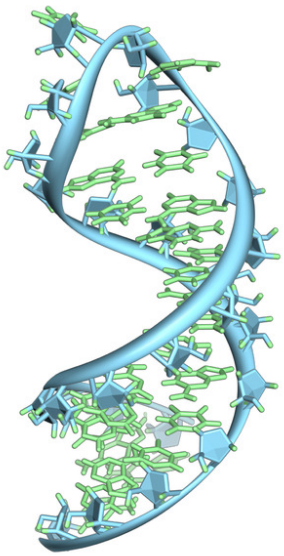
Systemic delivery of RNA treatment for cancer



A research organization has developed a RNA nanoparticle that could help treat cancer and viral infections.

The research involved building an X-shaped RNA structure in which each arm of the structure could contain different diagnostic and therapeutic packages.

One of the advantages of nanotechnology is the feasibility to construct therapeutic particles carrying multiple therapeutics with defined structure and stoichiometry. The field of RNA nanotechnology is emerging. However, controlled assembly of stable RNA nanoparticles with multiple functionalities which retain their original role is challenging due to refolding after fusion. Herein, the researchers report the construction of thermodynamically stable X-shaped RNA nanoparticles to carry four therapeutic RNA motifs by self-assembly of reengineered small RNA fragments. They proved that each arm of the four helices in the X-motif can harbor one siRNA, ribozyme, or aptamer without affecting the folding of the central pRNA-X core, and each daughter RNA molecule within the nanoparticle folds into their respective authentic structures and retains their biological and structural function independently. Gene silencing effects were progressively enhanced as the number of the siRNA in each pRNA-X nanoparticles gradually increased from one to two, three, and four. More importantly, systemic injection of ligand-containing nanoparticles into the tail-vein of mice revealed that the RNA nanoparticles remained intact and strongly bound to cancers without entering the liver, lung or any other organs or tissues, while remaining in cancer tissue for more than 8 h.

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