

# Ancient chemical bond may aid cancer therapy

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A chemical bond discovered by Vanderbilt University scientists that is essential for animal life and which hastened the "dawn of the animal kingdom" could lead to new therapies for cancer and other diseases.

The report, published online today by the *Proceedings of the National Academy of Sciences (PNAS)*, was co-authored by 83 participants in the "Aspirnaut" K-20 STEM pipeline program for diversity. Six were middle school students when the study was conducted, 42 were high school students, 30 were college undergraduates and five were graduate students.

Because many of the high school students grew up in poverty in rural communities, "they're invisible. They're an untapped talent pool," said Billy Hudson, Ph.D., who founded the Aspirnaut program with his wife and co-senior author Julie Hudson, M.D. "Aspirnaut connects the 'Forgotten Student' to STEM opportunities."

The study demonstrates that the sulfilimine bond, which Hudson's group discovered in 2009, is part of a "primordial innovation" dating back more than 500 million years to the ancestor of jellyfish. The bond stabilizes the collagen IV scaffold and is essential for more advanced tissue formation.

The bond is formed by hypohalous acids, a form of household bleach, generated by peroxidase, an ancient enzyme embedded in the extracellular environment. This "oxidant generator" is key to forming

new blood vessels that feed tumors, making it an attractive target for developing new drugs for cancer therapy, the researchers said.

The involvement of so many young students in a scientific publication is "rare, the first that I know of," said *PNAS* Editor-in-Chief Inder Verma, Ph.D. "It is a remarkable achievement," added Mina Bissell, Ph.D., who conducted the initial review of the manuscript for the journal.

During the summers of 2009 to 2013, the students participated in an "Expedition to the Dawn of the Animal Kingdom," a summer research program at Vanderbilt to search for the evolutionary origin of the sulfilimine [chemical bond](#).

They contributed to experiments that showed the sulfilimine bond and the peroxidase-based mechanism by which it forms can be traced to a common ancestor dating back more than 500 million years ago.

Of the 42 high-school researchers, 31 have now graduated. Thirty are attending or have completed college, 26 with STEM (science, technology, engineering and mathematics) majors.

**More information:** Triad of a collagen IV scaffold, peroxidase, and hypohalous acids is a primordial innovation essential for tissue evolution, [www.pnas.org/cgi/doi/10.1073/pnas.1318499111](http://www.pnas.org/cgi/doi/10.1073/pnas.1318499111)

Provided by Vanderbilt University Medical Center

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