Diet and Prostate cancer

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Norman Swan: If you're a regular listener then you'll know that a recurrent theme is that what we eat definitely helps to define what we are, especially when it comes to cancer. Michael Pollak is Professor of Medicine and Oncology at McGill University in Montreal. He has a special interest in eating and cancer, especially prostate cancer. But, as you'll hear, what he's found probably applies to other malignancies as well.

Michael Pollak: Most of the research concerning diet and prostate cancer over the past decade has emphasised micronutrients. These are constituents of the diet that are consumed in very small quantities like minerals and vitamins.

Norman Swan: Antioxidants, selenium, things like that.

Michael Pollak: Selenium, licopenes, vitamins...and there have been associations in population surveys that have implied that certain deficiencies could increase the risk of prostate cancer, and naturally that led to some enthusiasm to try to lower prostate cancer risk by providing micronutrient supplements. And that led to a large clinical trial in North America called the Select Trial which involved thousands of men, many years of follow-up, and the results are disappointing. The supplementation simply did not alter the risk of prostate cancer.

So now some of the research direction concerning nutrition and cancer has shifted away from micronutrients to macronutrients, and by macronutrients we mean the major food groups.

Norman Swan: Protein, fat, carbohydrate and also its macro effects on the body such as obesity.

Michael Pollak: Exactly, and here we find that eating too much in terms of prostate cancer, like cardiovascular disease, is not good for you.

Norman Swan: It increases your risk, or increases bad outcomes if you get it?

Michael Pollak: Excellent question. The effect on risk is measurable but small, the effect on outcome is very significant. Obese men are somewhat more likely

to get prostate cancer but prostate cancer patients who are obese do considerably worse.

Norman Swan: Which is more than just it's hard to operate on them?

Michael Pollak: Yes, it's not just due to surgical complications. The studies are quite definitive in showing that there's a biological difference. The question is why do obese people with prostate cancer do worse?

Norman Swan: To what extent do they do worse?

Michael Pollak: Death rates can be three to four times higher in obese men than in normal-weight men all other factors being equal; so just the presence of obesity can have an enormous effect on outcome. Our best treatments have relatively little effect on outcome compared to just being overweight.

Norman Swan: So it overwhelms prostate treatment?

Michael Pollak: Yes. The initial research suggested a simplistic idea that you eat too much your body has somehow more energy than it should and the cancer uses this energy, this excess nutrition, to grow better. But we now know that it's not the case, it's not that there's an excess of glucose to feed the cancer, for example, because cancers are very good at extracting nutrients from...

Norman Swan: They'll take it anyway?

Michael Pollak: Yes, so you're not going to fertilise the cancer more by providing more nutrients, they can get all the nutrients they need even if you're thin. So how then does obesity affect the cancer? The latest research suggests that obesity changes the hormonal environment of the man and in turn it's the obesity-related hormones that worsen the prognosis. We're not talking about the regular hormones that people think about in the context of prostate cancer.

Norman Swan: It's not testosterone?

Michael Pollak: It's not testosterone.

Norman Swan: So is it insulin, is it things to do with the risk of diabetes?

Michael Pollak: Right, it's insulin, and insulin-like growth factors. The prostate is not just sensitive to androgens like testosterone but also appears to be responsive to insulin, which is newer information.

Norman Swan: Insulin tells cells, especially in our muscles, to import sugar, glucose from the blood to use as energy. Insulin-like growth factors are another family of hormones, chemical messengers, which aren't well understood but one of their messages is to tell cells to go forth and multiply.

Both these hormones do this by docking with a receptor on the surface of a cell like a lock and key.

Research has found that prostate cancer cells have receptors for both insulin and insulin-like growth factors, IGFs, and one thing that certainly goes along with obesity are high insulin levels.

This has blindsided many prostate cancer researchers until relatively recently because for years they'd been focused on the male hormone testosterone, and had left insulin to the researchers looking at metabolic diseases like diabetes. Michael Pollak again.

Michael Pollak: If we take mice that have experimental prostate cancer and we simply feed these mice too much glucose, too much sugar, a junk food diet, we can show that not surprisingly that makes their insulin levels go up. But what's intriguing is it makes their prostate cancers grow faster and when we examine the insulin receptors on those tumours they get more activated. So that we really have fairly direct experimental evidence that higher levels of insulin can stimulate prostate cancer growth.

Insulin receptors detect the levels of insulin and the levels of insulin are fluctuating hour to hour according to how much you eat. Then there's the separate but closely related insulin-like growth factor receptors they detect the amount of IGF in the blood. The levels of IGF vary in a less acute manner with how much you eat. IGF 1 levels tend to vary less meal to meal but they're lower in people who are eating less.

Norman Swan: So you've got a story that's confirmed in animals, or it's suggested it's confirmed in animals, that the more calories you take the higher your insulin and the faster your tumour grows. That could be a worry for people with Type 2 diabetes who have been prescribed insulin. I mean what's the story here?

Michael Pollak: Well there's a very interesting convergence of research in this area, there have actually been recent reports of excess cancer amongst insulin users. These reports are highly controversial and of course people who are insulin dependent diabetics do not have much choice. Even if it were to be associated with a somewhat increased cancer risk...

Norman Swan: Because if you've got Type 1 diabetes you'll die without it?

Michael Pollak: Exactly. On the other hand...

Norman Swan: Just finishing off on Type 1 -- in Type 1 diabetes if you're taking insulin, well you probably aren't taking excess insulin in your body, you're probably taking the right amount.

Michael Pollak: Right, the physiological amount, and Type 2 diabetics actually their problem is insulin resistance.

Norman Swan: And the result is you're actually even without insulin treatment you've got very high levels of insulin.

Michael Pollak: And so these people, these Type 2 diabetics have high blood sugars and high insulins and the high insulin is not working in the classic insulin target tissues but may actually be stimulating cancers. Now an interesting drug is metformin because metformin is used in the treatment of Type 2 diabetes.

Norman Swan: It's a very old drug, a very reliable drug, in fact it makes you lose weight as well.

Michael Pollak: Yes, we are a big fan of metformin and it's now the subject of cancer research because we are testing the hypothesis that metformin use by lowering the glucose and especially lowering the insulin might be beneficial for prostate cancer patients who have high insulin levels. And in Sydney, Australia, one of the first clinical trials of metformin for prostate cancer is beginning I think later this year.

Norman Swan: In obese men?

Michael Pollak: Men who have high insulin levels and these are mainly obese men.

Norman Swan: Has anybody done an intervention where they've got obese men to lose weight and found whether or not that makes a difference to prostate cancer outcomes because that's the other acid test here?

Michael Pollak: Of course that would be highly desirable simply to forget the drugs and just lose weight. We predicted that that would be as effective. However we also know that it's very hard to lose weight and to maintain the weight loss. So the immediate message for prostate cancer patients is you have another reason, perhaps even a special reason to aim for your ideal body weight but this drug metformin and other drugs under development may provide a special help.

Norman Swan: And what about other cancers?

Michael Pollak: There are similar lines of research for colon cancer and for breast cancer, high levels of insulin are also implicated in those settings and either lifestyle or drug treatments that might lower the insulin levels are under study as ways to provide new kinds of hormonal management for these cancers.

Norman Swan: Michael Pollak is Professor of Medicine and Oncology at McGill University in Montreal.