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Surprising findings about Hepatitis C and insulin resistance

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We have known for several years that Hepatitis C, a common cause of liver cirrhosis and cancer, also makes people three to four times more likely to develop Type 2 diabetes.

In studying the insulin resistance of 29 people with Hepatitis C, Australian researchers have confirmed that they have high insulin resistance, a precursor to diabetes. However, almost all insulin resistance was in muscle, with little or none in the liver, a very surprising finding given that Hepatitis C is a liver disease.

Dr Kerry Lee Milner and Professor Don Chisholm from Sydney's Garvan Institute of Medical Research, in collaboration with Professor Jacob George from the Storr Liver Unit, University of Sydney at Westmead Hospital, have published their study in the prestigious international journal, *Gastroenterology*, now online.

Insulin, a hormone made by the pancreas, helps the body use glucose for energy. The two most important organs that respond to insulin are the liver and muscle. A healthy liver responds to insulin by not producing glucose, while healthy muscle responds by using glucose. An insulin resistant liver produces unwanted glucose, while insulin resistant muscle cannot absorb it from the bloodstream, leading to high levels of sugar in the blood.

"Contrary to all expectations, not only did we find no significant insulin resistance in the liver of the patients in the study, half of them suffered from a strain of Hepatitis C that causes about three times the normal level of fat to accumulate in the liver," said Professor Chisholm.

"The fifteen people with very high levels of fat in the liver had the same degree of insulin resistance as the fourteen that didn't have fatty livers."

"A number of important investigators around the world have been arguing that fat in the liver is an extremely important determinant of insulin resistance, perhaps the most important. At least in this context, we've shown that not to be the case."

"Before you get Type 2 diabetes, you must become insulin resistant and your insulin producing cells must also fail to compensate. Insulin resistance alone will not give you diabetes."

"In our study, we gave intravenous glucose, a specific stimulus to insulin secretion, and showed that insulin secretion was not impaired in Hepatitis C patients compared to our control group."

“This finding tells us that people with Hepatitis C who develop diabetes probably have susceptible insulin-producing cells, and would probably get it anyway – but much later in life. The extra insulin resistance caused by Hepatitis C apparently brings on diabetes at 35 or 40, instead of 65 or 70.”

“More work now needs to be done into why Hepatitis C causes insulin resistance in muscle. That will give us better insight into the behaviour of the disease.”

“At this stage, it is helpful for people with Hepatitis C to understand insulin resistance and what it can mean for them. If they have relatives with Type 2 diabetes, they will be genetically prone to developing it themselves and so would be advised to manage their diets very carefully and take plenty of exercise – to slow onset.”

Notes to Editors

Hepatitis C is a blood-borne virus and in Australia is caused mainly by drug users sharing needles, but also by unsterile tattooing or body piercing. There is no vaccine for Hepatitis C, unlike Hepatitis A and B.

Around 212,000 Australians suffer from chronic Hepatitis C, 80,000 - 85,000 of them in NSW. Across Australia, there are roughly 10,000 new infections each year.

There are 6 strains of Hepatitis C – the participants in this study were selected because they had either of two common strains in Australia, Genotype 1 and Genotype 3. The latter strain causes significant fat deposits in the liver.

While it is not noted in the media release above, the study observed that the degree of insulin resistance is a negative predictor of anti-viral treatment. In other words, the greater the insulin resistance, the less responsive people will be to treatment.

Between 50-80% of people who are treated for Hepatitis C are successfully treated, leaving 20-50% who do not respond. Treating with lifestyle changes or an insulin sensitiser should reduce this latter percentage – as well as delaying onset of diabetes.

The study found that predictors of insulin resistance were viral load and subcutaneous fat. This suggests the possibility that the virus alters either fat supply or alters the cell signalling proteins released from subcutaneous fat, either of which could generate insulin resistance.

ABOUT GARVAN

The Garvan Institute of Medical Research was founded in 1963. Initially a research department of St Vincent's Hospital in Sydney, it is now one of Australia's largest medical research institutions with nearly 500 scientists, students and support staff. Garvan’s main research programs are: Cancer, Diabetes & Obesity, Immunology and Inflammation, Osteoporosis and Bone Biology, and Neuroscience. The Garvan’s mission is to make significant contributions to medical science that will change the directions of science and medicine

and have major impacts on human health. The outcome of Garvan's discoveries is the development of better methods of diagnosis, treatment, and ultimately, prevention of disease.

MEDIA ENQUIRIES

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