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# Women have stronger immune systems than men and it's all down to a single chromosome

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As anyone familiar with the phrase 'man-flu' will know women consider themselves to be the more robust side of the species when it comes to health and illness. Now new research, published in *BioEssays*, seems to support the idea. The research focuses on the role of MicroRNAs encoded on the X chromosome to explain why women have stronger immune systems to men and are less likely to develop cancer.

The research, led by Dr Claude Libert from Ghent University in Belgium, focused on MicroRNA, tiny strains of ribonucleic acid which alongside DNA and proteins, make up the three major macromolecules that are essential for all known forms of life.

"Statistics show that in humans, as with other mammals, females live longer than males and are more able to fight off shock episodes from sepsis, infection or trauma," said Libert. "We believe this is due to the X chromosome which in humans contains 10% of all microRNAs detected so far in the genome. The roles of many remain unknown, but several X chromosome-located strands of microRNA have important functions in immunity and cancer."

Dr Libert's team proposes that the biological mechanisms of the X chromosome have a strong impact on an individual's genes, known as genetic imprinting, which gives an immunological advantage to females. To develop their hypothesis the team produced a detailed map of all described microRNAs which have a role in immune functions and cancer in both human and mouse X chromosomes.

"We believe this immunological advantage is due to the silencing of X-linked genes by these microRNAs," said Libert. "Gene silencing and inactivation skewing are known mechanisms which affect X-linked genes and may influence X-linked microRNAs in the same way."

This genetic silencing leaves males at an immunological disadvantage as a male has only one X-chromosome. The Y-Chomosone contains fewer genes so if the genes involved in immunity are silenced maternally the male is left with no compensating genetic information.

"How this unique form of genetic inheritance influences X-chromosone linked microRNAs will be a challenge for researchers for years to come," concluded Libert, "not only from an evolutionary point of view, but also for scientists investigating the causes and cures of disease."

Provided by Wiley

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