Inflammation research opens route to better pain relief

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Research at the University of Leeds could pave the way to a new generation of painkillers by providing a new theory of how inflammation causes pain.

An international group of scientists led by Dr Nikita Gamper of the University's Faculty of Biological Sciences has discovered how two proteins play a key role in the way we feel pain, offering new targets on which drug development can be focused. The findings are published online today (March 24) in the Journal of Clinical Investigation.

"Pain originates from a series of electrical signals sent by nerve cells in outlying areas of the body to the central nervous system and ultimately the brain," said Dr Gamper. "We still know very little about the mechanism by which these signals are generated, so existing painkillers are non-specific, designed to generally dull the reception of the signals in the central nervous system.

"Because they target the central nervous system, some stronger pain killers can provoke severe side effects, such as disorientation, drowsiness or nausea - and many of these drugs are addictive. Our research is trying to better understand where pain originates, to enable more targeted drugs to be developed that avoid these side effects."

Pain can be a healthy response, informing us that something in our bodies is going wrong, is damaged or at risk of being damaged. Inflammation often distorts this healthy reaction, causing pain that lasts

much longer than is needed to transmit the message, as is the case in toothache, sore throat or arthritis.

In research funded jointly by the Wellcome Trust and the Medical Research Council, Dr Gamper's team has discovered that a substance released at sites of inflammation - called bradykinin - manipulates two proteins commonly found at the damage-sensing terminals of peripheral nerve cells. When targeted by the bradykinin, these proteins then cause the nerve cells to send electrical 'pain' signals to the brain.

The research offers a new concept of how inflammation can cause pain and is the first time that one of these proteins - Calcium-activated chloride channel Ano1 - has been shown to have a role in pain transmission. The other protein, called M-type potassium channel, although previously linked to neuronal activity, was not known to have a role in inflammatory pain.

"The process we've identified takes place in the peripheral sensing neurons where the pain signal is generated," said Dr Gamper. "Targeting the peripheral nervous system for drug development would create painkillers that would leave the central nervous system untouched, thus reducing the likelihood of side effects."

Dr Gamper is now planning to study these proteins in more depth and identify their possible role in other types of pain, such as neuropathic pain and migraine.

Provided by University of Leeds