infectious disease agents are circulating. This environment helps people fight infections.

It makes sense that our immune systems adapt to cope with variation in infections as

these are thought to be the main cause of mortality for most of our evolutionary history.

## Read more

[RA diagnosis and possible causes](#)

RA is diagnosed through a combination of blood tests, scans and examination of the joints.

This article was downloaded from [www.nras.org.uk](http://www.nras.org.uk). National Rheumatoid Arthritis Society (NRAS) is a registered charity in England and Wales (1134859) and Scotland (SC039721). A private company limited by guarantee. Registered in England and Wales (7127101).