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Press release

For immediate publication

Fasting to fight cancer: Med Uni Graz researchers investigate ways to combat liver carcinoma

Graz, 24 January 2022—While massive advances have been made in cancer treatment in recent years and decades, several types of cancer remain difficult to treat for various reasons. One of these problematic types is liver cancer, more specifically hepatocellular carcinoma. Med Uni Graz researchers have devoted a new publication appearing in the journal "Science Advances" to new therapeutic methods. Their research examined how fasting has an effect on treatment of this carcinoma, and the findings are promising.

Fasting: More than just a fad diet

Fasting and its effects have long been the focus of biology and medical research. The positive effects of regularly going without food are becoming clear in more and more studies. In collaboration with Utrecht University and the Max Planck Institute in Dresden, Med Uni Graz has investigated molecular and metabolic processes during the treatment of the cancer cells involved in hepatocellular carcinoma. The focus is on one of the greatest problems in treating this carcinoma: rapid resistance to drugs and consequently relatively early exhaustion of potential therapeutic options. The cell changes caused by fasting can help to avoid this resistance. Since hepatocellular carcinoma is one of the deadliest carcinomas and the incidence of this disease is increasing globally, research on this type of cancer is a priority.

The problem of resistance

The drug Sorafenib is affected by resistance. Its active substance is primarily used to fight liver cell and kidney cell carcinomas. Sorafenib interferes with cell division and cuts off the blood supply to tumors. The tumor cells are prevented from multiplying and newly formed cells can no longer be connected to the vascular system. This treatment initially works well against hepatocellular carcinomas, but these tumors quickly develop a resistance to Sorafenib and the carcinoma continues to grow.

As Med Uni Graz researchers have shown, Sorafenib has another effect that also occurs in resistant cells: It inhibits the cellular respiration of the mitochondria. If enough glucose is available as a source of energy, the cancer cells can still continue to divide.

Fasting as part of combination therapy

"If Sorafenib is used in combination with fasting (and thus restriction of glucose), the two most important mechanisms that provide energy are suppressed and tumor growth is significantly reduced," explains study director Andreas Prokesch from the Gottfried Schatz Research Center at Med UniGraz. "Thus fasting can help to prevent or reduce the

development of resistance to Sorafineb." The combined effects of Sorafenib and fasting were investigated in isolated liver cancer cells, in organoids derived from patients and in live mice.

New treatment option for liver cancer

Fasting as part of combination therapy may be relevant to clinical practice since many studies have indicated that a group of metabolically stable cancer patients tolerate fasting very well and fasting does not lead to any further unwanted side effects. The study also indicated that tumor suppressor p53 is required to obtain the combined effect of fasting and Sorafenib. This treatment strategy can be considered for the two thirds of all liver cancer patients who do not have a p53 mutation.

Further research should indicate whether this combination therapy can be translated to treatment of hepatocellular carcinoma in clinical practice.

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Profile: Andreas Prokesch

Andreas Prokesch received a PhD in biomedical engineering from Graz University of Technology. After conducting research in the USA, he became the leader of a research team at the Gottfried Schatz Research Center at the Medical University of Graz. This team investigates the molecular effects of fasting and its uses in metabolic diseases and cancer.

Link to the publication: <https://www.science.org/doi/10.1126/sciadv.abh2635>