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## **As we learn more about fat, we learn more about its links to cancer**

by: Paul Taylor

The question I recently read that excess body fat could become the second leading preventable cause of cancer, after tobacco. I get it that smoking is bad. But how exactly does fat cause cancer?

The answer As a result of continuing research, our understanding of fat has gone through a huge transformation in recent years.

It was once thought that fat - medically known as adipose tissue - was just an inert collection of cells used for the storage of surplus calories, or energy, that we can draw upon in times of need.

But now medical experts realize that fat behaves almost like an organ - interacting with other parts of the body. It actually sends out signals that play a crucial role in regulating metabolism, the immune system and other functions. If we become overweight or obese, the normal running of the body can get knocked off balance by too many signals from fat.

"Different products that are produced by fat cells or in fat cells can affect all kinds of pathways and result in multiple causes for someone to develop cancer," says Dr. Rossanna Pezo, a medical oncologist at Sunnybrook Health Sciences Centre in Toronto.

Researchers still have a lot to learn about how all these processes interact. However, they have already identified several ways in which fat may contribute to the development of a variety of cancers. For instance, fat can be converted to estrogen - a hormone that is known to fuel the growth of some ovarian, endometrial (the membrane lining the uterus) and breast cancers. In postmenopausal women, whose ovaries produce a dwindling amount of estrogen, fat becomes a primary source of this cancer-linked hormone.

"Generally speaking, the more fat that there is, the more estrogen that is produced," says Dr. Rachel Murphy, an assistant professor in population and public health at the University of British Columbia.

Fat also creates a state of chronic inflammation - another factor linked to cancer. The inflammatory process is associated with free radicals, unstable oxygen molecules that can damage DNA and cause potentially cancerous genetic mutations, says Dr. Darren Brenner, an assistant professor in the department of oncology at the University of Calgary.

Furthermore, excess weight often leads to a condition known as insulin resistance. Insulin is a hormone that moves glucose (or sugar) from the blood stream into cells where it is used for energy. As the body's cells become resistant to insulin, the pancreas responds by producing more and more of the hormone in an attempt to clear glucose from the bloodstream. Elevated levels of insulin and related substances - such as insulin-like growth factor-1 - stimulate cells to divide and multiply. This increased activity may lead to random genetic mutations that set the stage for cancer.

Usually, the body can cope with a certain amount of DNA damage. Cells have a built-in self-destruct mechanism when they go awry. But if there are too many mutated cells, some are likely to survive and may become cancerous, Brenner says.

Fat also physically alters the body in ways that can boost the likelihood of getting certain types of cancer. In particular, people with excessive weight around the abdomen are prone to gastric reflux (or heartburn), in which digestive juices will back up into the tube connecting the mouth to the stomach.

The constant irritation can damage cells and may lead to esophageal cancer.

But fat alone isn't the only problem. Dietary and lifestyle factors that may contribute to weight gain are also directly linked to an increased cancer risk. For example, diets rich in red meats and highly processed foods have been implicated in colorectal and other cancers.

"It's not a simple story," Brenner says. "These independent risk factors can be additive in their effects."

On the flip side of the risk equation, people who tend to eat lots of fresh fruits and vegetables and whole grains are consuming a host of micronutrients that may help guard against cancer.

Likewise, studies suggest that regular exercise may be protective, too. All this does not bode well for the future health of many Canadians, given that more than 60 per cent are overweight or obese.

It's certainly not easy to lose weight. Murphy says we may need public policies designed to encourage lifestyle choices that help to keep people trim. That could mean making sure healthy foods are affordable, or designing cities to incorporate exercise into daily activities.

Of course, cancer isn't inevitable. So, if you are struggling to live a healthier life, it's important to keep in mind that "even little changes can help reduce your risk," Brenner says.

"We see that trend in the research."

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