

Buckyballs used as 'passkey' into cancer cells

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Scientists at Rice University and pediatric specialists at Baylor College of Medicine have discovered a new way to use Rice's famed buckyball nanoparticles as passkeys that allows drugs to enter cancer cells.

The research appears in the Jan. 21 issue of the journal *Organic and Biomolecular Chemistry*.

All living cells defend themselves by walling off the outside world. Cell walls, or membranes, form a protective cocoon around the cell's inner machinery and its DNA blueprints.

"Drugs are far more effective if they're delivered through the membrane, directly into the cell," said lead researcher Andrew Barron. "Viruses, which are often toxic, long ago developed ways of sneaking through cell walls. While we're mimicking some techniques used by viruses, we're using non-toxic pieces of protein, and we're incorporating buckyballs as a passkey."

The passkeys that Barron and colleagues developed contain a molecule called Bucky amino acid that was created in Barron's lab. Bucky amino acid, or Baa, is based on pheylalanine, one of the 20 essential amino acids that are strung together like beads on a necklace to build all proteins.

Barron's graduate student, Jianzhong Yang, developed several different Baa-containing peptides, or slivers of protein containing about a dozen or so amino acids. In their natural form, with pheylalanine as a link in



their chain, these peptides did not pass through the cell walls.

Barron's group collaborated with Yang's brother, Baylor College of Medicine assistant professor Jianhua Yang at Texas Children's Cancer Center, and found the Baa-containing peptides could mimick viral proteins and pass through the walls of cancer cells. The peptides were found effective at penetrating the defenses of both liver cancer cells and neuroblastoma cells.

"Neuroblastoma is the most common extracranial solid tumor in children, and it is responsible for about 15 percent of pediatric cancer deaths," said Jianhua Yang. "Our findings are significant because neuroblastoma cells are well-known for their difficulty in transfection through the cell membrane."

Barron is Rice's Charles W. Duncan Jr.-Welch Professor of Chemistry, professor of materials science and associate dean for industry interactions and technology transfer.

Source: Rice University

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