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# Men respond more aggressively than women to stress and it's all down to a single gene

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The pulse quickens, the heart pounds and adrenalin courses through the veins, but in stressful situations is our reaction controlled by our genes, and does it differ between the sexes? Australian scientists, writing in *BioEssays*, believe the SRY gene, which directs male development, may promote aggression and other traditionally male behavioural traits resulting in the fight-or-flight reaction to stress.

Research has shown how the body reacts to stress by activating the adrenal glands which secrete catecholamine hormones into the bloodstream and trigger the aggressive fight-or-flight response. However, the majority of studies into this process have focused on men and have not considered different responses between the sexes.

"Historically males and females have been under different selection pressures which are reflected by biochemical and behavioural differences between the sexes," said Dr Joohyung Lee, from the Prince Henry's Institute in Melbourne. "The aggressive fight-or-flight reaction is more dominant in men, while women predominantly adopt a less aggressive tend-and-befriend response."

Dr Lee and co-author Professor Vincent Harley, propose that the Y-chromosome gene SRY reveals a genetic underpinning for this difference due to its role in controlling a group of neurotransmitters known as catecholamines. Professor Harley's earlier research had shown that SRY is a sex-determining gene which directs the prenatal development of the testes, which in turn secrete hormones which

masculinise the developing body.

"If the SRY gene is absent the testes do not form and the foetus develops as a female. People long thought that SRY's only function was to form the testes" said Professor Harley. "Then we found SRY protein in the human brain and with UCLA researchers led by Professor Eric Vilain, showed that the protein controls movement in males via dopamine."

"Besides the testes, SRY protein is present in a number of vital organs in the male body, including the heart, lungs and brain, indicating it has a role beyond early sex determination," said Dr Lee. "This suggests SRY exerts male-specific effects in tissues outside the testis, such as regulating cardiovascular function and neural activity, both of which play a vital role in our response to stress."

The authors propose that SRY may prime organs in the male body to respond to stress through increased release of catecholamine and blood flow to organs, as well as promoting aggression and increased movement which drive fight-or-flight in males. In females oestrogen and the activation of internal opiates, which the body uses to control pain, may prevent aggressive responses.

The role of SRY regulation of catecholamines also suggests the gene may have a role in male-biased disorders such as Parkinson's disease.

"New evidence indicates that the SRY gene exerts 'maleness' by acting directly on the brain and peripheral tissues to regulate movement and blood pressure in males," concluded Lee. "This research helps uncover the genetic basis to explain what predisposes men and women to certain behavioural phenotypes and neuropsychiatric disorders."

**More information:** Lee. J, Harley. V, “The male fight-flight response: A result of SRY regulation of catecholamines?” *Bioessays*, Wiley-

Blackwell, March 2012, DOI: 10.1002/bies.201100159