

'Electronic switch' opens doors in rheumatoid joints

January 2 2008

A breakthrough in understanding the way atoms move across cell membranes in the human body could pave the way for the development of new treatments for inflammatory diseases such as rheumatoid arthritis.

Scientists at the University of Leeds have identified a previously unknown natural mechanism that opens ion channels – proteins at the cell surface that act as doorways into and out of cells – through the naturally occurring protein thioredoxin.

Ion channels allow movement of ions - electrically charged atoms - across the cell membrane to carry out various functions such as pain transmission, timing of the heart beat, and regulation of blood glucose. Often, they need to be stimulated to open and, until now, two main groups of activating mechanisms have been acknowledged: changes in cell voltage and binding of chemical factors.

In a paper published today (03 January) in *Nature*, Professor Beech and colleagues from the University's Faculty of Biological Sciences reveal that thioredoxin works in a different manner: it activates an ion channel by donating electrons to it, in a process Professor Beech likens to “an electronic on-switch”.

“Thioredoxin is naturally present in cells and is secreted to help the body counter stressful chemical reactions that occur in inflammation, which can damage cells,” he explains. “We already knew that inflammatory

diseases cause the production of high levels of thioredoxin – in fact with rheumatoid arthritis, it’s striking how much is present in affected joints. But we didn’t know until now that thioredoxin can also activate ion channels, conferring additional protective potential and offering opportunities for mimicking the effect with drugs.”

“It would seem that the body’s own natural defences have provided us with new understanding that could be significant in the development of future treatments for arthritis and related diseases,” he says.

Source: University of Leeds

Citation: 'Electronic switch' opens doors in rheumatoid joints (2008, January 2) retrieved 18 September 2024 from <https://phys.org/news/2008-01-electronic-doors-rheumatoid-joints.html>

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