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Singapore designs bioinspired nanoparticles that deliver gene editing to lower bad cholesterol

August 26, 2026 | News

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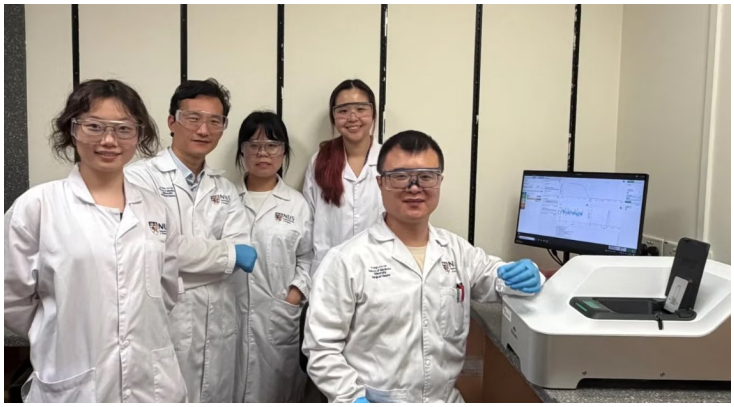

Researchers from the National University of Singapore (NUS) Medicine and China's Tianjin Medical University General Hospital have developed a bioinspired lipid nanoparticle (LNP) that can deliver gene-editing machinery to the liver and reduce low-density lipoprotein (LDL) cholesterol, commonly known as “bad” cholesterol.

The nanoparticles reduced LDL and total cholesterol by more than 20 per cent after two doses, while showing fewer signs of inflammation and toxicity than the comparator formulations.

The research team designed the LNP using materials inspired by molecules naturally found in the body, with the aim of improving the safety of messenger RNA (mRNA) delivery. mRNA is a temporary set of genetic instructions that tells cells how to make a specific protein. Once the instructions have been used, the mRNA is naturally broken down by the body.

LNPs protect mRNA and transport it into cells, but some conventional formulations contain laboratory-made lipids that may trigger inflammation as they break down. To develop a potentially more biologically compatible carrier, the researchers combined naturally occurring polyamines with oleic acid, a fatty acid found in the body.

The strongest-performing candidate, agmatine-oleic acid, or Agm-oa, carried and protected about 98 per cent of its mRNA payload and delivered it effectively to cultured liver cells and laboratory models. Following administration, the nanoparticles accumulated mainly in the liver.

The researchers stressed that the findings remain pre-clinical. Longer-term studies are needed to determine how long the effects last, assess possible unintended genetic changes, and confirm safety before the technology can be considered for human studies.