How sunlight causes skin cells to turn cancerous

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Most skin cancers are highly curable, but require surgery that can be painful and scarring.

A new study by Loyola University Health System researchers could lead to alternative treatments that would shrink skin cancer tumors with drugs. The drugs would work by turning on a gene that prevents skin cells from becoming cancerous, said senior author Mitchell Denning, Ph.D.

The study was published Jan. 15, 2010 in the Journal of Biological Chemistry.

More than 1 million people in the United States are diagnosed with skin cancer each year. In the new study, researchers examined a type of skin cancer, called squamous cell carcinoma, that accounts for between 200,000 and 300,000 new cases per year.

Squamous cell carcinoma begins in the upper part of the epidermis, the top layer of the skin. Most cases develop on areas that receive lots of sun, such as the face, ear, neck, lips and backs of hands. There are various surgical treatments, including simple excision, curettage and electrodessication (scraping with a surgical tool and treating with an electric needle) and cryosurgery (freezing with liquid nitrogen). Removing large skin cancers can require skin grafts and be disfiguring.

Sunlight can damage a skin cell's DNA. Normally, a protein called

protein kinase C (PKC) is activated in response to the damage. If the damage is too great to repair, the PKC protein directs the cell to die.

Healthy cells grow and divide in a cell-division cycle. At several checkpoints in this cycle, the cell stops to repair damaged DNA before progressing to the next step in the cycle. The new study found that the PKC gene is responsible for stopping the cell at the checkpoint just before the point when the cell divides. In squamous cell carcinoma, the PKC gene is turned off. The cell proceeds to divide without first stopping to repair its DNA, thus producing daughter tumor cells.

Denning said a class of drugs called protein kinase inhibitors potentially could shrink tumors by turning the PKC gene back on. Several such drugs have been approved by the Food and Drug Administration for other cancers. Denning is pursuing grant funding to test such drugs on animal models.

Provided by Loyola University Health System