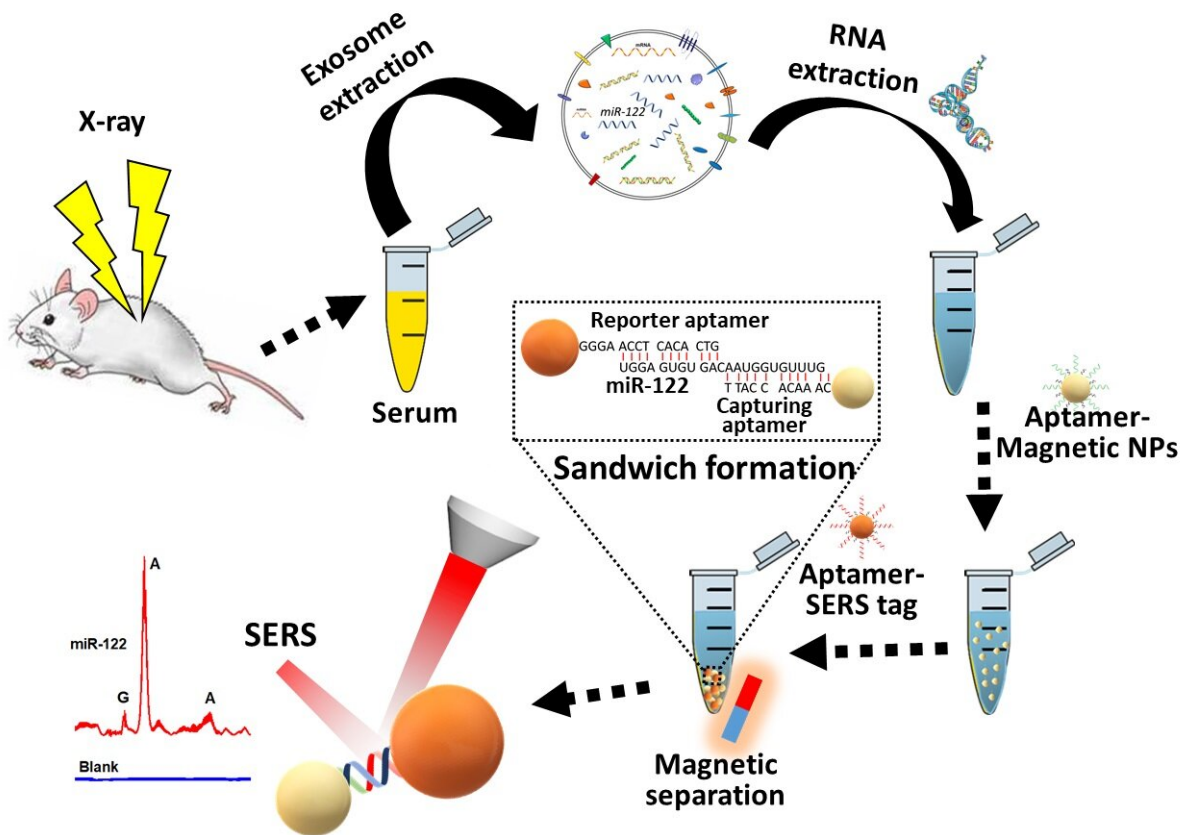


# Novel aptamer-SERS detection protocol to detect hepatic inflammation related miR-122

November 17 2021, by Zhang Nannan



Schematic illustration of SERS detection of exosomal miR-122 in mice exposed to X-ray irradiation. Credit: Muhammad

A team led by Prof. Huang Qing at the Hefei Institutes of Physical

Science (HFIPS) of the Chinese Academy of Sciences developed a novel biosensor based on aptamer-combined surface-enhanced Raman spectroscopy (SERS) to achieve the inflammatory microRNA-122 (miR-122) detection in cell-secreted exosomes.

By combining aptamer-modified SERS tags and a magnetic nanoparticle-based miRNA capturing element, the researchers developed a label-free SERS-sandwich assay to detect and evaluate the exosomal miR-122, which is reported to be actively involved in radiation-actuated rectal and hepatic injuries or inflammation.

The SERS tags were composed of a thiolated aptamer, which were modified with additional G bases at the 3' end and functionalized on Au shell [nanoparticles](#) via Au-S bonds. The capturing element was prepared by anchoring a thiolated aptamer on [magnetic nanoparticles](#).

For the recognition of target miRNA, the magnetic capturing element was initially exposed to the target, and the miRNA sequence was captured via immunoreaction between recognition and target sequence. The nanoparticles were separated using an [external magnetic field](#), rinsed, and probed with SERS tags.

As a result, the target sequence was captured via sandwich formation. The enhanced Raman signal of adenine base at 3' end of SERS tag was used to calibrate the output.

The researchers then utilized aptamer-combined SERS methodology to detect miRNA as the biomarker to evaluate radiation-induced organ injury.

Magnetic nanoparticles in this research provide additional facility of rapid and ready separation of analytes using an external magnetic field. This method is also applicable to evaluate the drug triggered liver

inflammation via examining the exosomal miRNA as the biomarker.

In general, this method could provide easy and early diagnosis for analyzing hepatic inflammation cases at the clinical level.

**More information:** Muhammad Muhammad et al, Highly Sensitive Detection of Elevated Exosomal miR-122 Levels in Radiation Injury and Hepatic Inflammation Using an Aptamer-Functionalized SERS-Sandwich Assay, *ACS Applied Bio Materials* (2021). [DOI: 10.1021/acsabm.1c00845](https://doi.org/10.1021/acsabm.1c00845)

Provided by Chinese Academy of Sciences

Citation: Novel aptamer-SERS detection protocol to detect hepatic inflammation related miR-122 (2021, November 17) retrieved 26 April 2024 from <https://phys.org/news/2021-11-aptamer-sers-protocol-hepatic-inflammation-mir-.html>

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