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Green Tea Linked To Skin Cell Rejuvenation

ScienceDaily (Apr. 25, 2003) — Research into the health-promoting properties of green tea is yielding information that may lead to new treatments for skin diseases and wounds.

Dr. Stephen Hsu, a cell biologist in the Medical College of Georgia Department of Oral Biology, has uncovered a wealth of information about green tea in the last few years. Most importantly, he helped determine that compounds in green tea called polyphenols help eliminate free radicals, which can cause cancer by altering DNA. He also found that polyphenols safeguard healthy cells while ushering cancer cells to their death.

He recently began studying the most abundant green tea polyphenol, EGCG. Using pooled human keratinocytes (skin cells), he and his colleagues studied the normal growth of the skin cells and compared it to the growth of the cells when exposed to EGCG.

To their astonishment, they found that EGCG reactivated dying skin cells. "Cells that migrate toward the surface of the skin normally live about 28 days, and by day 20, they basically sit on the upper layer of the skin getting ready to die," Dr. Hsu said. "But EGCG reactivates them. I was so surprised."

The skin consists of three layers: the epidermis (outer layer), dermis (mid-layer) and hypodermis (inner layer). Dr. Hsu learned that green tea polyphenols aren't absorbed beyond the epidermis, so any benefits are limited to that outer layer of skin. But the benefits, he stressed, seem significant.

Cells in the epidermis, or keratinocytes, are in a constant state of renewal. The newly formed cells, stem cells, are undifferentiated but rapidly dividing. As they push through the epidermis, they begin differentiating. During this migration and differentiation process, the cells are very active, expending and consuming vast amounts of energy.

Once they reach the surface of the skin, their metabolic activity slows dramatically and they prepare to die, while forming a water-proof, sheet-like structure. As they die off about a month into their life cycle, they are replaced by another wave of migrating cells supplied by stem cells, starting the process all over again.

But EGCG seems to be a fountain of youth for skin cells. "When exposed to EGCG, the old cells found in the upper layers of the epidermis appear to start dividing again," Dr.

Hsu said. "They make DNA and produce more energy. They are reactivated. There are lots of unknowns-this is the first step into the door-but if we can energize dying skin cells, we can probably improve the skin condition."

In addition, the researchers found that EGCG accelerates the differentiation process among new cells.

Combining these effects of EGCG on skin cells in different layers of the epidermis, Dr. Hsu noted potential benefits for skin conditions as diverse as aphthous ulcers, psoriasis, rosascea, wrinkles and wounds. "If skin cells surrounding wounds or infections don't heal in time, fibroblasts in the connective tissue may rush in to fill the void and cause scar tissue formation," he said. "If we can spur the skin cells to differentiate and proliferate, we can potentially accelerate the wound-healing process and prevent scarring."

This potential benefit is particularly exciting for conditions such as diabetes, which stubbornly inhibits the wound-healing process, Dr. Hsu said.

He and his colleagues hope to identify dermatologists interested in collaborating on clinical studies of EGCG and other polyphenols on patients.

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