Effective pain treatment for cancer patients?

June 25 2009

Professor Dr. Rohini Kuner is a researcher at the Pharmacology Institute of the University of Heidelberg. Credit: Photo: Pharmacology Institute of the University of Heidelberg.

Cancer patients often suffer from severe pain that cannot be effectively treated with conventional medication. Researchers at the Pharmacology Institute of the University of Heidelberg have found the possible reasons for this - tumors release two signal substances that make nerve cells especially sensitive and enhance tumor growth. In animal tests, when the researchers blocked the effect of the signal substances on the nerve cells, the sensitivity of the nerve cells and tumor growth were reduced.

The results of the research of the international working group headed by Professor Dr. Rohini Kuner indicate a new approach for the development of effective pain medication for cancer patients. The work

has now been published online in the prestigious journal *Nature Medicine*.

Tumor pain: new therapies are urgently needed

For patients, [severe pain](#) is one of the worst and most feared symptoms of cancer. The causes of the frequently extreme pain are still largely unknown. Cancer pain is frequently difficult to handle with conventional pain medication such as opioids. High dosages are required to achieve any effect at all - as a result, the side effects are immense for the patients and tolerance may quickly ensue. "There is a great need for special pain medication for cancer patients," says pharmacologist Professor Dr. Rohini Kuner, who is especially interested in explaining the mechanisms of chronic pain.

Tumor signals make nerve cells extremely sensitive to pressure

In this research project, she and her colleagues examined tissue from mice to determine what signal substances were released by tumors. They discovered two molecules that were previously known only as growth factors for blood-forming stem cells. Contact with these molecules made nerve cells in the vicinity of the cancer tissue considerably more sensitive to pressure, as the researchers demonstrated by testing nerve activity with electrodes. "The findings are consistent with descriptions of cancer patients who say that merely touching the affected area is painful," explained Professor Dr. Kuner.

But not just touching, even [tumor growth](#) itself causes pain, for the expanding tissue also exerts pressure. The cancer cells apparently use the growth factors for their own growth and spread through the nerve pathways and blood vessels to the rest of the organism.

An injection against tumor pain?

The discovery made in Heidelberg opens up new prospects in the fight against cancer pain - in the next step, the researchers injected proteins (antibodies) that block the contact sites for cancer signal substances on the nerve cells. Indeed, the sensitivity of nerve cells and tumor growth were reduced.

Further research must now show whether this use is also possible in human tissue. If so, it would be conceivable to inject these "protein blockers" directly into the tumor and thus reduce pain and side effects for the patient.

More information: Matthias Schweizerhof, Sebastian Stösser, Martina Kurejova, Christian Njoo, Vijayan Gangadharan, Nitin Agarwal, Martin Schmelz, Kiran Kumar Bali, Christoph W. Michalski, Stefan Brugger, Anthony Dickenson, Donald A. Simone, and Rohini Kuner, Hematopoietic colony stimulating factors mediate tumor-nerve interactions and bone cancer pain, Nature Medicine 2009, Published online: 07 June 2009, doi:10.1038/nm.1976

Source: University Hospital Heidelberg (news : web)