A wonder drug against cancer, HIV and other diseases?

Researchers at the Massey Cancer Center have found that AR-12 can neutralize the proteins that protect cancer cells. The drug also may be effective against Ebola, Zika and bacterial infections.

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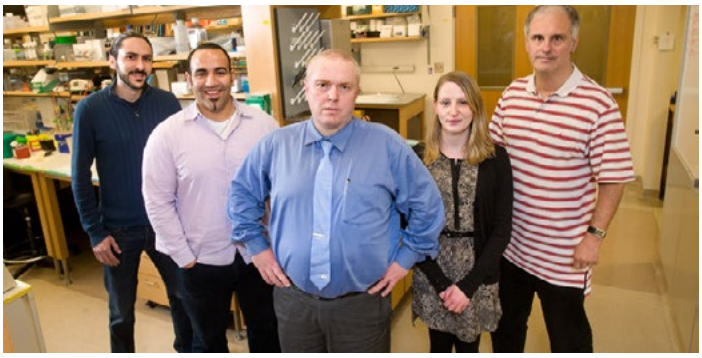
TAGS
AR-12, cancer, chaperone proteins

PUBLISHED
Nov. 1, 2016

Chaperones make sure students stick together during class field trips. The cells in your body have chaperones, too: “chaperone” proteins that keep a cell’s shape intact. Usually, that’s good. But when someone has cancer, these proteins allow cancer cells to reproduce and spread throughout the body.

So a VCU researcher has found a way to ditch those annoying chaperone proteins – and stop the spread of cancer – just like students might ditch their chaperones on a field trip.

‘We saw interesting effects with the AR-12 drug against those viruses and against bacteria,’ Dent says.



Dr. Paul Dent, center, and his team of researchers at the Massey Cancer Center. (Photo courtesy of Dr. Dent)

Dr. Paul Dent, a researcher at VCU’s Massey Cancer Center, is experimenting with a new drug that targets the chaperone proteins that protect cancer cells.

The drug, called AR-12, overrides the chaperones from holding a cell’s shape. AR-12 does its damage by breaking apart the host cell, which is needed for cancer cells to reproduce (otherwise they’ll die). This secret weapon has the potential to fight off not only cancer but also Ebola, Zika and the human immunodeficiency virus, as well as bacterial infections.

“We saw interesting effects with the AR-12 drug against those viruses and against bacteria,” Dent said.

He said cancer cells are very active, thus creating more enzymes. Once the cancer attaches to a cell, chaperone proteins stick with the enzyme and keep it together. But AR-12 can render the chaperones useless.

“These proteins are flopping around like a jellyfish out of water when they’re catalyzing, which means they can fall out of shape easily,” Dent said. “And if they fall out of shape, they’re dead.”

The chaperones protect the cancer by giving it a safe place to live. “The chaperone is snuggled up to the enzyme,” Dent said. “And if the enzyme should ever get a bit incorrectly shaped, the chaperone spends some ATP (adenosine triphosphate) energy and keeps it together.”

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HSP90; another is HSP70. Dent said that when HSP90 is attacked, HSP70 is formed – and vice versa. This has posed issues for researchers because when they target one chaperone family, a different one replaces it and protects the cell.

Previous chaperone inhibitors could target only HSP90 or HSP70. This where the drug AR-12 is useful: It blocks both the HSP90 and HSP70 families.

"Unlike many drugs that target one specifically, this drug targets both, albeit not as potently," Dent said. When AR-12 prevents the chaperones from holding a cell together, the cell loses its shape and kills the cancer.

But this possible wonder drug is not on the market yet. Research has been done on AR-12 for years now, but the drug's owner, Arno Therapeutics, is still seeking approval from the U.S. Food and Drug Administration.

"AR-12 was tested in cancer patients. Although it was safe and showed some activity, the drug uptake in patients was variable," Dent said. "So the FDA told Arno Therapeutics they needed to reformulate AR-12 before doing more clinical work."

Dent said he is disappointed that the company hasn't reformulated the drug so that testing can resume.

On its website, Arno Therapeutics describes itself as "a biopharmaceutical company that focuses on the clinical development of targeted cancer therapies and novel drug candidates for unmet medical needs." •