

Study reinforces link between obesity, high-fat meals and heart disease

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The effect of a high-fat meal on blood vessel walls can vary among individuals depending on factors such as their waist size and triglyceride levels, suggests new research at UC Davis.

The new research reinforces the link between belly fat, inflammation and thickening of the arterial linings that can lead to heart disease and strokes.

Triglycerides are types of fat molecules, commonly associated with "[bad cholesterol](#)," known to increase risk of inflammation of the endothelium, the layer of cells that lines arteries.

"The new study shows that eating a common fast food meal can affect inflammatory responses in the blood vessels," said Anthony Passerini, assistant professor of biomedical engineering at UC Davis, who led the project.

"Our techniques allowed us to measure the inflammatory potential of an individual's lipids outside of the body and to correlate that with easily measured characteristics that could be used to help better understand a person's risk for vascular disease," Passerini said.

Passerini collaborated with Scott Simon, professor of biomedical engineering at UC Davis, to develop cell culture models to mimic the properties of blood vessels. They wanted to learn how triglyceride levels can cause endothelial inflammation, and find a way to assess an

individual's inflammatory potential.

They recruited 61 volunteers with high and normal fasting triglyceride levels and a range of waist sizes, then measured levels of triglyceride particles in their blood after they ate a typical fast food breakfast from a major fast food franchise: two breakfast sandwiches, hash browns and orange juice.

Passerini's team found that after eating the high-fat meal, the size of a type of a particle called triglyceride-rich [lipoprotein](#) (TGRL) varied directly with the individual's waist size and preexisting blood triglyceride level. These particles can bind to the [endothelium](#), triggering inflammation and an immune response that brings [white blood cells](#) to repair the damage. Over time, this leads to atherosclerosis.

The researchers tested whether TGRL particles from the volunteers' blood could cause cultured endothelial cells in the laboratory to express markers for inflammation.

There was a mixed response: individuals with both a waist size over 32 inches (not terribly large by most standards) and high triglyceride levels had large lipoprotein particles that bound easily to the endothelial cells and caused inflammation in response to an immune chemical "trigger."

The TGRLs only caused inflammation when exposed to this immune molecule, which suggests that people with existing low-grade inflammation may be more susceptible to endothelial dysfunction related to triglyceride "spikes" that occur after eating high-fat meals, Passerini said.

In people who are predisposed, repeated episodes of inflammation could lead to atherosclerosis. Passerini's lab is continuing to investigate how abdominal obesity, high [triglyceride levels](#) and inflammation can lead to

atherosclerosis.

More information: The findings are published online in the journal *American Journal of Physiology - Heart and Circulatory Physiology*.

Provided by University of California - Davis

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