

Patent awarded for synthetic compounds with medical applications

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A patent has been issued for a series of synthetic compounds developed at Kansas State University that have applications for treating cancer and other diseases that affect cell communication.

The compounds, called quinolines, can restart communication between adjacent cells in the body if those communication channels have become closed from a disease.

U.S. Patent 8,809,368, "Compounds Affecting Gap Junction Activity," was recently awarded to the Kansas State University Research Foundation, a nonprofit corporation responsible for managing technology transfer activities at the university. The patent is for research conducted by Duy Hua, university distinguished professor of chemistry; Thu "Annelise" Nguyen, associate professor of toxicology; and Dolores Takemoto, professor emeritus of biochemistry.

In 2007, Hua developed several new quinolines—colorless, pungent, oily liquids that are naturally found in coal tar.

Based on computational modeling with the quinolines, Hua believed the compounds could affect gap junction activity in cells. Gap junctions are "doorways" or channels between adjacent cells that allow small molecules, ions and the body's electrical signals to move from one cell to a neighboring cell.

Hua turned the quinolines over to Nguyen and Takemoto to study their

effectiveness in real cells. The researchers looked at whether the quinolines could restore gap junction activity, and thus communication, in cells clusters that no longer had gap junction activity.

Researchers found that the quinolines developed by Hua reopened the closed channels in the cells.

"By reopening these channels, we can once again have cells functioning normally," Nguyen said. "The cells are able to regulate themselves once again with biological markers that tell cells when to die. This function is necessary for the body to function normally."

The quinolines' ability to restore lost gap junction activity may make the [synthetic compounds](#) a new resource in the fight against cancer, Nguyen said.

"In [cancer cells](#), gap junction activity is low compared to normal cells because cancer [cells](#) have a low expression of the protein that makes up the gap junction channels," Nguyen said. "The protein is either not able to make gap junctions or the [gap junctions](#) are made closed. Here we have [compounds](#) that can restore that gap junction activity to normal."

The Kansas State University developed quinolines are currently the only gap junction enhancer in existence.

The patent is currently licensed to Sigma-Aldrich, an American life science and high technology company.

Provided by Kansas State University

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