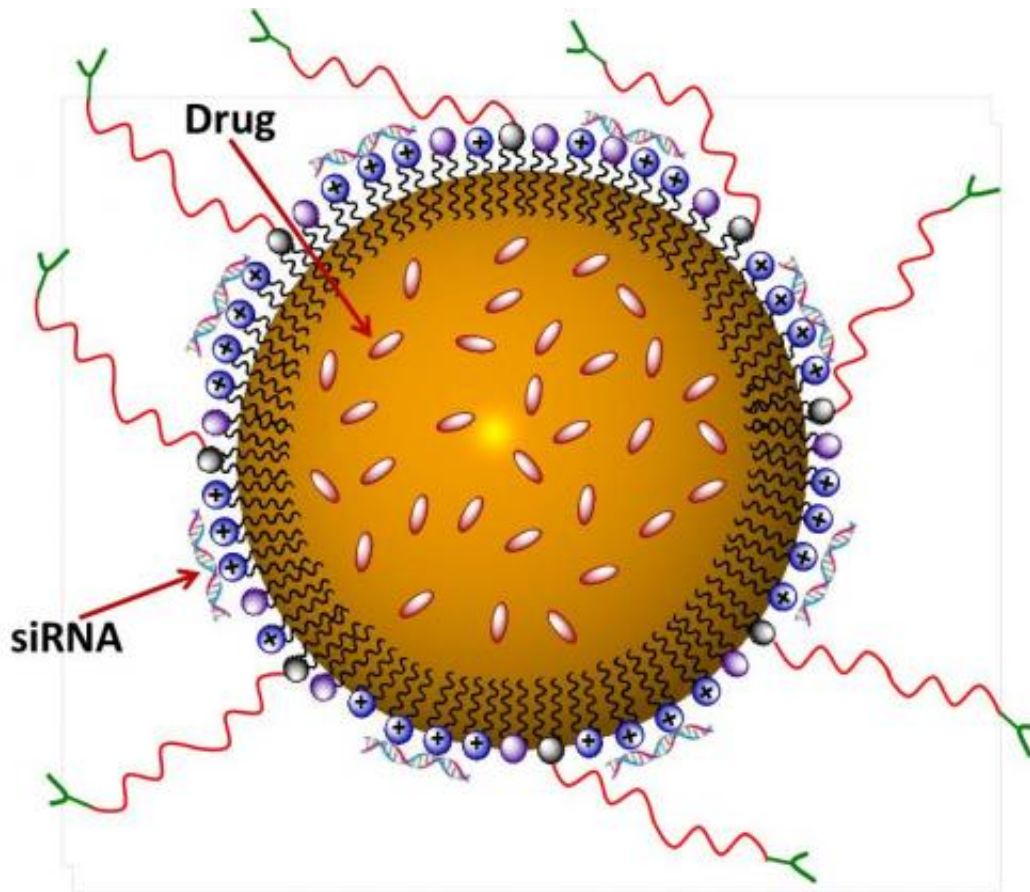


# Research offers promising new approach to treatment of lung cancer

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This nanocarrier-based drug delivery system may aid in the treatment of lung cancer, bringing both drugs and siRNA into the cancer cell to help kill it. Credit: Oregon State University

Researchers have developed a new drug delivery system that allows

inhalation of chemotherapeutic drugs to help treat lung cancer, and in laboratory and animal tests it appears to reduce the systemic damage done to other organs while significantly improving the treatment of lung tumors.

This advance in [nanomedicine](#) combines the extraordinarily small size of nanoparticles, existing [cancer drugs](#), and [small interfering RNA](#) (siRNA) that shut down the ability of cancer cells to resist attack.

The combination of these forces resulted in the virtual disappearance of [lung tumors](#) in experimental animals.

Lung cancer is the leading cancer killer in both men and women. Despite advances in surgery, chemotherapy still plays a major role in its treatment. However, that treatment is constrained by the toxic effects of some drugs needed to combat it and the difficulty of actually getting those drugs into the lungs.

The findings were made by Oleh Taratula at Oregon State University and Tamara Minko and O. Garbuzenko at Rutgers University and the Cancer Institute of New Jersey. They were just published in the *Journal of Controlled Release*.

"Lung cancer damage is usually not localized, which makes chemotherapy an important part of treatment," said Taratula, an assistant professor in the OSU College of Pharmacy and co-author on this study. "However, the drugs used are toxic and can cause organ damage and severe side effects if given conventionally through intravenous administration.

"A [drug delivery system](#) that can be inhaled is a much more efficient approach, targeting just the cancer cells as much as possible," he said. "Other chemotherapeutic approaches only tend to suppress tumors, but

this system appears to eliminate it."

A patent is being applied for on the technology, and more testing will be necessary before it is ready for human clinical trials, the researchers said.

The foundation of the new system is a "nanostructured lipid nanocarrier," [tiny particles](#) much smaller than a speck of dust that are easily inhaled and also readily attach to cancer cells. This carrier system delivers the anticancer drug. However, it also brings siRNA that makes the cancer cell more vulnerable.

Cancer cells often have two forms of resistance to drugs – "pump" resistance that tends to pump the drug out of cells, and "nonpump" resistance that helps keep the cell from dying. The siRNA used in this system helps to eliminate both those forms of resistance, and leaves the cancer cell vulnerable to the drug being used to kill it.

By being inhaled, this system also avoids degradation of the chemotherapeutic agents that occurs when they are injected, researchers said. They arrive in more intact form, ready to do their job on lung [cancer cells](#), while minimizing any side effects.

In more conventional chemotherapy for lung cancer, the drugs tend to accumulate in the liver, kidney and spleen, with much less of the drugs ever making it to the lungs. In this study, the amount of the drug delivered to the lungs rose to 83 percent with the inhalation approach, versus 23 percent with injection.

**More information:**

[ir.library.oregonstate.edu/xmlui/handle/1957/38581](http://ir.library.oregonstate.edu/xmlui/handle/1957/38581)

Provided by Oregon State University

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