

Russian scientists develop targeted cancer drug delivery with tenfold higher efficacy

Russian biochemists have unveiled a targeted cancer drug delivery method that proved ten times more effective than conventional chemotherapy. The technology uses nano-containers that break down almost instantly in the bloodstream, releasing the drug directly at the tumour site. The approach's effectiveness has been confirmed in melanoma models, Academician Sergei Deev, chief researcher at the Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry, told a conference in Novosibirsk.

Conventional doxorubicin therapy, which damages cancer cell DNA, has a major drawback: the drug is poorly soluble in water and aggressively affects healthy tissue throughout the body. The new development overcomes this by delivering a precise strike. Deev said tests on a model of early lung metastases from melanoma showed the new approach to be many times more effective than standard treatment.

The key to the method lies in the container material – so-called metal-organic frameworks. It was for the discovery of these structures that an international group of scientists won the 2025 Nobel Prize. Russian researchers found that the metals in these frameworks are easily replaced by phosphate ions, which are abundant in human blood. This causes rapid and complete breakdown of the nanoparticles, allowing the drug to exit blood vessels and penetrate deep into tumour tissue.

The release of doxorubicin takes no more than 30-60 minutes, the developers said. During that time, a high concentration of the drug reaches cancer cells, bypassing the transport phase inside carrier nanoparticles. This significantly improves the drug's bioavailability and reduces the toxic burden on the patient's body.

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