How a High-Fat Meal Affects Blood Flow to the Heart

What is the problem and what is known about it so far?
The heart is a hollow muscular organ that constantly pumps blood through the body. The heart needs its own blood supply to function properly. The main blood vessels that supply blood to the heart are called coronary arteries. If a part of a coronary artery is blocked for any reason, the surrounding vessels expand (vasodilate) in an attempt to compensate for blocked or reduced blood flow. The difference between normal blood flow and the increased blood flow that occurs with vasodilatation is called the coronary flow reserve. The coronary flow reserve indicates the heart’s ability to compensate for clogged arteries by increasing flow through unaffected arteries. Meals that are high in fat raise levels of fatty substances (triglycerides) in the blood within a few hours. Researchers think that these fatty substances may alter the ability of blood vessels to vasodilate and thus decrease coronary flow reserve.

Why did the researchers do this particular study?
To see how a single high-fat meal affects coronary flow reserve.

Who was studied?
15 young healthy men (average age, 29 years) without heart disease.

How was the study done?
The authors used special tests (Doppler echocardiography spectral velocity tracings) to estimate coronary flow reserve. Five men had this test before and after a high-fat liquid meal and before and after a low-fat liquid meal. Ten additional men had the test only before and after the high-fat liquid meal. The high-fat meal contained 1200 calories, 100 grams of fat, 50 grams of saturated fat, and 300 milligrams of cholesterol. The low-fat meal contained 1200 calories, 10 grams of fat, 2 grams of saturated fat, and 6 milligrams of cholesterol. All 15 men had blood drawn after the high-fat meal to measure levels of fatty substances (triglycerides).

What did the researchers find?
Five hours after the high-fat meal, triglyceride levels had increased from about 100 mg/dL to 250 mg/dL. Coronary flow reserve decreased after the high-fat meal by about 18%. There was little change in triglyceride levels and coronary flow reserve after the low-fat meal.

What were the limitations of the study?
The study was small and short. It does not tell us anything about the long-term consequences of frequent high-fat meals. The study involved healthy young men. People with known heart disease might have different reductions in blood flow reserve with high-fat meals. Finally, the study was not able to determine whether increases in triglyceride levels were directly responsible for the observed reductions in coronary flow reserve.

What are the implications of the study?
A single high-fat meal can reduce blood flow reserve to the heart in young healthy men.