First Ever Facial Skin Graft
Tega Cay burn victim begins skin graft procedure

By Mary Jo Balasco - The Herald, Rock Hill, South Carolina

Within days of the outdoor fireplace accident in which Connor McKemey was burned last month, grafts of his skin were growing in a laboratory to replace burned tissue. Now, surgeons are beginning the long process of placing those grafts over his body to form new skin. Surgeons at the Burn Center in Augusta, Ga., recently spent four hours placing 72 of the grafts -- called Cultured Epidermal Autografts, or CEAs -- on Connor's neck, back, chest and sides, his mother, Karin McKemey, said.

Epicel grafts are see-through sheets of skin cells -- only two to eight cell layers thick -- that are grown from a small sample of a burn patient's own healthy skin. Because of the delicacy of the cultured grafts, up to 25 technicians are required to remove each graft from the flask it grew in. It was the first in a series of surgeries that 13-year-old Connor will undergo in coming weeks to cover his wounds with skin, Karin said. So far, she said, the grafts are "looking good."

Connor was burned just days before Christmas at his parent's Tega Cay home when their backyard fireplace erupted. Karin, who was burned trying to help Connor, was released from the center last month. Connor -- with burns on more than 85 percent of his body -- doesn't have enough healthy skin to cover the wounds. So, a combination of cultured grafts and his own was used, Karin said. Connor, in a medically induced coma, had enough healthy skin for his face. The natural skin was used for his face because the color will match more closely, she said. On Monday, she said, doctors plan another surgery to place 96 more grafts of the cultured skin on Connor's arms, legs, hands and feet.

The grafts were grown from a sample of healthy skin -- about the size of a postage stamp -- that surgeons clipped from Connor's body after his arrival at the burn center. After receiving the skin biopsy, surgeons measure a patient's wounds and calculate how many cultured grafts will be needed, said Dr. Robert Mullins at the burn center. At the Cambridge, Massachusetts laboratory, technicians spend about five days preparing a skin sample to be grown into cultured grafts. During this time, surgeons back at the Augusta center worked almost daily for more than three weeks cutting burned skin, one area at a time, from Connor's face, arms, legs, back and chest. Then, they temporarily covered the areas with cadaver skin in preparation for grafts.

Skin cells are separated from the sample and placed in a flask so they can reproduce. The cells in one flask produce enough skin for one graft. In the laboratory, skin cells reproduce faster than in the body because they are in an ideal setting -- in an incubator at body temperature, 98.6 degrees Fahrenheit, where they are fed a high-nutrient food called a media. "It's like running a newborn nursery. They have to be fed and kept warm," said Gail Pituck, clinical specialist for Epicel Genzyme Biosurgery, which produces the grafts. Every day, lab technicians inspect each flask containing the duplicating cells, change the nutrient media and calculate how much growth has occurred, she said.

After about two weeks in the lab, the skin cells replicate to form a cultured graft the size of a playing card. Then they are ready to be transported to the burn center. The cultured grafts consist of only the
top layer of skin, called the **epidermis**, so they are very thin -- between two and eight cell layers thick. Normal skin consists of three layers.

Because of the delicacy of the cultured grafts, as many as 25 technicians are required to remove each graft from the flask it grew in, she said. Then, it is clipped to a piece of petrolatum gauze and placed in a carrier dish. Up to 48 dishes are placed in one transport box, which is kept cool to slow the reproduction of the cells, she said. The box is sealed and hand-delivered to the burn center.

A surgeon places the skin side of the graft onto the wound bed, and the petrolatum backing is left on facing upward. The graft is stapled in place. Enough grafts are placed to cover an area of wound and then, a netted dressing is applied. It takes about a week for the grafts to attach to the body. Seven to 10 days after placement, the dressings, staples and petrolatum gauze backings are removed.

Pituck said cultured grafts might look different from natural skin because fragile melanocyte cells, which give skin its color, might not reproduce in the same quantity as in natural skin. Cultured skin does not have hair follicles, which gives it a smoother look.

The fragile grafts require special care. A **bili light** is shined on them periodically during the first few days to dry them, which might reduce the risk of infection, Mullins said. After his first grafting surgery, Connor has been kept highly sedated and turned every two hours so that pressure does not harm the grafts, said Karin.

Once wounds are grafted, they take about a year to heal, Mullins said. But the skin usually grows enough to close the wound in a few weeks. In a week, if Connor's second grafting surgery goes well, Karin said doctors will allow Connor to come out of the medical induced coma for a few minutes. "I can't tell you how much I want to see his eyes and hear his voice again," Karin said. "Every day, we get closer to that moment, and I truly believe that faith, prayer and the sheer will of this community is what is getting us there."

**Artificial Skin Fact Sheet**

[http://www.nigms.nih.gov/Education/Factsheet_ArtificialSkin.htm](http://www.nigms.nih.gov/Education/Factsheet_ArtificialSkin.htm)

**What are the functions of skin?**

Skin is the largest organ in the body, a highly dynamic network of cells, nerves and blood vessels. Skin does many things, including:

- Protects us from the cold, heat and microorganisms
- Preserves fluid balance
- Controls body temperature
- Senses the outside world
- Helps prevent and fight disease
What is artificial skin?
Thirty years ago, National Institutes of Health-funded burn surgeons determined that badly burned skin should be removed as quickly as possible, followed by immediate and permanent replacement of the lost skin. This seemingly simple idea ultimately became standard practice for treating major burn injuries and led to the development of an artificial skin system called Integra Dermal Regeneration Template.

When skin is damaged or lost due to severe injury or burns, bacteria and other microorganisms have easy access to warm, nutrient-rich body fluids. To treat a severe burn, surgeons first remove the burned skin and then quickly cover the underlying tissue, usually with a combination of laboratory-grown skin cells and artificial skin.

After removing burn-damaged skin, surgeons blanket a wound with a covering like Integra, then apply a skin graft on top of this biomaterial to encourage the growth of new skin to close the wound. Ideally, surgeons obtain skin grafts from an unburned area of skin elsewhere on the body. But when the burn is severe and covers 80 to 90 percent of a person’s body surface, there is not enough skin to use for this purpose.

What is Integra?
Integra is an artificial substance that contains no living components. It is not designed to be a replacement skin. Rather, Integra supplies a protective covering and a pliable scaffold onto which a person’s own skin cells can regenerate the lower, dermal layer of skin destroyed by burn.

Integra consists of two layers, just like living skin. The bottom layer, which is designed to regenerate the lower layer of real skin, is composed of a matrix of interwoven bovine collagen (a fibrous cow protein) and a sticky carbohydrate (sugar) molecule called glycosaminoglycan that mimics the fibrous pattern of the bottom layer of skin. This matrix then sticks to a temporary upper layer: a medical-grade, flexible silicon sheet that mimics the top, epidermal layer of skin. Integra looks somewhat like translucent plastic wrap.

What is a skin graft?
There are two types of skin grafts. An autologous skin graft transfers skin from one part of the body to another. In contrast, an allograft transfers skin from another person, sometimes even a cadaver. Allografts offer only temporary cover, as they are quickly rejected by a person’s immune system. New epidermal skin can be produced by taking cells from a non-burned epidermal layer of skin, growing them into large sheets of cells in a laboratory, then placing the cell sheets on top of Integra. Scientists do not yet know how to grow the lower, dermal layer of skin in the lab.

After first removing tissue destroyed by a severe burn, a burn surgeon drapes Integra over a wounded area of skin and leaves it there for two to four weeks, during which time the burn victim’s own cells climb onto the matrix and grow a new dermis. Surgeons then remove the top layer of Integra and apply a very thin sheet of that person’s own epithelial cells. Over time, a normal epidermis (except for the absence of hair follicles) is reconstructed from these cells.

What is an EPICEL GRAFT?

Based on the reading, what is MEDIA?

_______ Write the LETTER of the following that you believe is the BEST definition for a BILI LIGHT:

A. the light used in tanning beds before people go on vacations
B. the light used in hospitals for therapy, especially with newborns and for skin grafts
C. the light created by a laser for scanning bar codes at a grocery checkout

What are 4 different functions of your skin?

1. ___________________________________________________________ 2. ___________________________________________________________

3. ___________________________________________________________ 4. ___________________________________________________________

What is the author’s PURPOSE in writing this article?
First Ever Facial Skin Graft

SURVEY: Record important titles, subtitles, bold-faced words, captions, etc.

QUESTION: Write out at least 3 "Who, What, When, Where, Why, or How" questions based on your survey.
1.) __________________________________________________________________________________________
2.) __________________________________________________________________________________________
3.) __________________________________________________________________________________________

READ: As you read, look for and write down answers to the questions from above.
1.) __________________________________________________________________________________________
2.) __________________________________________________________________________________________
3.) __________________________________________________________________________________________

RECITE: Write down 10 FACTS or NEW pieces of information you’ve learned in this article.

Also number them (1-10) please

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