Medical Xpress

Discoveries point to more powerful cancer treatments, fewer side effects

February 27 2014

What if there were a way to make chemotherapy and radiation more effective as cancer treatments than they are today, while also getting rid of debilitating side effects that patients dread? A new study led by Alexey Ryazanov, a professor of pharmacology at Rutgers Robert Wood Johnson Medical School and member of the Rutgers Cancer Institute of New Jersey, suggests the day that happens could be getting closer.

Side effects such as heart damage, nausea and hair loss occur when cancer therapy kills healthy cells along with the malignant cells that are being targeted. It is a medical form of collateral damage. But Ryazanov explains that if a way could be found to protect those healthy cells, then doses of chemo and radiation could actually be increased, "killing all the cancer cells and the patient would be cured. We also could start treating cancers that now can't be cured because the most effective doses are too toxic to normal tissues."

The key to Ryazanov's vision of cancer treatment is addition by subtraction – specifically elimination of eEF2K – an enzyme that influences the rates at which proteins are created in the human body. Ryazanov first identified eEF2K more than a quarter century ago, and since then, bit by bit, he and other scientists have uncovered many complicated processes for which that enzyme is responsible.

Ryazanov's latest findings, published in the journal *Developmental Cell*, demonstrate that the presence of eEF2K weakens healthy cells. His evidence is the enzyme's involvement in a process where defective cells

involved in reproduction are degraded—and ultimately destroyed—as a way to preserve genetic quality from one generation to the next.

Still, there is eEF2K in every cell in the body, and Ryazanov says the enzyme's presence tends to leave cells less robust than they otherwise would be. According to Ryazanov, it is that added weakness that leaves healthy cells vulnerable to being poisoned by chemo and radiation.

Ryazanov says removing the enzyme would make those healthy cells stronger, to the point where they would survive cancer therapy, and that, in turn, would eliminate the side effects.

How would healthy cells survive cancer treatment while malignant cells would not? Ryazanov explains that tumors grow and cancer spreads when malignant cells divide and duplicate. Chemo and radiation are specifically designed to block cell division, and Ryazanov says removing the enzyme eEF2K actually makes the cancer cells more vulnerable to the treatment. By contrast, as long as healthy cells are strong enough to resist being poisoned, the cancer therapies won't hurt them.

In 2008, Ryazanov founded Longevica Pharmaceuticals, a company whose mission is to perfect medications designed to eliminate the enzyme and improve the performance of chemo and radiation. Animal testing is already underway, and Ryazanov hopes that his new findings will speed the day when medications that pass those tests can be tried in people. He even predicts that taking such a drug may be as easy as swallowing a pill.

Ryazanov says there is a nice logic to the research and drug development that have become his life's work – because the cancer therapies he wants to enhance already exist and are known to work. Making chemo and radiation less toxic, he says, can make those therapies dramatically more effective in the relatively near future, while other cutting-edge

approaches to cancer treatment might need far more time to prove their ultimate worth.

Provided by Rutgers University