



DMS grad student Courtney Kozul coauthored a paper showing that even low levels of exposure to arsenic, like those often found in well water, increase susceptibility to the H1N1 flu virus.

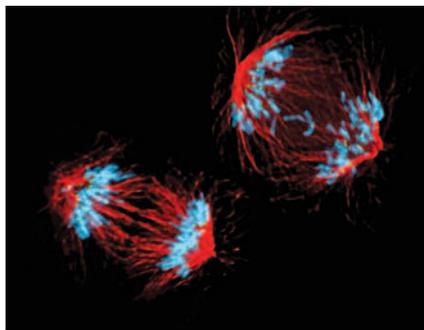
Manipulating proteins facilitates division

A team of DMS researchers has found a way to help tumor cells solve a difficult division problem.

Before a cell divides, it creates a copy of its chromosomes. As the cell splits, the paired copies are divided up between the two daughter cells. In tumor cells, however, both chromosomes often end up in the same daughter cell, leaving the other one with fewer chromosomes.

Role: This tendency—known as chromosome instability—is bad news. It’s an indicator of a poor prognosis and an increased likelihood of metastasis. DMS biochemist Duane Compton, Ph.D., explains that chromosome instability complicates treatment by helping tumors evade the effects of chemotherapeutic drugs. But Compton and three researchers in his lab—graduate students Samuel Bakhom and Sarah Thompson and postdoctoral fellow Amity Manning, Ph.D.—identified two proteins that play an important role in regulating chromosome segregation. By manipulating levels of these proteins, they facilitated correct chromosome division—the first time anyone has successfully suppressed chromosome instability. They reported their findings in *Nature Cell Biology*.

The DMS team examined tumor cells



The left cell is dividing properly, but the right one shows a chromosome segregation defect. The chromosomes are blue and the microtubules are red.

during mitosis. Thin fibers called microtubules extend from opposite sides of the cell and attach to the chromosomes. When all goes well, one chromatid (a copy of the duplicated chromosomes) attaches to fibers on one side, and the other to fibers on the opposite side. Then the fibers pull apart the chromatid pairs and the cell divides, leaving each daughter cell with one copy of each chromosome.

Sometimes, however, fibers from both sides of the cell attach to a single chromatid. It’s a common occurrence, Compton says, but usually the incorrect attachments are fixed. His team identified two proteins—Kif2b and MCAK—that allow cell division to proceed correctly. “Their job is to destabilize those attachments,” Compton says. “One is acting kind of early in the process of mitosis, and then it gets shut down and the other one acts a little later.”

But if those proteins don’t do their job, as often happens in tumor cells, a chromatid attached to fibers from both sides may go in the wrong direction. When that occurs, one daughter cell will have more chromosomes than the other.

Stable: Once they identified these proteins, the researchers were able to make tumor cells segregate properly by increasing the amount of Kif2b and MCAK during mitosis. This even suppressed chromosome instability for another 50 generations in tumor cells. “So,” says Compton, “we can make these tumor lines that are unstable now become stable.”

Eventually, this knowledge could provide new ways of fighting tumors. One possibility is that suppressing chromosome instability may make tumors more responsive to chemotherapy. Or, he adds, it may be possible to hinder tumor growth by increasing instability to a point where the cells are no longer viable. AMOS ESTY

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Talking to teens

A \$100 personal digital assistant (PDA) can improve communication between primary-care physicians and adolescents. For teens, “health risks occur mainly because of behavioral rather than biomedical issues,” wrote DMS researchers in *Archives of Pediatrics and Adolescent Medicine*. Using PDAs, they asked teens at five primary-care practices to answer a series of questions about nutrition, exercise, drug use, and other behaviors before their check-ups. Those who did the digital screening were more likely to discuss behavioral health risks with the physician.



Unlocking genetic secrets

Jason Moore, Ph.D., a DMS geneticist, was part of an international team of researchers who reported in the journal *Science* the results of a large-scale study of the genetics of Africans and African-Americans. The researchers analyzed DNA from thousands of people and determined that Africans are descended from 14 ancestral populations. Generally, genetic differences corresponded to cultural and linguistic diversity. The data may eventually be used to help design medical treatments. “Our in-depth characterization of genetic structure in Africa benefits research of biomedical relevance in both African and African diaspora populations,” the authors wrote. ■

