Nanoparticles for lung cancer pass next test

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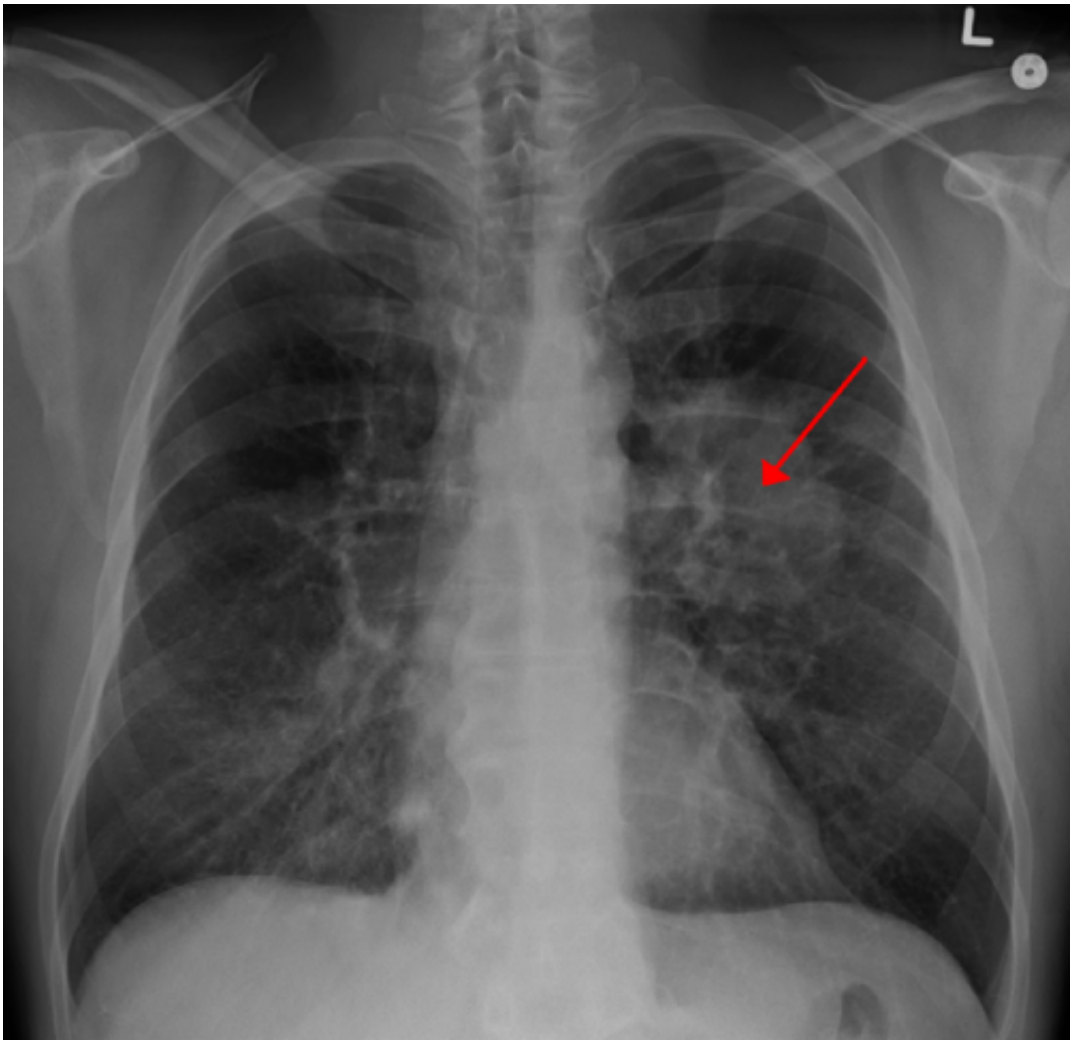

Lung CA seen on CXR. Credit: CC BY-SA 4.0 James Heilman, MD/Wikipedia

The most common type of lung cancer, non-small cell lung cancer (NSCLC), continues to be difficult to treat, with five year survival rates

of about 36 percent for stage 3A tumors. Jefferson College of Pharmacy researchers are developing a new treatment approach based on nanotechnology that was recently shown to be effective in mouse models of the disease. The research was published in the journal *Molecular Pharmaceutics.*

The nanoparticles were designed to deliver a molecule that's been shown to stall tumor growth and may make tumors more susceptible to chemotherapy. The molecule, called microRNA 29b, would be ineffective if delivered by injection alone, as it quickly becomes degraded in the bloodstream or picked up and removed by immune cells.

To bypass these limitations, Sunday Shoyele, PhD, Associate Professor in the Department of Pharmaceutical Sciences at Jefferson (Philadelphia University + Thomas Jefferson University) and colleagues, developed a nanoparticle comprised of four parts. First, Dr. Shoyele included part of a human antibody, immunoglobulin G (IgG), to cloak the particle from the immune system. Second, the research team added the MUC1 antigen, which acts like a navigation system guiding the nanoparticles to the MUC1-covered lung tumors. Finally, the therapeutic payload, microRNA-29b, along with the other two components are glued together using a sticky polymer called poloxamer-188.

Dr. Shoyele and colleagues showed that these components formed a spherical nanoparticle capable of properly finding the lung tumors and shrinking the tumors in mouse models of the disease. "This work extends our previous work demonstrating that these particles were effective in shrinking tumor tissue in a petri dish. Here we show that they are also effective in a more complex living system," said Dr. Shoyele.

Additional tests are needed before the technology is ready for testing in human clinical trials. Dr. Shoyele plans to continue the research with comprehensive toxicity tests and scaling the nanoparticle manufacturing

process for clinical trials.

More information: Maryna Perepelyuk et al, Evaluation of MUC1-Aptamer Functionalized Hybrid Nanoparticles for Targeted Delivery of miRNA-29b to Nonsmall Cell Lung Cancer, *Molecular Pharmaceutics* (2018). DOI: 10.1021/acs.molpharmaceut.7b00900

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