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IIT Guwahati advances cholesterol and triglyceride detection with advanced nanotechnology

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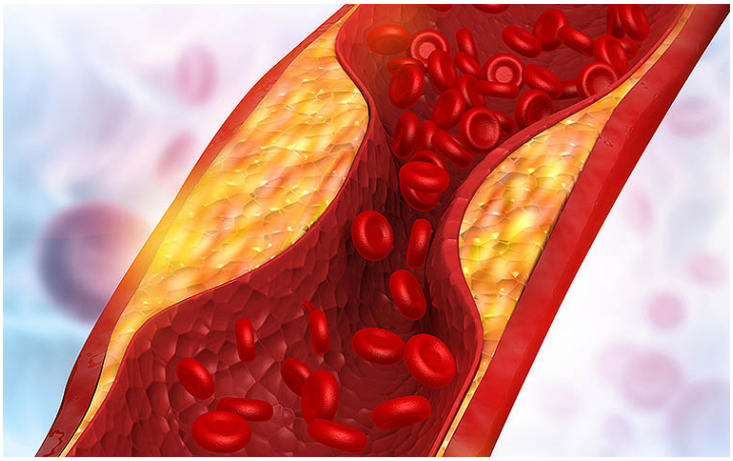
Representing a major step forward in molecular diagnostics



Researchers at Indian Institute of Technology Guwahati (IIT-G), led by Prof. Dipankar Bandyopadhyay, Centre for Nanotechnology and Department of Chemical Engineering, have developed an innovative approach to improve the detection of cholesterol and triglycerides by integrating Surface-Enhanced Raman Scattering (SERS) on the nanoscale objects.

The work utilises bimetallic nanostructures that are 10,000 times thinner than the width of a human hair for the high-fidelity detection of the biomarkers in the human blood.

The metabolic biomolecules like cholesterol and triglycerides play pivotal role in maintaining a harmonious cardiovascular health of a human body. The high (HDL) and low (LDL) density lipoproteins transport cholesterol to the cellular sites for various metabolic activities. An imbalance of LDL and HDL cause arterial plaque formation leading to hypertension, formation of blood clots, or ischemia.

On the other hand, Triglycerides (TGA) transform into fatty acids and glycerol during digestion which in turn is packaged inside lipoproteins namely very low-density lipoprotein (VLDL), for transportation to the cells. An elevated level of triglycerides leads to atherosclerosis and coronary artery disease, pancreatitis, type 2 diabetes, or fatty liver.

Therefore, the timely detection of any abnormality and a close monitoring of cholesterol and triglyceride levels in the blood is highly sought for. While traditional lipid profile tests of blood are reliable, they often require laboratory settings, are not available as a point-of-care solution, and can take time to provide results.

To address these limitations, the researchers have focused on a technique that combines nanotechnology and molecular detection, which can further be translated into a point-of-care as device with an enhanced diagnostic precision.