Fat tissue is capable of making and releasing a variety of proteins and hormones. One such protein is called adiponectin, which encourages glucose and fat metabolism in skeletal muscle. Eating a diet high in saturated fat reduces the amount of adiponectin produced by fat tissue, whereas eating fish oil increases the amount produced. An important function of skeletal muscle is the removal of glucose from the blood following a meal. This helps to maintain normal blood sugar levels and prevent conditions such as type 2 diabetes. Eating a high fat diet can activate inflammatory pathways in skeletal muscle, which reduces the muscle’s ability to respond to insulin and take up glucose from the blood. Eating fish oil is thought to counteract this activation of inflammation, thus helping to maintain normal muscle function. High fat diets have also been shown to reduce the skeletal muscle response to adiponectin, reducing the ability of adiponectin to break down fat in the tissue. Accumulated fat in the muscle can also interfere with the muscle’s ability to respond to insulin.

**What is this research about?**

Fat tissue is capable of making and releasing a variety of proteins and hormones. One such protein is called adiponectin, which encourages glucose and fat metabolism in skeletal muscle. Eating a diet high in saturated fat reduces the amount of adiponectin produced by fat tissue, whereas eating fish oil increases the amount produced. An important function of skeletal muscle is the removal of glucose from the blood following a meal. This helps to maintain normal blood sugar levels and prevent conditions such as type 2 diabetes. Eating a high fat diet can activate inflammatory pathways in skeletal muscle, which reduces the muscle’s ability to respond to insulin and take up glucose from the blood. Eating fish oil is thought to counteract this activation of inflammation, thus helping to maintain normal muscle function. High fat diets have also been shown to reduce the skeletal muscle response to adiponectin, reducing the ability of adiponectin to break down fat in the tissue. Accumulated fat in the muscle can also interfere with the muscle’s ability to respond to insulin.

**What did the researchers do?**

The researchers wanted to see if fish oil could preserve muscle health following a high fat diet. They fed rats 3 different diets: a control diet, a diet high in saturated fat (SFA), and a diet high in saturated fat that was supplemented with fish oil (SFA/n-3). Some animals were also fed the SFA diet first for 4 weeks, and then the SFA/n-3 diet for a further 2 or 4 weeks to see if the fish oil diet could help recover some function. Skeletal muscle samples were taken from the rats and analyzed for response to insulin and adiponectin.

**Keywords:**
Skeletal muscle, fat tissue, adiponectin, insulin, type 2 diabetes, high saturated fat diet, fish oil

**What you need to know:**
A high fat diet that was supplemented with fish oil was able to preserve the ability of skeletal muscle to respond to adiponectin and insulin.
What did the researchers find?
The response to adiponectin was decreased in the skeletal muscle from rats fed the SFA diet, but was maintained in the skeletal muscle of rats fed the SFA/n-3 diet. The response to insulin was maintained in the skeletal muscle from control and SFA/n-3-fed rats, as well as in rats that were initially fed the SFA diet and then the SFA/n-3 diet for 4 weeks. Proteins involved in inflammatory pathways in the skeletal muscle were increased in the muscle from rats fed the SFA diet.

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How can you use this research?
Health professionals can use this research when looking for new therapeutic treatments for adults who have type 2 diabetes or high blood sugar levels.

Nutritional Scientists can use this research as background for further work to discover the role that fish oil can play in health and disease.

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Nutritional Scientists can use this research as background for further work to discover the role that fish oil can play in health and disease.

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