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Small molecules can starve cancer cells

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All cells in our body have a system that can handle cellular waste and release building blocks for recycling. The underlying mechanism is called autophagy and literally means "self-eating". Many cancer cells have increased the activity of this system and the increased release of building blocks equip the cancer cells with a growth advantage and can render them resistant towards treatment.

"We have discovered a small molecule that can block autophagy in different cancer cells and specifically, this molecule can increase the sensitivity of breast cancer cells towards one of the most commonly used treatments for breast cancer," says Professor Anders H. Lund, at BRIC, University of Copenhagen.

The results have just been published in *EMBO Journal*: "microRNA-101 is a potent inhibitor of autophagy, Frankel et al."

The molecule that the researchers have studied is called microRNA-101 and is found naturally in our cells. In cancer research, there is currently a large focus on both autophagy and microRNA molecules, which can control our genes and both mechanisms are known to play an important role for cancer development.

"We have shown that microRNA-101 can turn off specific genes and thereby inhibit autophagy in cancer cells. The fact that microRNA molecules can regulate autophagy is quite new and our results disclose a large and interesting field within cancer research" says researcher Lisa Frankel, who has been leading this research project in Anders H. Lund's

laboratory.

MicroRNA-101 is often lost in liver cancer, prostate cancer and breast cancer. By controlling the level of microRNA-101 in cells of different cancer types, the researchers from BRIC show that microRNA-101 regulates autophagy. In addition, the researchers have shown that breast cancer cells become more sensitive towards treatment with the anti-hormone Tamoxifen, when they via microRNA-101 turn off the autophagy system.

"This result has a clear clinical relevance, as resistance against tamoxifen is a large problem in the treatment of breast cancer," says Anders H. Lund.

The next step of the researchers is to investigate whether other microRNA molecules are involved in the regulation of autophagy in cancer cells. Further, they will take a closer look at the role of microRNA-101 in normal development of our organism and in the development of cancer.

Provided by University of Copenhagen