

High iron levels may promote the mobility of brain tumor cells

Iron is essential for healthy cells. Cancer cells also require this trace element. Researchers in Freiburg have now found evidence that high levels of iron directly in the tumor microenvironment promote the spread of certain cells in a particularly aggressive type of brain tumor known as glioblastoma. In the long term, iron metabolism could therefore serve as a target for more precisely influencing particularly invasive tumor cells. The findings were published on October 8, 2026, in the journal **Neuro-Oncology. The study does not indicate whether iron from the diet or from dietary supplements plays a role in this process.**

“Our findings suggest that certain brain tumors spread more aggressively within the brain when the cells have high levels of iron in their surroundings,” says study lead author Dr. Vidhya Madapusi Ravi, research group leader at the Department of Neurosurgery at the Medical Center – University of Freiburg.

“If we gain a better understanding of these mechanisms, new opportunities could emerge in the long term to inhibit the spread of such tumor cells in a more targeted manner, thereby making treatment significantly more effective,” says Prof. Dr. Jürgen Beck, Medical Director of the Department of Neurosurgery at the Medical Center – University of Freiburg.

Why Invasive Tumor Cells Are So Problematic

Glioblastomas are among the most aggressive brain tumors. A particular challenge is that individual cancer cells can penetrate deep into the surrounding brain tissue. Once there, they are nearly impossible to remove completely during surgery. Remaining cells can later trigger a relapse.

The Freiburg researchers have now demonstrated in cell cultures and human brain tissue sections that additional iron enhances the movement and growth of certain tumor cells—and thus their spread throughout the brain. The researchers hypothesize that a particularly active iron metabolism is responsible for this. “This shifts the focus not only to the tumor cell itself but also to its immediate surroundings,” says Madapusi Ravi. It is already known from other types of tumors that cancer cells alter their iron metabolism. In the case of glioblastomas—which are difficult to treat—this had not yet been clarified.

The study focused exclusively on how increased iron levels directly affect the tumor microenvironment. The results therefore do not allow for any conclusions regarding whether iron-rich foods or dietary supplements influence the course of the disease.

It also remains unclear whether iron directly triggers the observed changes or is part of a more complex interplay within the tumor tissue. The researchers now aim to clarify the underlying mechanisms and determine whether iron metabolism can be therapeutically influenced in the long term.

Publication:

Christophe Petry et al., Spatially restricted iron-metabolism-associated stress programs prime invasive mesenchymal glioblastoma states in human tissue-context models, *Neuro-Oncology*, 2026; noag220
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Further information

