

REPORT

Apple Stem Cells Offer Hope For Aging and Damaged Skin

By Gary Goldfaden, MD

As we age, the reduced turnover of our cells means we can lose control over how our skin ages. Epidermal *stem cells* needed to create healthy new skin are significantly reduced and function less efficiently. A discovery based on promising plant stem cell research may allow you to regain control.

Scientists have found that a novel extract derived from the stem cells of a rare apple tree cultivated for its extraordinary longevity shows tremendous ability to rejuvenate aging skin. By stimulating aging skin stem cells, this plant extract has been shown to lessen the appearance of unsightly wrinkles. Clinical trials show that this unique formulation increases the longevity of skin cells, resulting in skin that has a more youthful and radiant appearance.



STEM CELLS

Cells in our bodies are programmed for specific functions. A skin cell, a brain cell, and a liver cell all contain the same DNA, or set of genes. However, each cell's fate is determined by a set of epigenetic (able to change gene expression patterns) signals that come from inside it and from the surrounding cells as well. These signals are like command tags attached to the DNA that switch certain genes on or off.

This selective coding creates all of the different kinds of cells in our bodies, which are collectively known as differentiated (specialized) cells.



Although differentiated cells vary widely in purpose and appearance, they all have one thing in common: they all come with a built-in operational limit. After so many divisions, they lose their ability to divide and must be replaced. This is where stem cells come in.

Your body also produces other cells that contain no specific programming. These stem cells are "blank," so your body can essentially "format" them any way it pleases. Two universal aspects shared by this type of cell are: (1) the ability to replenish itself through a process of self-renewal and (2) the capacity to produce a differentiated cell.

In animals and humans, two basic kinds of stem cells exist: embryonic and adult stem cells. **Embryonic stem cells** have the power to change into any differentiated cell type found anywhere in your body. **Adult stem cells**, on the other hand, are generally more limited. They can only evolve into the specific type of cell found in the tissue where they are located. The primary function of these adult stem cells is maintenance and repair.

But certain adult stem cells found in nature retain the unlimited developmental potential that embryonic stem cells possess. These cells have become the main focus for an exciting new wave of **regenerative medicine** (repairing damaged or diseased tissues and organs using advanced techniques like stem cell therapy and tissue engineering).

THE ROLE OF STEM CELLS IN THE SKIN

The basal (innermost) layer of the skin's epidermis comprises two basic types of cells: (1) the slowly dividing epidermal stem cells (that represent about 2-7% of the basal cell population) and (2) their rapidly dividing offspring that supply new cells to replace those that are lost or dying.¹⁻³

The slow self-renewal process of epidermal stem cells, however, creates a problem. Because each epidermal stem cell only

lasts for a certain number of divisions, and because each division runs the risk of lethal DNA mutation, the epidermal stem cell population can become depleted. When this happens, lost or dying skin cells begin to outnumber their replacements and the skin's health and appearance start to decline.

So what can be done? Scientists turned to plants for the answer.

PLANTING A SEED OF HOPE

Plants also have stem cells. Like humans, plant stem cells depend on epigenetic control and signals from surrounding cells for their development. Unlike humans, however, each plant-derived adult stem cell possesses the ability to generate a whole new plant.⁴ Scientists have found a way to harness the power of plant stem cells by growing plant tissues in culture.

The technique is a relatively simple one. First, viable tissue is obtained from a source plant. This material is called an explant. Next, a small cut is made in the explant. New cells form on the surface of this cut in an attempt to heal the wound. This colorless mass of cells is called a callus. The slowly dividing cells of a callus are undifferentiated cells that lack the characteristics of normal plant cells. They are essentially unprogrammed and full of potential.

With this technology, it is theoretically possible to propagate any plant cell in a liquid culture, opening up a whole new realm of possibilities. This fact started scientists thinking—what would happen if an extract of genetically long-lived plant stem cell tissue was applied to human skin?

COMPARING APPLES TO APPLES

Today, apples are cultivated primarily to enhance their appearance and flavor. But before the rise of refrigeration, an apple's ability to stay fresh for a long time was its most sought-after characteristic.

For this reason, a special variety of apple was cultivated in the middle of the 18th century that could be stored for a greatly extended period of time. In essence, it was the genetically modified, longer-living stem cells of this tannin-rich variety of apple, called the Uttwiler Spätlauber apple, which were responsible for its unique storage longevity.

In a certain isolated area of rural Switzerland, a few of these hardy apple trees still survive today. Scientists obtained an explant from the leaf of one of these trees to produce a special anti-aging stem cell extract.

THE AMAZING RESULTS

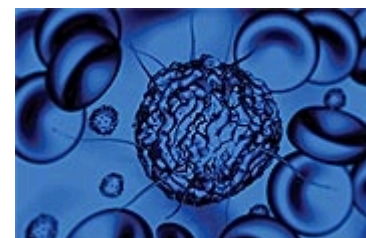
In order to test the theory that this unique plant extract would produce anti-aging effects, scientists at Mibelle Biochemistry first obtained human stem cells from the blood of an umbilical cord. Their first in-house study on cell viability showed that, at a concentration of only 0.1%, an extract of Uttwiler Spätlauber stem cells stimulated the proliferation of human stem cells by an astounding 80%!⁵

In a second experiment, these scientists irradiated the umbilical cord blood stem cells with UV light. Nearly 50% of the stem cells cultured in growth medium alone died, but the cells grown in the culture containing the special apple extract showed only a small decrease in the number of living cells.⁵

Another in vitro experiment conducted by the scientists involved fibroblast cells. These are the most common of all cells in the connective tissue of the skin. They manufacture the collagen, glycosaminoglycans, reticular and elastic fibers, and glycoproteins that make up the extracellular matrix (connective tissues providing support to cells). Fibroblasts not only help provide a structural framework for the skin, they also play a critical role in wound healing.

In their experiment, the scientists treated fibroblast cells with hydrogen peroxide for two hours until the cells began to show classic signs of aging. In scientific terms, this means that several genes essential for cell proliferation and growth were significantly down-regulated. However, after incubating these cells for 144 hours in a 2% Uttwiler Spätlauber extract, this down-regulation of genes was effectively neutralized, and in some cases, it was actually reversed! In addition, the scientists noted that the expression of an important antioxidant enzyme called *heme oxygenase 1* was also stimulated.⁵

Finally, the scientists conducted a human study to determine the anti-wrinkle effectiveness of a special cream containing a 2% Uttwiler Spätlauber extract along with lecithin liposomes. This patent-pending cream (called PhytoCellTec™ Malus Domestica) was applied twice daily to the crow's feet area of 20 participants. Wrinkle depth was reduced by an average of 8% after just two



weeks, and by 15% after four weeks—thus reducing the signs of aging!

WHAT YOU NEED TO KNOW: APPLE STEM CELLS OFFER HOPE FOR AGING AND DAMAGED SKIN

- Scientists are conducting intensive research on stem cells, which show tremendous potential to repair damaged tissues and organs.
- Stem cells are capable of self-renewal and can transform themselves into differentiated cells.
- Epidermal stem cells are crucial to replenish the skin cells that are lost due to continual shedding. When epidermal stem cells are depleted, the number of lost or dying skin cells outpaces the production of new cells, threatening the skin's health and appearance.
- Like humans, plants also have stem cells. Scientists are keenly interested in a stem cell extract from the Uttwiler Spätlauber apple tree, whose fruit demonstrates an exceptionally long shelf-life.
- This extract, termed PhytoCellTec™ Malus Domestica, has been shown to stimulate human stem cell proliferation, protect stem cells against ultraviolet light-induced death, and mitigate aging-related alterations in gene expression.
- A human study showed that topical application of PhytoCellTec™ Malus Domestica reduced the depth of crow's feet wrinkles after only two weeks.
- *Chondrus crispus* (red seaweed) extract, hyaluronic acid, and an antioxidant tea blend complement the effects of PhytoCellTec™ Malus Domestica to help promote radiant, youthful skin.

REVITALIZE YOUR SKIN

A potent concentration of this PhytoCellTec™ Malus Domestica is now available to help preserve and protect your vital skin stem cells. This special apple extract complements other ingredients provided in a new topical formula.

One is a special extract of *Chondrus crispus*, a red seaweed found only in the cold waters off the Atlantic coast. With its abundance of mineral salts, trace elements, proteins, and vitamins, this extract is an excellent emollient with soothing, anti-inflammatory properties.⁶ Other anti-aging ingredients are hyaluronic acid (noted for its outstanding moisturizing ability)⁷ and a concentrated antioxidant tea blend, which helps fight the free radicals that contribute to skin aging.^{8,9}

Combined, these ingredients comprise an innovative topical formulation that protects and preserves the youthful look and vitality of your skin in ways never before possible. Just a tiny bit applied to your face, neck, and décolleté area twice daily can help revitalize the tone, texture, and appearance of aging skin.

Gary Goldfaden, MD, a clinical dermatologist and lifetime member of the American Academy of Dermatology, is founder of Academy Dermatology in Hollywood, FL, and COSMESIS Skin Care. He is also a member of the Life Extension Scientific Advisory Board.



If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

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