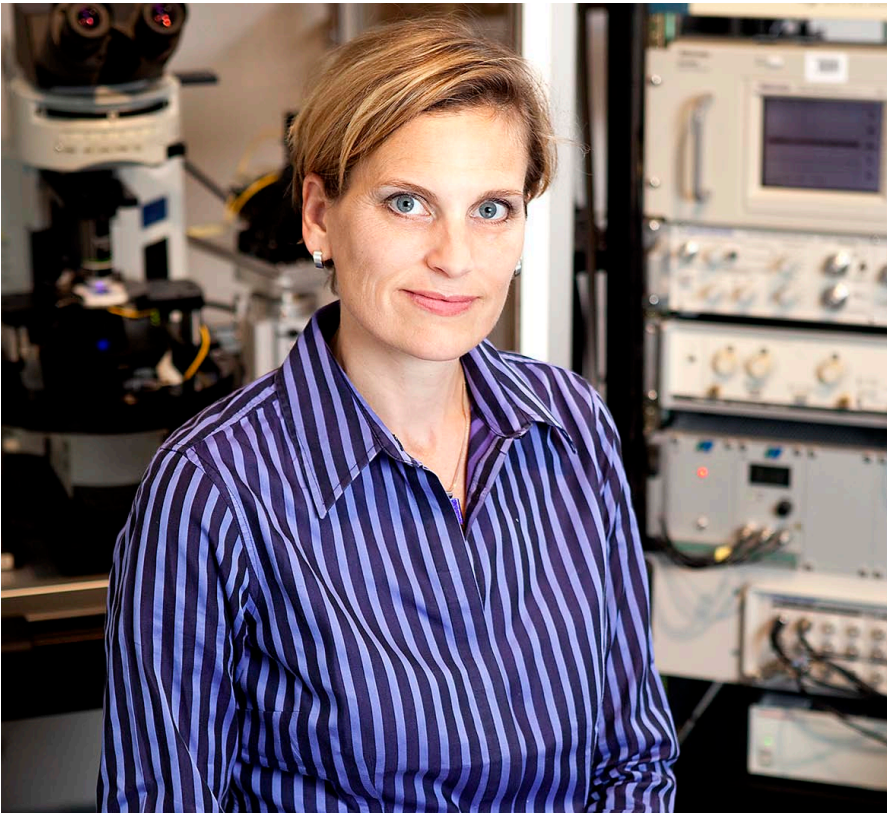




Research Frontiers: Understanding the Connection Between the Skin and the Nervous System



Ellen A. Lumpkin, Ph.D.

If you've ever accidentally smashed your finger while hammering a nail, you may have noticed an ever-so-slight delay between the moment you sensed the hammer blow and the onset of pain. In that microsecond, your inner voice may even have had time to say, "Boy, that's going to hurt!" And then it did.

An explanation for this curious phenomenon can be found in the laboratory of Ellen A. Lumpkin, Ph.D., Associate Professor of Dermatology and Physiology and Cellular Biophysics at Columbia University. Dr. Lumpkin is among a handful of

scientists around the world who study the neurobiology of the skin. She is particularly interested in deciphering the networks of molecules, genes, and cells involved in the first moments of touch sensation, that is, when a force gets converted into an electrical signal, which is then transmitted along nerve fibers, ultimately reaching the brain.

Dr. Lumpkin also studies the mechanisms that allow us to distinguish between light touch and painful touch, a critical task we do unconsciously countless times a day. As Dr. Lumpkin notes,

cont. on page 3

Columbia Researchers Discover Genetic Basis of Two Types of Hair Loss

For the 5.3 million Americans who suffer from alopecia areata (AA), an autoimmune disease that attacks hair follicles and causes hair loss, there's encouraging news from Columbia's Department of Dermatology.

A team of investigators led by Angela M. Christiano, Ph.D., Professor of Dermatology and Genetics & Development at Columbia University and Director of the Center of Human Genetics, has discovered eight genes that underpin AA. Since many of these genes are also implicated in other autoimmune diseases, including rheumatoid arthritis and type 1 diabetes — and treatments have already been developed that target these genes — this discovery may quickly lead to new treatments for AA. At present, there is no cure and no reliable treatment.

The findings, reported in the June issue of the journal *Nature*, point to a particular group of proteins, cells, and cell receptors that appear to be involved in the

cont. on page 3

Chairman's Message



How do you define "itch"? Centuries ago, a German physician named Samuel Hafenreffer described itch as "the desire to scratch." Remarkably, that definition is still in use today — a reflection of how little we've learned about the biological mechanisms that underlie itch, or touch or pain for that matter, even after all these years.

This is not as trivial as it may seem. Because we don't understand these mechanisms, we have few ways to stop the maddening desire to scratch that accompanies many skin diseases, real or imagined (as illustrated in the article on the Psychocutaneous Medicine Clinic on p. 5) or to alleviate problems like touch hypersensitivity (see our cover story).

One of the new missions of the Department of Dermatology is to fill the gaps in our knowledge of these biological mechanisms. We are currently in the process of creating a center for neuroscience of the skin that will support studies of the complex interactions of the skin, the mind, and the brain.

Our first recruit for the new center is Ellen A. Lumpkin, Ph.D., whose groundbreaking research into touch receptors is featured in this issue. We hope to bring several more like-minded researchers on board in the months and years ahead, and to establish new collaborations with the many world-class neuroscientists already at Columbia University.

This work is long overdue. No other academic medical center has yet to assemble the critical mass of basic scientists needed to explore this critical frontier. With the help of our Columbia colleagues and the support of our benefactors, the Department of Dermatology can be at the vanguard of this exciting new field and, most importantly, bring new treatments and cures to patients with skin disease.

In closing, I would like to take this opportunity to thank all of the Department's alumni and friends for their support over the past year. I would particularly like to thank our alumni and faculty (listed below) for their continued, greatly increased participation in the Department's Residents' Education and Development (RED) Fund, allowing us to help this talented group of residents to defray the escalating costs of their training.

David R. Bickers, M.D.

Carl Truman Nelson Professor and Chairman

The Department of Dermatology would like to thank the following friends and alumni for their 2009 support of the Residents' Education and Development (RED) Fund:

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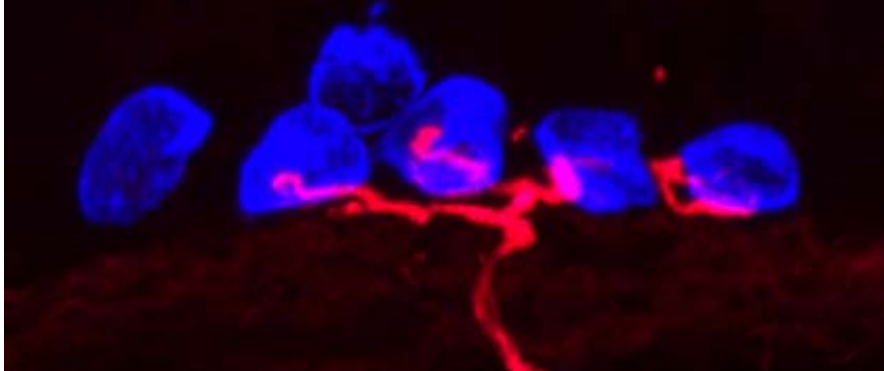
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Research Frontiers, from page 1

Dr. Lumpkin's research aims to discover how the skin's touch receptors, like the Merkel cell-neurite complexes pictured, convert shapes and textures into neural signals.



"If you can't tell the difference between a light breeze and a hammer blow, your brain can't produce the appropriate responses."

And that can make life unbearable. In many conditions — from severe sunburns to peripheral nerve disease to chronic pain — it is this very ability that goes haywire, so that a mere caress can cause excruciating pain. Doctors call this touch hypersensitivity, for which treatments are few and far between.

Surprisingly little is known about the fundamentals of touch, probably the least understood of our senses. "To show you how much we have yet to learn, we still don't know a single gene that is required for encoding touch in mammals," says the researcher.

But thanks to scientists like Dr. Lumpkin, that may soon change. She and her colleagues recently demonstrated in mouse studies that Merkel cells, which are found in the skin, play an essential role in the ability of nerves to resolve fine spatial details, like shapes and textures.

"This a big step forward because it tells us where to look for candidate genes for touch," she says. "By understanding

the genetic differences between different classes of touch receptors and pain receptors, we hope to identify new targets for medications so we can selectively intervene in touch hypersensitivity or other types of skin-related pain." There's a great need for new treatments, especially for long-term pain. Existing therapies, including topical anesthetics like lidocaine, do lessen discomfort, but they have overly broad effects and are best suited for short-term relief.

So, why do we experience that slight delay between initial sensation and pain when smashing a finger? As Dr. Lumpkin explains, our bodies have one system dedicated to light touch and another to pain. The nerves of the former, compared to the latter, are more heavily insulated with a fatty substance called myelin, which speeds the transmission of signals. As a result, light touch signals arrive at the brain just before the pain signals. And we see all this even sooner, because visual signals have so little distance to travel from the eyes to brain. It's a fascinating, if painful, lesson in the neurobiology of the skin.

Hair Loss, from page 1

destruction of hair follicles in AA. "Finally, we have the possibility of developing drugs that specifically target the mechanism behind the disease," says Dr. Christiano.

In an earlier *Nature* paper, Dr. Christiano and her colleagues identified the gene behind a different form of hair loss, hereditary hypotrichosis simplex, a progressive form of hair loss beginning in childhood. This disease is caused by a phenomenon called hair follicle miniaturization — the same key feature in male pattern baldness. When hair follicles go through this process, they shrink or narrow, causing the thick hair on the head to fall out and be replaced by thin, fine hair, known as "peach fuzz."

Importantly, Dr. Christiano and her team's findings implicate a specific non-hormonal signaling pathway in causing hereditary hypotrichosis simplex. If this holds true, it may be possible to develop non-hormonal therapies for the disease, which would enable more people to get treatment. Most currently available treatments for hair loss involve blocking hormonal pathways, which can cause adverse effects.

A Conversation with a dermatologist just for kids



A national leader in pediatric dermatology, Maria Garzon, M.D., Professor of Clinical Dermatology and Clinical Pediatrics, and the Director of Pediatric Dermatology at Columbia University Medical Center, specializes in the treatment of vascular birthmarks (abnormal growths of blood vessels in or underneath the skin that cause red or purple discolorations), which affect one in ten children. She is a co-founder of the interdisciplinary Vascular Anomalies Clinic at Morgan Stanley Children's Hospital of NY/Columbia University Medical Center (CUMC) and a founding member and president of the Hemangioma Investigator Group, an international research consortium that studies hemangiomas, a serious form of vascular birthmark.

Q: What are the most common pediatric skin problems that you see here at CUMC?

A: Since we're a referral center, we tend to see severe cases of common pediatric diseases like atopic dermatitis [eczema], acne, and vascular birthmarks. Columbia is a busy organ transplant center, so we're often called to consult on children who have skin reactions to transplants or to immunosuppressive medications.

Q: Most vascular birthmarks are harmless, but some are not, and some will go away on their own and some will not. How can a parent tell the difference?

A: It's not always obvious. Children with a vascular birthmark should be evaluated by their pediatrician and, when certain lesions will require further evaluation, by a dermatologist or a pediatric dermatologist. It's important to determine whether a birthmark is, for example, a common fading type vascular stain such as a "salmon" patch stain, which is usually harmless, or an infantile hemangioma, which in some cases can cause serious complications. Our pediatric dermatology group has made a great effort to teach general pediatricians and dermatologists about which hemangiomas are more likely to be problematic and require referral to a pediatric dermatologist.

Q: What's the major concern with hemangiomas?

A: Hemangiomas may not be limited to the skin. They can also extend to other parts of the body. For instance if they are around the eye, they can interfere with vision, or around the airway, they can potentially interfere with breathing. Sometimes they grow on internal organs like the liver. If we suspect any of these complications, the child needs further testing.

Q: Are there any obvious warning signs that a hemangioma may be particularly dangerous?

A: That's one area we've been studying in the Hemangioma Investigator Group. We recently submitted a study for publication that supported the finding that children with five or more hemangiomas on the skin are at high risk for

liver hemangiomas. In another study, we found that approximately 30 percent of infants with facial hemangiomas bigger than about 2 inches are at high risk for having a group of potentially serious abnormalities, affecting the eyes, heart, brain, and arteries. This relatively newly-recognized syndrome goes by the acronym PHACE.

Q: How are hemangiomas treated?

A: Treatment ranges from oral medications to laser or surgical removal, depending on what organs and tissues are involved. It is very important to tailor the treatment to the specific needs of an individual patient. For children with more complex hemangiomas and vascular malformations, we established the Vascular Anomalies Clinic. This is a group of pediatric surgeons, plastic surgeons, interventional radiologists, hematologists, ophthalmologists, otolaryngologists, orthopedists, and other specialists that meets once a month to review cases and determine the optimal treatment approach.

Two and Counting...

With just 162 board-certified pediatric dermatologists around the nation, most medical centers are lucky to have one on staff. The Department of Dermatology has two, with a third slated to join the faculty in the months ahead.

The Department's second pediatric dermatology specialist is Kimberly Morel, M.D., Assistant Professor of Clinical Dermatology and Clinical Pediatrics. A research-

psychocutaneous medicine

The Mind-Skin Connection

By some estimates, one-third of patients who seek care for skin disorders also have significant emotional and psychiatric issues. But all too often, these patients — especially those with the most intractable problems — cannot find the help they need, falling into the cracks between dermatology and psychiatry.

The Department of Dermatology at Columbia University has been working to bridge these two disciplines since the early 1980s, after recognizing that many of its psoriasis inpatients were anxious or depressed. In response, the Department enlisted a psychiatrist in the consultation-liaison service of the Department of Psychiatry to study these patients, run group counseling sessions, and serve as a resource for faculty.

“The patients were eager to talk,” recalls Iona Ginsburg, M.D., now Associate Clinical Professor of Psychiatry (in dermatology), who pioneered the service — one of the first of its kind. “The disease was having a profound effect on their day-to-day lives, on their relationships, on their sense of self.”

This was a big shift for dermatology. “No one had ever really looked at



Iona Ginsburg, M.D.

this before at Columbia,” says Danielle Engler, M.D., then a resident and now Associate Clinical Professor of Dermatology who teams with Dr. Ginsburg in treating these patients. “We were looking for medications to treat the disease but not at how the disease would affect one’s quality of life.”

Over time, the number of inpatients with psoriasis waned, as treatment shifted to outpatient settings. But the need for this type of care did not, prompting the Department to launch an outpatient clinic in Psychocutaneous Medicine in the late Eighties.

Nowadays, it is lesser-known ailments that bring most patients to the



Danielle Engler, M.D.

twice-a-month clinic, disorders like trichotillomania (hair pulling) and olfactory reference syndrome (in which people think, incorrectly, that they have terrible body odor). They also see patients devastated by such conditions as acne or psoriasis, even when the condition is not very severe. By far the most common disorder seen in the clinic is delusional parasitosis. “People with this disease are convinced their skin is infested with creeping, crawling insects,” explains Dr. Engler. “While the sensations are real, the infestation is not. This is a psychiatric disease.”

For some reason, this disorder [cont. on page 7](#)

er as well as a clinician, Dr. Morel studies a variety of diseases, with a particular focus on epidermolysis bullosa (EB), a condition in which painful, disfiguring sores, much like third-degree burns, form all over the skin in response to the slightest trauma.

“There is no cure yet for EB,” says Dr. Morel, “but there’s a lot of exciting research happening here, including clinical trials of topical wound care and bone marrow transplants.” Short of a cure, current treatments aim at preventing the sores from developing and healing the ones that do.

Three years ago, Dr. Morel established an outpa-



tient clinic specifically for children with EB. An interdisciplinary effort, the Pediatric Epidermolysis Bullosa Interdisciplinary Clinic includes dermatologists, nutritionists, pain management specialists, dentists, occupational and physical therapists and social workers, who are able to address the many aspects of the disease.

dermatology residents: Serving America's Heroes



Jessica Newman, M.D., and Andrew Avarbock, M.D., Ph.D.

For a large urban hospital, the James J. Peters Veterans Administration Medical Center in the Bronx has a surprisingly small-town feel. It's the type of place where everyone is greeted with friendly nods and warm "hellos" — and that's just in the parking lot. This is but one of several reasons why Columbia Dermatology residents say that the V.A. rotation is a significant addition to their training in dermatology.

"Because we see our patients so often here at the V.A. dermatology clinics, we learn not only about their disease, but also about their families and what is going on in their lives," says Andrew Avarbock, M.D., Ph.D., a second-year dermatology resident who is midway through his V.A. rotation. "It's a very appreciative group."

The Department has been affiliated with the Bronx V.A. since 2007, giving residents a wealth of hands-on experience with an unusually varied patient population. On a given day, a resident may see an elderly World War II

veteran with skin cancer, a middle-aged Vietnam War veteran with chloracne (a severe form of acne resulting from exposure to the defoliant Agent Orange), and a young Iraqi War veteran with folliculitis (inflammation of the hair follicles, a consequence of wearing heavy uniforms and armor in hot climates). "It's a great complement to the types of cases we see at other clinical sites," says Dr. Avarbock.

Another benefit of the three-month V.A. rotation, a yearly requirement of all residents, is the amount of autonomy given to trainees. "The V.A. encourages progressive responsibility as you go through your residency," explains Jessica Newman, M.D., M.P.H., Chief of the Dermatology Department at the V.A. and Assistant Clinical Professor of Dermatology at Columbia, who oversees the rotation. "This is especially important for third-year residents. They're about to become attending physicians or to enter private practice. They need to think on their own. It's great for confidence-building."

"I feel like the primary doctor in my own practice," adds Dr. Avarbock. "While there is significant oversight, we're also allowed to formulate and implement our own treatment strategies. This is unique to the V.A."

Residents are also afforded ample opportunity to participate in surgery and collaborate with other specialists on complex cases.

"The V.A. has been a major addition to our residency program and has allowed us to expand our residents' skill set," says David R. Bickers, M.D., Chairman of Dermatology at Columbia. "We've had incredible support from Dr. Erik Langhoff [the V.A.'s Chief of Staff], and we look forward to even more collaboration in the future."

One such collaboration is already on the horizon. In the coming months, the hospital plans to add a "teledermatology" service, an advanced communications technology program in which primary care physicians in the V.A. system from outlying areas will be able to submit high-definition images of skin lesions and rashes for evaluation by dermatologists, including residents, at the Bronx facility. "This is ideal for patients who are unable to visit our clinic and thus don't always get the care they need," says Dr. Newman. "We're not in the middle of Alaska, but our facility can be remote for an aging veteran without a car who lives in the Hudson Valley."

Dr. Newman, for one, is happy to make the extra effort. "The patients at the V.A. are the nicest you could possibly imagine," she says. "Before I came here, I didn't think about 'America's heroes.' But I've really come to appreciate what these men and women have done for our country."

Mind-Skin, from page 5

tends to affect middle-aged or older Caucasian women, though the condition has been reported in men and in people of all ages and races. Not infrequently, they see a *folie a deux* where the afflicted person involves a family member in the delusion. Common consequences include depression and self-imposed social isolation (out of fear of infecting others). The bottom line, says Dr. Engler, is that "these people are miserable."

The challenge in caring for patients with delusional parasitosis is getting them to recognize that the problem is in their mind, not in their skin. A common mistake is to send these patients directly to a psychiatrist, a move that most patients resist. At the Psychocutaneous Medicine Clinic, each patient is seen jointly by a dermatologist and a psychiatrist. "This tends to be very reassuring to most patients," notes Dr. Ginsburg.

"Also, it lets them know from the start that we take their complaints very seriously," adds Dr. Engler. "We'll even bring them into an exam room to take a close look at their skin, even if it's quite obvious to us that the problem is largely psychiatric."

"Another reason our clinic has been successful," Dr. Engler continues, "is that we have the time to explore how the disease is affecting their lives." All told, this approach often helps convince patients to accept psychiatric help.

Typically, delusional patients are started on antipsychotic medications, which can be quite effective. Such patients are rarely cured, however. Rather, says Dr. Ginsburg, "the goal is return them to normal functioning, to improve their quality of life, and to experience the delight in daily activities they felt previously."

Events

Columbia Dermatology's 2010 Annual Alumni Reception

In March, 2010, Columbia Dermatology faculty members and residents headed to the warm climes of Miami, Florida, to take part in the 68th annual meeting of American Academy of Dermatology. Dr. David Bickers, Chairman of Columbia's Department of Dermatology, marked this occasion by continuing what has now become a tradition of hosting Columbia Dermatology's annual alumni reception, at the stunning Setai Hotel in South Beach. The guests used this opportunity to reconnect with each other and meet current Columbia Dermatology residents.



above: Jessica Weiser, M.D., Nicole LeBoeuf, M.D., Alexis Young, M.D., Jocelyn Lieb, M.D., Shanthi Colaco, M.D., Julian Mackay-Wiggan, M.D., and Christine Lauren, M.D.



above: David R. Bickers, M.D., Sara Patterson, Ruth Treiber, M.D., Eric Treiber, M.D., Bernard Cohen, M.D., and Vicki Cohen.

Annual Free Skin Cancer Screening

On May 11, 2010, Columbia Dermatology participated in the free American Academy of Dermatology's 25th Annual Melanoma Skin Cancer Protection and Prevention Screening at the Herbert Irving Pavilion on campus uptown, and at the East 60th Street facility. The 290 patients screened were provided with a wonderful opportunity to learn about the importance of annual skin cancer screening for early detection of skin cancers, and available therapies.

A welcome to Columbia Dermatology's new Department Administrator

Columbia Dermatology is pleased to announce the addition of Tom Gutowski to our staff as Department Administrator and Chief Financial Officer.



Tom comes to us most recently from Weill Medical College of Cornell University and New York-Presbyterian, the University Hospitals of Columbia and Cornell, where he served as Administrator for the Department of Urology. Tom has a B.A. in Psychology from New York University and an M.B.A. in Health Care Administration from Baruch College/Mount Sinai School of Medicine.



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