Researcher develops effective fasting tool against cancer

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Fasting is a tool for effective cancer treatment. A new study shows that the right diet in combination with chemotheraphy not only protect the body's immune system, it also turns it against cancer cells.

Valter Longo is a professor at the University of Southern California and a Chalmers Jubilee Professor. He is currently visiting Chalmers to participate in the Healthy Ageing conference on August 30-31 and talk about his new findings, published in last month´s *Cancer Cell*.

"We created a fasting mimicking diet, and have proved that it is working in cancer treatment in mice and have very promising clinical data suggesting the same. Now we want to move forward by determining if this could be an inexpensive alternative to the very expensive immunotherapy, and also to see what happens if the diet is combined with immunotherapy, he says."

Valter Longo have been studying fasts – the effect on cells and how a 4-day fast can even prolong lifespan, and the effect on cancer – for a long time. In 2012 he showed that starvation, in combination with chemotherapy drug Doxorubicin, made tumours shrink much more than if only the drug was administrated. The reason for this is that starvation deprives the cancer cells of the food they need while they continue to grow.

But low nutrition can also hurt the patients. In particular, it temporarily damages cells that are the immune systems' main anti-cancer weapon,

the so called TIL-cells (tumour-infiltrating lymphocytes). Even though they eventually come back even stonger, the temporary deficiency can be problematic. Therefore, Longo went on to invent a fasting mimicking diet that cuts off food supply to cancer cells, while feeding the TIL-cells. For mice, this is a plant based low sugar and low protein diet rich in vitamin D, zinc and fatty acids essential to TILs' performance.

In his new research, Valter Longo proved that this diet – in combination with chemotherapy – shrinks breast cancer tumours in mice to a fourth of its size. The research group examined samples at cellular level to figure out why, and found two explanations for this. When compared to a control group, the mice given only chemotherapy had 70 percent more TILs, the mice given only the diet had 80 percent more, and the group that had both therapies had 240 percent more TILs. The team also showed that a specific enzyme was protecting the tumours from TILs – but this enzyme was weakened by Professor Longo's diet.

"We were a little surprised to find that the therapy would render cancer cells typically resistant to the immune system, like breast cancer cells, sensitive to it," he says.

The diet is already used in treatment, and even though Longo´s team so far only have been focusing on breast cancer and melanoma, there´s a strong possibility that this will work also for patients with other forms of cancer.

"Yes, I think this is very, very likely."

Valter Longo is far from the only one to present interesting results at the Healthy Ageing seminar.

"I look forward to hearing the lecture of Nobel Laureate Professor Tomas Lindahl and also of Professor Frank Madeo with his research on

spermidine. However, the symposium is full of remarkable speakers so it will be a great couple of days, Valter Longo concludes.

Fellow researchers will be joined by high school kids in the audience. Healthy Ageing is organized by Chalmers Life Science Engineering Area of Advance and Molecular Frontiers, with support from the Royal Swedish Academy of Sciences and AstraZeneca."

Provided by Chalmers University of Technology