Newly Discovered Pathway Might Help in Design of Cancer Drugs

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Johns Hopkins chemists have discovered a new way to sabotage DNA's ability to reproduce, a finding that could eventually lead to the development of new anti-cancer drugs and therapies.
The method could enable future doctors to target treatment more precisely, rather than directing chemotherapeutic medication or radiation to tumors through a scattershot approach, said Marc Greenberg (pictured at right), a chemistry professor in the university's Zanvyl Krieger School of Arts and Sciences, who presented his team's findings today at the 229th American Chemical Society Meeting in San Diego.

"What we did was to identify a way to create a very damaged form of DNA that is often more deadly to the cell than other types of damage," said Greenberg. "That's how many anti-tumor medications — medications such as mitomycin c — work: They kill off tumors by linking up with the cancer cells' DNA and sticking its genetic code together so it dies. Our discovery takes that a step further, establishing that there is a way to efficiently create this type of damage by modifying the DNA itself ."

In the lab, Greenberg and his team used organic chemistry to create a synthetic, double-stranded DNA with special chemical characteristics and exposed it to long wavelength light that selectively switches on the DNA damage process.

He said that the synthetic DNA is very similar to that which is produced when cells are exposed to radiation, with one exception: Greenberg's

team's DNA was damaged at only one place on its chain, allowing the researchers to study it and learn about that particular chemical pathway in detail.

"Exposing DNA to radiation is like hitting a fine piece of crystal stemware with a hammer. It shatters, and looking for a particular chemical pathway is like looking for a needle in a haystack," the chemist explained. "What we did was more like carrying out a precision attack. It let us get a closer look."

Source: Johns Hopkins University