Newly discovered breathing molecule vital to treating respiratory conditions

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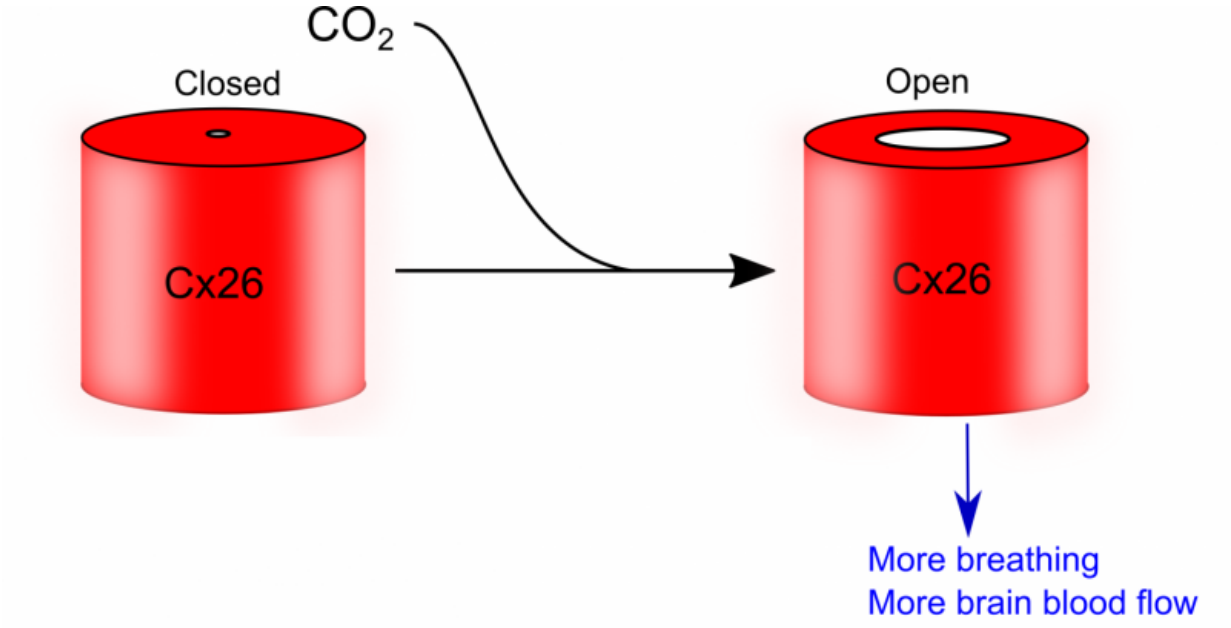

Credit: University of Warwick

Respiratory conditions could be better targeted and treated, thanks to the discovery of the vital molecule which regulates breathing – according to research by the University of Warwick.

Professor Nicholas Dale at the School of Life Sciences has exploited evolutionary principles to identify Connexin26 (Cx26) as a key molecule that reacts to CO2 in our bodies and activates breathing.

Cx26 molecules detect levels of CO_2 in the blood-stream, and when levels reach a certain point, they tell our bodies to excrete the CO_2 and take in oxygen – the vital life-preserving process that allows us to breathe, and creates blood flow to the brain.

Without this essential molecular function, harmful levels of CO_2 would remain in the bloodstream, making breathing difficult or impossible.

Mutations in Cx26 are directly connected to a number of serious conditions - ranging from congenital deafness, to respiratory conditions, and serious syndromes that affect skin, vision and hearing. As Cx26 is vital to breathing well, people carrying these mutations may be at risk of sleep apnoea.

Identifying these mutations and working out how to restore the molecule to its normal function could lead to effective, targeted, personalised treatments to mitigate these risks and improve quality of life.

Different animals have varying levels of sensitivity to CO_2. Professor Dale's group exploited this idea to see whether the properties of Cx26 matched the physiological requirements of: birds, which fly at high-altitude and can tolerate low levels of CO_2; humans and rats which are broadly similar at an intermediate level; and mole rats, which live exclusively underground and tolerate very high levels of CO_2.

The researchers found that the CO_2 binding properties matched the sensitivities of these different animals. Evolutionary natural selection has thus modified the CO_2-binding properties of Cx26 - showing that this molecule is a universally important sensor of CO_2 in warm blooded animals.

Professor Dale comments on the significance of the research:

"Important molecules with universal physiological functions are shaped by evolution. We have exploited this simple fact to show that the CO2-binding characteristics of Cx26 are important in our bodies too. This is likely to open up new ways to identify and treat people at risk of sleep apnoeas."

The research, 'Evolutionary adaptation of the sensitivity of Connexin26 hemichannels to CO2', is published in the *Proceedings of the Royal Society B*.

More information: Evolutionary adaptation of the sensitivity of connexin26 hemichannels to CO2. *Proceedings of the Royal Society B*, DOI: 10.1098/rspb.2016.2723

Provided by University of Warwick