

NU SBDRC

Northwestern University
Skin Biology and Diseases Resource-based Center



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WELCOME

by: Amy Paller, MD

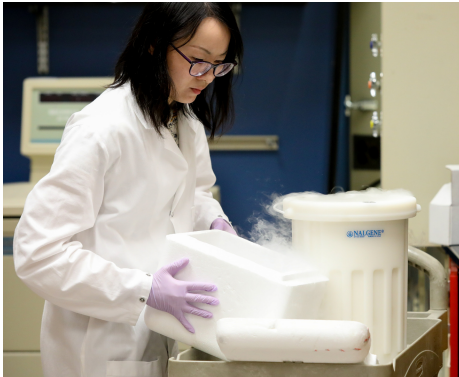
The Northwestern Skin Biology & Diseases Resource-Based Center is one of only six NIH/NIAMS-funded SBDRCs in the nation. Our goal is to foster and synergize skin and epithelial biology research across multiple disciplines on both Northwestern University campuses and throughout the larger Chicago clinical research community. We proudly support more than 71 faculty members from 25 departments, divisions and centers across Northwestern, in addition to faculty among our Chicago Biomedical Consortium affiliates.

Amy Paller, MD

Director, Skin Biology and Diseases Resource-based Center

SBDRC RESEARCH CORES

Our Core facilities are designed to help SBDRC investigators accomplish their research goals related to cutaneous biology and to provide a level of support to newly recruited junior investigators who are interested in skin research. The Cores strive to provide all SBDRC users with access to specialized techniques, expertise, biological analysis and instrumentation that enhances research progress. The Cores promote optimizing the capabilities of manpower, sharing available resources and efforts while being cost effective. Visit the SBDRC website for more information.



STEM CORE

The Skin Tissue Engineering and Morphology (STEM) Core enables researchers to apply primary skin culture models in their research program by providing training, services, specialized equipment, and materials for the initiation, maintenance, processing, and analysis of primary human skin cell cultures, i.e., keratinocytes, melanocytes, fibroblasts, neurons, and immune cells (with the TEST IT Core). The STEM Core also generates short- and long-term mouse keratinocyte cultures for studies aimed at defining the cellular and molecular basis of skin defects evident in engineered mouse models. Users also have access to a large supply of primary human keratinocytes isolated from neonatal foreskin, female and male adult skin, and a library of patient keratinocytes. Please contact Associate STEM Core Director, Bethany Perez White bethany.perez-white@northwestern.edu for any questions.



TEST IT CORE

The Translational and Experimental Skin Testing and Immune Tracing (TEST IT) Core has a well-equipped facility and the necessary support to develop critical experiments. TEST IT provides service, equipment, protocols, and training to help investigators differentiate healthy skin from skin with abnormal immune responses. The TEST IT core will help to develop the methodology needed to understand cutaneous immune responses in health and disease. TEST IT provides cutting edge technologies and expert support for clinical and translational studies, aiming to dissect mechanisms of immunopathogenesis at the single cell level, and exploring novel disease-specific biomarkers with diagnostic and therapeutic applications. State-of-the-art equipment and training is available. Please contact Core Director Caroline Le Poole caroline.lepoole@northwestern.edu for any questions.

The "in vivo" component of the TEST IT Core provides a unique service of acquiring healthy skin and skin from patients with a wide variety of skin disorders through skin biopsy and tape stripping to be processed in the Core. It is also a site in which patients can be tested with external agents that perturb skin, such as ultraviolet light or chemicals, and skin changes studied. The Core can also work with scientists hoping to bring their potential discoveries to the bedside for topical application or injection into skin in early human testing. Please contact Core Director Kurt Lu kurt.lu@northwestern.edu for any questions.



GET IN CORE

The Gene Editing, Transduction and Nanotechnology (GET-iN) Core provides a variety of innovative customized services for cell engineering via gene modifications for in-vitro and in-vivo applications including gene knockdown and overexpression, CRISPR-Cas9 editing, Luciferase reporters for transcription factors and different labels for cell tracking.

The GET iN Core can generate high titer Lenti-, Retro- and Adeno-viral stocks. The Core is planning to provide services related to epigenetic gene expression modifications using CRISPRa and CRISPRi technology in the near future. Please contact GET iN Core Managing Director, Pankaj Bhalla p-bhalla@northwestern.edu for any questions.

Pilot and Feasibility Grant Funding Opportunities

The Northwestern Skin Biology and Diseases Resource-based Center is offering Pilot and Feasibility award funding for proposals that involve research in cutaneous biology. The studies are designed to:

- Foster research about keratinocytes leading to sufficient preliminary data for procurement of federal funding
- Attract established investigators to pursue research related to skin biology
- Encourage collaborative opportunities between the Department of Dermatology and other departments within the medical school and the university
- Provide mentorship in grant writing as well as feedback regarding the conduct of scientific investigation for more junior scientists

"Our goal is to foster and synergize skin and epithelial biology research across multiple disciplines on both Northwestern University campuses and throughout the larger Chicago clinical research community."

Applications for our 2021-2022 Pilot & Feasibility Awards are now open. To learn more about the P&F application requirements, see the current request for proposals on our website. The deadline to apply is April 26, 2021.



Current P&F award recipients finish up research projects

Daniela Menichella, MD, PhD & Abdelhak Belmadani, PhD

What is the title of your P&F project?

A role for epidermal keratinocytes in small fiber degeneration in diabetic peripheral neuropathy.

What is your research focus and how did you become interested in the topic?

My research focuses on the role of epidermal keratinocytes in cutaneous sensory fiber degeneration and associated pain related behaviors.

I became interested in the topic during my collaboration with Dr. Daniela Menichella, investigating the mechanisms of sensory nerve degeneration in DPN.

What is the potential impact of your research?

Increase our understanding of the mechanisms through which keratinocytes promote regeneration of cutaneous nerves in PDN. Identify keratinocyte-derived factors that promote regeneration of cutaneous nerves as new molecular targets for the development of novel treatments for both impaired wound healing and painful neuropathy of diabetic patients.

How can SBDR members and researchers contact you to collaborate?

E-mail: a-belmadani@northwestern.edu

Phone: 312-503-3202

E-mail: d-menichella@northwestern.edu

Phone: 312-503-3223



Sui Huang, MD, PhD

What is the title of your P&F research project?

The Role of Nucleoli in Skin Differentiation

What is your research focus and how did you become interested in the topic?

I have been interested in the function of the nucleoli for more than 25 years. I got interested in it because of the complexity of the structure and the multi-functionality of it, much of which has not been explored.

What is the potential impact of your research?

Being an important organelle, understanding its function in differentiation could help explain many disease states and could help develop intervention strategies.

How can SBDR members and researchers contact you to collaborate?

Email: s-huang2@northwestern.edu

Call: 312-503-4269

Current P&F award recipients finish up research projects



Jaehyuk Choi, MD, PhD

What is the title of your P&F research study?

Optimizing scRNA-seq to Improve Understanding of Skin-resident T cells. We are using single cell technologies to identify and characterize the T cells in the skin.

The goal is to make an atlas that defines the differentiation state and effector functions of unconventional T cells in different compartments of the skin.

What is the research focus and how did you become interested in the topic?

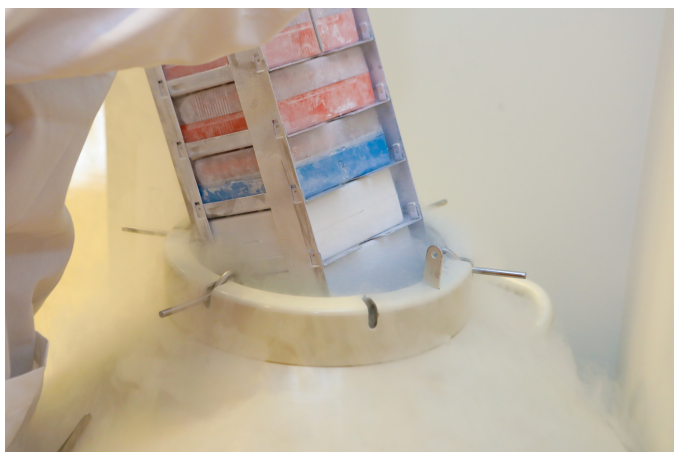
The phenotypes of skin lymphomas are determined by the cancer's cell-of-origin and somatic mutations. By studying skin lymphomas, we have serendipitously encountered heretofore underappreciated skin-resident T cells.

What is the potential impact of your research?

Our research may implicate a novel cell type in the skin. We hypothesize that these cells play an important role in health and disease.

How can SBDRS members and researchers contact you to collaborate?

They can email me at jaehyuk.choi@northwestern.edu.



Peter Sporn, MD

What is the title of your P&F research study?

Single Cell Transcriptomic Analysis of Pulmonary and Cutaneous Sarcoidosis to Inform Mechanistic Studies in a Mouse Model

What is your research focus and how did you become interested in the topic?

I have always been fascinated by immune-mediated and inflammatory lung diseases. As a pulmonary physician, I became interested in sarcoidosis years ago for a variety of reasons, including the fact that the disease was poorly understood, that few other clinicians focused on the disease, and that it disproportionately and more severely affects African Americans, whose needs are underserved. Over the years, along with colleagues in pulmonary medicine, dermatology and other specialties, we have built a robust multi-disciplinary clinical sarcoidosis program at Northwestern. We are part of an international Sarcoidosis Clinical Studies Network, funded by the Foundation for Sarcoidosis Research, and recently were designated as an inaugural Sarcoidosis Center of Excellence by the World Association of Sarcoidosis and Other Granulomatous Diseases (WASOG). In addition to clinical and basic studies related to sarcoidosis, my laboratory investigates innate immunity and host defense against bacterial and viral infections in the lung.

What is the potential impact of your research?

We believe that our investigation of gene transcription in sarcoidosis at the single cell level and our mechanism-focused studies using genetic approaches in the mouse will reveal previously unrecognized unique cell populations and pathways that are important in sarcoidosis pathogenesis. This new knowledge should help lay the basis for novel treatment approaches in the future.

How can SBDRS members and researchers contact you to collaborate?

I am appreciative of support from the SBDRS Pilot and Feasibility Program, and welcome the possibility of collaboration with other SBDRS-affiliated researchers. I may be reached by email at p-sporn@northwestern.edu.

Northwestern SBDRC Seminar Series

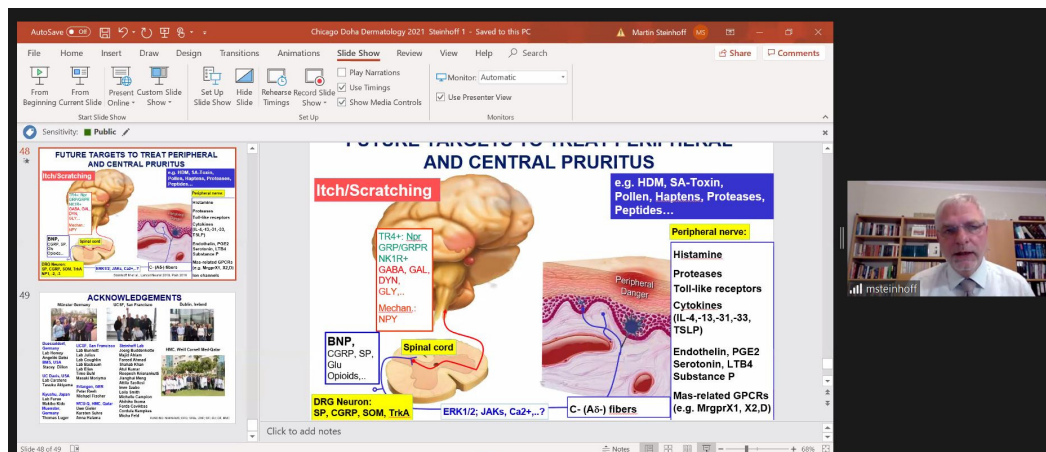
Dr. Steinhoff discusses the molecular mechanisms of itch and neuroinflammation

On March 16th the SBDRC hosted a seminar featuring world-renowned physician scientist Martin Steinhoff, MD, PhD, MSc, PRCPI. Dr. Steinhoff gave a seminar to SBDRC members and the Northwestern Dermatology community. During the talk Dr. Steinhoff discussed:

- Understanding the principles of peripheral and central itch
- Deciphering the mechanism of histamine-dependent and independent itch
- Similarities and difference of cytokine-induced itch
- Mechanisms of itch scratch cycle
- Modern management of chronic itch



Martin Steinhoff, MD, PhD, MSc, PRCPI
Professor and Chairman,
Department of Dermatology
Director, Translational Research Institute
Hamad Medical Corporation
Professor, Weill Cornell University Qatar & New York,
Qatar University



Professor Steinhoff is Chairman of the Department of Dermatology and Venereology & Residency Program Director, as well as Director of the Dermatology Institute and Translational Research Institute (TRI) at Hamad Medical Corporation, Qatar. He is also Full Professor at Weill Cornell University New York & Qatar.

Dr. Steinhoff studied Medicine and Human Biology, University of Marburg, Germany, where he received his MD in oncology and PhD in neuroimmunology. He has published more than 230 peer-reviewed articles which include the first description of several mechanistic pathways in atopic dermatitis, pruritus and rosacea.

Dr. Steinhoff's research has been funded with more than \$72 million to date including NIH R01. He also conducted various clinical trials as PI. For his research, Professor Steinhoff received several prestigious international awards world-wide.

Dr. Steinhoff was member of the board of directors of the European Society of Dermatology Research (ESDR), and is an honorary member of several Societies for Dermatology.

Thanks for the interesting presentation and discussion!

Are you a clinical or bench scientist with an interest in cutaneous biology?

If you meet one of the following criteria, consider applying for SBDRC membership today.

Bench Research Members

Faculty who have research programs related to cutaneous biology, are independent and have extramural federal funding. This represents the majority of our members.

Junior Bench Research Members

Full-time faculty members conducting cutaneous biological research without external funding or assistant professors with external funding (e.g., Dermatology Foundation CDA) who have submitted federal funding proposals. Their research frequently utilizes the core facilities and is enhanced by association with the center's critical mass of funded investigators.

Clinical Collaborative Associate Members

Members of the clinical faculty who do not have wet laboratories but perform clinical research and have expertise in skin disorders. These members have contributed significantly to the translational endeavors of the center through collection of patient materials, data interpretation and participation in clinically relevant enrichment programs such as Bench to Bedside.



WELCOME NEW SBDRC MEMBERS!



Rui Yi, PhD
Professor of Pathology (Experimental Pathology) and Dermatology



Tomoko Hayashida, MD, PhD
Research Associate Professor of Pediatrics (Nephrology)

Both clinical and bench scientists interested in cutaneous biology comprise our core membership in an effort to encourage communication and collaborations between clinicians who perform clinical research and bench scientists who hope to see their work translated into a human benefit.

[View individual profiles of our members](#)

for publication and contact information, research and clinical specialties and more

New Publications

Check out some of the recent publications within the last year stemming from work done in the Northwestern SBDRC Research Cores

Zhang, H., Zhao, H., Zhao, X., Xu, C., Franklin, D., Vázquez-Guardado, A., Bai, W., Zhao, J., Li, K., Monti, G., Lu, W., Kobeissi, A., Tian, L., Ning, X., Yu, X., Mehta, S., Chanda, D., Huang, Y., Xu, S., Perez White, B.E., Rogers, J.A. Biocompatible Light Guide-Assisted Wearable Devices for Enhanced UV Light Delivery in Deep Skin. *Adv Funct Mater.* 2021 DOI: 10.1002/adfm.202100576

Ramesh P, Shivde R, Jaishankar D, Saleiro D, Le Poole IC. A Palette of Cytokines to Measure Anti-Tumor Efficacy of T Cell-Based Therapeutics. *Cancers (Basel).* 2021 Feb 16;13(4):821. PMID: 33669271; PMCID: PMC7920025.

Chen, X., Lloyd, S.M., Kweon, J., Gamalong, G.M., Bao, X. Epidermal progenitors suppress GRHL3-mediated differentiation through intronic polyadenylation promoted by CPSF-HNRNPA3 collaboration. *Nat Commun* 2021 Jan 19;12(1):448. PMID: 33469008 PMCID: PMC7815847

Hegazy M, Cohen-Barak E, Koetsier JL, Najor NA, Arvanitis C, Sprecher E, Green KJ, Godsel LM. Proximity Ligation Assay for Detecting Protein-Protein Interactions and Protein Modifications in Cells and Tissues in Situ. *Curr Protoc Cell Biol.* 2020 Dec;89(1):e115.. PMID: 33044803.

Song Q, Wang XQ, Holmes TR, Bonkowski M, Roth EW, Ponedal A, Mirkin C, Paller AS. Epidermal SR-A Complexes Are Lipid Raft Based and Promote Nucleic Acid Nanoparticle Uptake. *J Invest Dermatol.* 2020 Dec 30;S0022-202X(20)32397-6. doi: 10.1016/j.jid.2020.10.027. Epub ahead of print. PMID: 33385397.

Wang J, Calvert AE, Kaplan N, McMahon KM, Yang W, Lu KQ, Peng H, Thaxton CS, Lavker RM. HDL nanoparticles have wound healing and anti-inflammatory properties and can topically deliver miRNAs. *Adv Ther (Weinh).* 2020 Dec;3(12):2000138. doi: 10.1002/adtp.202000138. Epub 2020 Sep 30. PMID: 33709017; PMCID: PMC7941746.

Holmes TR, Paller AS. Gene Regulation Using Spherical Nucleic Acids to Treat Skin Disorders. *Pharmaceuticals (Basel).* 2020 Nov 2;13(11):360. doi: 10.3390/ph13110360. PMID: 33147737; PMCID: PMC7693734.

Biyashev D, Onay UV, Dalal P, Demczuk M, Evans S, Techner JM, Lu KQ. A novel treatment for skin repair using a combination of spironolactone and vitamin D3. *Ann N Y Acad Sci.* 2020 Nov;1480(1):170-182. doi: 10.1111/nyas.14485. Epub 2020 Sep 6. PMID: 32892377; PMCID: PMC7754145.

Kell MJ, Ang SF, Pigati L, Halpern A, Fölsch H. Novel function for AP-1B during cell migration. *Mol Biol Cell.* 2020 Oct 15;31(22):2475-2493. doi: 10.1091/mbc.E20-04-0256. Epub 2020 Aug 20. PMID: 32816642; PMCID: PMC7851849.

Pavel AB, Renert-Yuval Y, Wu J, Del Duca E, Diaz A, Lefferdink R, Fang MM, Canter T, Rangel SM, Zhang N, Krueger JG, Paller AS, Guttman-Yassky E. Tape strips from early-onset pediatric atopic dermatitis highlight disease abnormalities in nonlesional skin. *Allergy.* 2021 Jan;76(1):314-325. doi: 10.1111/all.14490. Epub 2020 Aug 20. PMID: 32639640.

Malki, L., Sarig, O., Cesarato, N., Mohamad, J., Canter, T., Assaf, S., Pavlovsky, M., Vodo, D., Anis, Y., Bihari, O., Malovitski, K., Gat, A., Thiele, H., White, B.E.P., Samuelov, L., Nanda, A., Paller, A.S., Betz, R.C., Sprecher, E. Loss-of-function variants in C3ORF52 result in localized autosomal recessive hypotrichosis. *Genet Med.* 2020 Jul;22(7):1227-1234. PMID: 32336749; PMCID: PMC7405639

Wang J, Kaplan N, Wang S, Yang W, Wang L, He C, Peng H. Autophagy plays a positive role in induction of epidermal proliferation. *FASEB J.* 2020 Aug;34(8):10657-10667. doi: 10.1096/fj.202000770RR. Epub 2020 Jun 29. PMID: 32598088; PMCID: PMC7688513.

Han F, Dellacecca ER, Barse LW, Cosgrove C, Henning SW, Ankney CM, Jaishankar D, Yemelyanov A, Krymskaya VP, Dilling DF, Le Poole IC. Adoptive T-Cell Transfer to Treat Lymphangioliomyomatosis. *Am J Respir Cell Mol Biol.* 2020 Jun;62(6):793-804. PMID: 32078336; PMCID: PMC7710336.

Casalino-Matsuda SM, Chen F, Gonzalez-Gonzalez FJ, Nair A, Dib S, Yemelyanov A, Gates KL, Budinger GRS, Beitel GJ, Sporn PHS. Hypercapnia Suppresses Macrophage Antiviral Activity and Increases Mortality of Influenza A Infection via Akt1. *J Immunol.* 2020 Jul 15;205(2):489-501. Epub 2020 Jun 15. PMID: 32540997; PMCID: PMC7343622.

Wang J, Kaplan N, Wysocki J, Yang W, Lu K, Peng H, Battle D, Lavker RM. The ACE2-deficient mouse: A model for a cytokine storm-driven inflammation. *FASEB J.* 2020 Aug;34(8):10505-10515. doi: 10.1096/fj.202001020R. Epub 2020 Jun 17. PMID: 32725927; PMCID: PMC7323146.

Jaishankar D, Cosgrove C, Deaton RJ, Le Poole IC. A Rapid Method for Multispectral Fluorescence Imaging of Frozen Tissue Sections. *J Vis Exp.* 2020 Mar 30;(157). PMID: 32281983.

Arnette CR, Roth-Carter QR, Koetsier JL, Broussard JA, Burks HE, Cheng K, Amadi C, Gerami P, Johnson JL, Green KJ. Keratinocyte cadherin desmoglein 1 controls melanocyte behavior through paracrine signaling. *Pigment Cell Melanoma Res.* 2020 Mar;33(2):305-317. PMID: 31563153; PMCID: PMC7028503.

Save The Date

April 21 @ 8am

2021 June K. Robinson, MD Lectureship:
Robert D. Galiano, MD, FACS
Jared Jagdeo, MD

The 2021 June K. Robinson, MD Lectureship presents Robert D. Galiano, MD, FACS at 8am. At 10:45am, Dr. Jared Jagdeo, MD will present "Light Emitting Diode Visible Light Phototherapy"

April 27 @ 4-5pm

NU SBDRC Short Research Presentations

Join the Northwestern SBDRC for a series of research presentations taking place over the next few months. Each one hour session consists of three brief presentations of exciting abstracts that describe research utilizing the SBDRC.

May 13 @ 4-5pm

NU SBDRC Seminar Series:
Ralf Paus, MD, FRSB

The Northwestern SBDRC has a monthly seminar series targeted toward researchers. The seminar series will highlight exciting research from world-renowned physician scientists. The next seminar of this virtual series features Professor Ralf Paus, MD, FRSB. His seminar is entitled "Chemosensation biology of the human hair follicle: Why can it "smell" and "taste"?"

July 12 @ 9am

NU SBDRC Research Retreat

The Northwestern SBDRC retreat provides a forum to enhance interactions among center investigators. In the spirit of outreach and providing visibility for research activities related to skin biology at Northwestern, we open the retreat to the entire Feinberg School of Medicine scientific community and dermatology programs at other Chicago institutions. This is an opportunity to highlight achievements in skin research, find potential new collaborators and learn about new capabilities offered by the Cores with examples of their value.

IAC & TEST IT Core Monthly Seminar
Series

The IAC and TEST IT Core facilities host a monthly seminar series to highlight technologies available in the core. They also present data generated in the core facility.

Email skin-center@northwestern.edu for details

Congratulations



AMY PALLER, MD

Department of Dermatology Chair and NU SBDRC Director, Dr. Amy Paller was awarded the prestigious 2021 American Skin Association's David Martin Carter Mentor Award.

Dr. Paller was also awarded the Tanioku Kihei Memorial Award from the Japanese Society for Investigative Dermatology

CAROLINE LE POOLE, PHD

NU SBDRC TEST IT Core Director, Dr. Caroline Le Poole was awarded the American Skin Association's 2021 Research Achievement Award in Vitiligo and Pigment Cell Disorders



JAEHYUK CHOI, MD, PHD



The SBDRC congratulates Dr. Jaehyuk Choi for his induction into the prestigious American Society of Clinical Investigation