ISBS
Symposium
Tampa, FL

PROGRAM

U.S. Technical Symposium of
The International Society for Biophysics and Imaging of the Skin

"Biophysics By The Bay"

Grand Hyatt Tampa Bay, **Tampa, FL**
April 6-9, 2011

Scientific Program Committee

- Randy Wickett, PhD (Planning Chair)
- Ernie Braue, PhD (Scientific Program Chair)
- Neelam Muizzuddin, PhD (Workshop Chair)
- Joachim Fluhr, MD
- Stacy Hawkins, PhD
- Martha Tate, PhD
- Gary Grove, PhD

Conference Organizer

- Tami Luckey, Professional Planning Concepts, Inc.

Local Host

- Jeffrey Berg

Welcome to the USA 2011 Symposium of the International Society for Biophysics and Imaging of the Skin.

Welcome to Tampa and the USA 2011 Symposium. We look forward to a productive week with a schedule filled with insightful keynote speakers and presentations including a ½ day workshop on "*To design a perfect research study*". Be sure not to miss the Tribute to Al Kligman at the Welcome Reception. We left the final night open for you to enjoy a bit of Tampa Bay. As local residents, we have several suggestions of restaurants and attractions to enjoy during your free time or if you plan to extend your stay. Please come by and see us at the Registration Desk for details.

Thank you and we look forward to meeting you.

Jeffrey Berg and Tami Luckey

Jeffrey Berg

Things to do in the Tampa Bay area:

SHOP: International Mall, Hyde Park Shopping and WestShore Plaza

BEACHES: Clearwater Beach and Caladisi Island

LOCAL ATTRACTIONS: Florida Aquarium, Historic Ybor City, Dali Museum, Lowry Park Zoo, Morean Arts Center and the Tampa Museum of Art

THEME PARKS: Busch Gardens

Tami Luckey

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SYMPOSIUM SCHEDULE AT A GLANCE

	Wednesday April 6th	**Thursday April 7th**	**Friday April 8th**	**Saturday April 9th**
Morning		½ Day Workshop "***To Design a Perfect Research Study***"	AM Keynote & Presentations	AM Keynote & Presentations
Afternoon	Symposium Registration open from 5:00-7:00pm	Opening Session Keynote & Presentations	PM Keynote & Presentations	Conference Close by 1:00 PM
Evening	Welcome Reception & Mixer – "***A Tribute to Al Kligman***" 7:00-9:00pm	**Gala Event** entertainment by ***Liz Pennock & Dr. Blues***	Free Time	

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SCHEDULE OF EVENTS

Wednesday, April 6, 2011

All Day	Symposium attendee arrival in Tampa
5:00-7:00	**Registration** in Audubon Foyer
7:00-9:00	**Welcome Reception & Mixer** – "***A Tribute to Al Kligman***" in Audubon Ballroom A

Thursday, April 7, 2011

7:00-5:00	**Registration** in Audubon Foyer
7:15-8:15	**Breakfast** in Audubon B and **Poster Setup** in Audubon B or Audubon Foyer. Posters to be displayed until 12:00PM, April 9th; must be down by 1:00PM
8:00-5:00	**Technical Showcase** in Audubon A
8:15-8:30	**Opening Remarks** and housekeeping: **Klaus-Peter Wilhelm**, MD and **Ernie Braue**, PhD
8:30-12:30	**½ Day Workshop "Innovative Study Designs"**
	Session A: Moderator Ernie Braue, PhD
8:30-9:00	**Keynote** address by **Neelam Muizzuddin**, PhD (**O-01**) Historic perspective of Clinical Research
9:00-9:30	(**O-02**) Techniques for evaluating instrumental performance, **Gary Grove**, PhD
9:30-10:00	(**O-03**) Research studies in the real world, **Randy Wickett**, PhD
10:00-10:30	Morning Break and Exhibition in Audubon B
	Session B: Moderator **Neelam Muizzuddin**, PhD
10:30-11:00	(**O-04**) From bench to skin-side: The "soft" requirements to turn a concept into a successful clinical study, **Joachim Fluhr**, MD
11:00-11:30	(**O-05**) Skin Statistics Basic and Applied, **Jim Bowman**, MS
11:30-12:00	(**O-06**) Elements of a Perfect Clinical Claims Support Study Design, **Judy Woodford**, PhD
12:00-12:30	Round table Question and Answer
12:30-1:30	Lunch in Audubon B
1:30-2:30	**Poster Session A** in Audubon B or Audubon Foyer – **ODD** numbered posters manned

Thursday, April 7, 2011 (continued)

2:30- 4:50	**Podium 1: Photo Biology and Population Variation** Moderator: **Howard Maibach**, MD and **Barbara Gilchrest**, MD
2:30-3:15	**Keynote** address by **Barbara Gilchrest, MD** (**O-07**) Photoaging: New Concepts for Old Skin
3:15-3:45	Afternoon Break and Exhibition in Audubon B
3:45-4:05	(**O-08**) In vivo method development for detecting micronized sunscreen particles on adult and infant skin, **Georgios Stamatas**, PhD
4:05-4:50	**Keynote** address by **Howard Maibach**, MD (**O-09**) Regional Variation in Skin Function: Man and Animal
4:50-7:00	Free Time
7:00-8:00	**Gala Event Dinner** in Audubon A
8:00-Close	**Gala Event** – entertainment by Liz Pennock and Dr. Blues

Friday, April 8, 2011

7:00-5:00	**Registration** in Audubon Foyer
7:15-8:15	**Breakfast** in Audubon B
8:00-5:00	**Technical Showcase** in Audubon A
9:00-11:50	**Podium 2: Imaging** Moderator: **Joachim Fluhr**, MD and **Nik Kollias**, PhD
9:00-9:45	**Keynote** address by **Nik Kollias**, PhD (**O-10**) Measuring the skin with light
9:45-10:05	(**O-11**) Influence of skin pigmentation in polarization spectroscopy imaging for assessment of erythema and blanching, **Gert Nilsson**
10:05-10:25	(**O-12**) Ageing signs evaluation in 3D on the face, **Jean-Jacques Servant**
10:25-10:55	**Morning Break** and **Exhibition** in Audubon B
10:55-11:15	(**O-13**) The examination of nitric oxide-accelerated wound healing by laser Doppler perfusion imaging of percutaneous sulfur mustard lesions, **Joseph Boecker** (***Albert Kligman Young Investigator Scholarship winner***)
11:15-11:35	(**O-14**) Modern Wrinkle Analysis: Shadow Analysis with the CK Visioline, **Tim Houser** (***Albert Kligman Young Investigator Scholarship winner***)
11:35-11:55	(**O-15**) A Framework for Learning Common Skin Imaging Analysis Tasks, **Paul Wighton** (***Albert Kligman Young Investigator Scholarship winner***)
12:00-1:00	**Lunch** in Audubon B
1:00-2:00	**Poster Session B** in Audubon B or Audubon Foyer – **EVEN** numbered posters manned
2:00-5:15	**Podium 3: Epidermal Function and Claim Support** Moderator: **Martha Tate**, PhD and **Stacy Hawkins**, PhD
2:00-2:45	**Keynote** address by **Joachim Fluhr**, MD (**O-16**) Epidermal barrier and its modulation: The skin as defender and sensor of the human body

2:45-3:05	(**O-17**) Clinical scoring and instrumental analysis to evaluate the skin types and efficacy of dermocosmetics, **Daiane Mercurio**
3:05-3:25	(**O-18**) Stratum corneum changes after damage with sodium lauryl sulfate, **Lisa Kroll**
3:25-3:55	**Afternoon Break** and **Exhibition** in Audubon B
3:55-4:15	(**O-19**) Multivariate validation of injury consistency in an established swine model for cutaneous sulfur mustard exposures, **John Azeke** (***Albert Kligman Young Investigator Scholarship winner***)
4:15-4:35	(**O-20**) Effect of an anti-inflammatory blend on reducing skin irritation caused by UVB or a chemical irritant, **Neelam Muizzuddin**, PhD
4:35-4:55	(**O-21**) Quantitative measurement of dark circles around eyes by image analysis of VISIA-CR photographs, **Di Qu**
4:55-5:15	(**O-22**) An Evaluation of Exaggerated Use Methods for Testing Mechanical Irritation Potential on Skin, **Lisa Stabe**
5:15-Close	**Free time** – client/customer entertainment and dinner on your own schedule. For recommendations, please stop by the Registration Desk.

Saturday, April 9, 2011

7:00-9:30	**Registration** in Audubon Foyer
7:15-8:15	**Breakfast** in Audubon B
8:00-12:00	**Technical Showcase** in Audubon A
8:30-11:45	**Podium 4: Emerging Technologies** Moderator: **Randy Wickett**, PhD and **Robert Lavker**, PhD
8:30-9:15	**Keynote** address by **Robert Lavker, PhD** (**O-23)** Epithelial Stem Cells and Regenerative Medicine
9:15-9:35	(**O-24**) Advances in Measuring the Water Content of Dry Skin by In-Vivo Confocal Raman Spectroscopy, **Arne Böhling**
9:35-9:55	(**O-25**) Assessment of ageing effects using non contact device: the Tonoderm®, **G. Boyer**
9:55-10:15	(**O-26**) Infrared Thermography to Measure Heat Transfer to Skin from a Heated Device, **James Mayne**
10:15-10:45	Morning Break and Exhibition in Audubon B
10:45-11:05	(**O-27**) A clinical comparative evaluation of two techniques to measure facial lines/wrinkles, **R. Frumento**
11:05-11:25	(**O-28**) Appearance of the cheeks with age and relationship to physical properties of the skin, **Akihiro Tada**
11:25-11:45	(**O-29**) The Critical Role of Instrumentation in Intellectual Property, **Jeffrey Mills**, PhD, Esq.
11:45-12:00	Update on next ISBS Conference
12:00-12:15	The **Albert Kligman Young Investigator Scholarship** Winners: **Joseph Boecker, Tim Houser, Paul Wighton** and **John Azeke**
12:15-12:30	**Best Poster Award** (Sponsored by **Acaderm, Inc.**)
12:30	**Closing Remarks**

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We give special thanks to cyberDERM, inc. for generously donating the

'Albert M. Kligman, MD Young Investigator Scholarship'

The 2011 ISBS U.S. Technical Symposium Organizing Committee is pleased to announce the 'Albert M. Kligman, MD Young Investigator Scholarship' which is being awarded at the 2011 symposium in Tampa, FL. This scholarship has been generously donated by cyberDERM, inc. to encourage young Investigators / individuals new to clinical research to become active participants in both ISBS and the scientific community at large by presenting at the U.S. Technical Symposium. The **young investigator forum** is intended to foster young researchers (persons, independent of their biological age, that are less than 5 years active in the field of non-invasive assessment of the skin) in their career development. This forum offers the opportunity to enter the international arena in a guided way discussing among other young investigators with one or two senior researchers from the field.

The Scholarship award included:

- Full 2011 ISBS U.S. Technical Symposium Registration
- 3 nights hotel accommodations at the Grand Hyatt Tampa Bay during the 2011 ISBS U.S. Technical Symposium in Tampa, FL
- 1 year of complimentary full membership into the International Society for Biophysics and Imaging of the Skin, which includes a 1-year subscription to the official journal of ISBS - "Skin Research and Technology"
- Up to $800 to cover coach airfare / driving expenses in order to attend the 2011 ISBS U.S. Technical Symposium in Tampa, FL

In order to be eligible for the scholarship, candidates had to:

- Be a 'Young Investigator' which was defined as being in the professional scientific field for less than 5 years
- Submit an abstract for the 2011 ISBS U.S. Technical Symposium and be willing to give an oral presentation

All submitted abstracts for the scholarship award were reviewed by the 2011 U.S. Technical Symposium Scientific Committee. Upon being awarded the scholarship, additional assistance and mentoring was provided by Joachim Fluhr, MD for preparing the winners' oral presentations for the 2011 U.S. Technical Symposium.

And the winners of the 2011 *Albert M. Kligman, MD Young Investigator Scholarship* are…

- **Joseph Boecker** who will be presenting on '*The examination of nitric oxide-accelerated wound healing by laser Doppler perfusion imaging of percutaneous sulfur mustard lesions*'
- **Tim Houser** who will be presenting on '*Wrinkle Analysis: Shadow Analysis with the CK Visioline*'
- **Paul Wighton** who will be presenting on '*A Framework for Learning Common Skin Imaging Analysis Tasks*'
- **John Azeke** who will be presenting on '*Multivariate validation of injury consistency in an established swine model for cutaneous sulfur mustard exposures'*

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We give a special thanks to the following major Symposium Sponsor:

Unilever, one of the world's largest consumer products companies, aims to add vitality to life by meeting everyday needs for nutrition, hygiene and personal care. Each day, around the world, consumers make 150 million decisions to purchase Unilever products. The company has a portfolio of brands that make people feel good, look good and get more out of life. Globally, Unilever has 230,000 employees in almost 100 countries. Unilever R&D areas of expertise include product, package, process development, as well as consumer-technical insights (CTI), consumer psychology, clinical and claims substantiation, analytical and microbiology. For more information visit www.unilever.com or www.unileverusa.com

We are pleased to acknowledge the following Sponsors:

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Grand Hyatt Tampa Bay, Tampa, Florida April 6-9, 2011

½ Day Workshop – "To Design a Perfect Research Study"

The 2011 ISBS U.S. Technical Symposium Organizing Committee is pleased to announce the ½ Day Workshop scheduled for the morning sessions on Thursday, April 7th, 2011. There are no additional costs associated with attending the ½ Day Workshop as it has been included in the full symposium registration fees.

Our workshop theme this year is "***To Design a Perfect Research Study***" and will provide you with additional tools and ideas for consideration when you are designing your next research study, whether you are a Sponsor, Testing Facility or Instrument Manufacturer. There's guaranteed to be something for everyone in this workshop. We've assembled a team of experts to present their thoughts on their specific areas of interest/expertise and it is sure to be a lively conversation. Following the presentation, the panel of experts will be available for a round table discussion and Q&A with the audience.

½ Day Workshop Schedule – Thursday, April 7th, 2011

Session A: Moderator Ernie Braue, PhD

8:30-9:00 am	Keynote: Historic Perspective of Clinical Research - Neelam Muizzuddin, PhD
9:00-9:30 am	Techniques for evaluating instrumental performance- Gary Grove, PhD
9:30-10:00 am	Research Studies in the "Real World" - Randy Wickett, PhD

10.00-10:30 am morning break

Session B: Moderator: Neelam Muizzuddin, PhD

10:30-11.00 am	From Bench to Skin-Side: The "Soft" Requirements to Turn a Concept Into a Successful Clinical Study - Joachim Fluhr, MD
11:00-11:30 am	Statistical Design of Clinical Studies - Jim Bowman, MS
11:30-Noon	Elements of a Perfect* Clinical Claims Support Study Design - Judy Woodford, PhD
Noon-12:30pm	Round Table Q&A with Presenters

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½ Day Workshop – "To Design a Perfect Research Study"

Neelam Muizzuddin, PhD – Workshop Chair & Moderator
Director of Clinical Research, Estee Lauder – neelam_muizz@yahoo.com

Neelam Muizzuddin obtained a Masters in Microbiology before immigrating to the United States, in 1986, where she started working for Estee Lauder Companies, as a Research Scientist. Always of a very active and energetic temperament, Neelam obtained her doctorate in Cell Biology while working full time. During her twenty plus years at Estee Lauder as a clinical researcher she has developed and worked on a myriad of skin testing projects including skin sensitivity, percutaneous absorption, skin whitening, acne, glycation, actinic effects, geographical and climatic effects, effects of hormones and psychological stress etc. She has extensive experience in skin bioengineering and has several publications as book chapters, patents and peer reviewed journals in these topics. At present she is Director of Clinical Research at Estee Lauder and Adjunct Professor at SUNY Stony Brook.

She is a Member of: American Contact Dermatitis Society, Society of Investigative Dermatology, Society of Cosmetic Chemists and Dermal Clinical Evaluation Society. She is a member of scientific committee for Society of Bioengineering and Skin. For Long Island Chapter of Society of Cosmetic Chemists she served as secretary in 1997, Chair of Educational Seminar committee 1998 & 1999, Chair of Program committee 1999; at present she is an active member of the educational seminar committee. She is also an instrument rated pilot and an artist.

Gary Grove, PhD
Vice President, cyberDERM, inc. – GGrove@cyberderm-inc.com

Dr. Gary Grove is a skin physiologist whose major research endeavors have focused upon objectively evaluating changes in human skin condition using non-intrusive testing procedures. Over the years, his group has earned an international reputation for introducing innovative methods and relevant models for studying the response of the skin to various environmental insults such as photo-aging, detergent damage, mechanical trauma, etc. Indeed, many of the instrumental testing procedures that are currently being employed to evaluate the safety and efficacy of cosmetics and topically applied drugs were first developed while Dr. Grove was with Dr. Albert Kligman at Duhring Labs and Ivy Laboratories from the mid 1970's to the mid 1980's. Dr. Grove was a co-founder of L.G.L's Skin Study Center and was their Vice President of R&D for 20 years. Currently, Dr. Grove is the Vice president of cyberDERM, inc. which is an independent testing lab located in Media, PA. Dr. Grove has published many articles including coauthoring with Dr. Albert Kligman in 1985, the groundbreaking paper on Retin-A's antiaging effects.

½ Day Workshop – "To Design a Perfect Research Study"

Randy Wickett, PhD
Professor of Pharmaceutics & Cosmetic Science, University of Cincinnati – wicketrr@ucmail.uc.edu

Dr. Wickett obtained his Ph.D. in Biophysics from Oregon State University in 1972 and was a Post-Doctoral Fellow at the University of Minnesota from 1972 to 1974. He worked at Procter and Gamble's Miami Valley Laboratories in Cincinnati Ohio from 1974 to 1985, performing research on skin and hair. In 1985 he moved to the SC Johnson Company where he was in charge of clinical and biophysical research for skin and hair care products. In 1991 he joined the University of Cincinnati and is Professor of Pharmaceutics and Cosmetic Science in the College of Pharmacy, in charge of the graduate program in Cosmetic Science. Dr. Wickett has authored more than 90 scientific publications and several patents and given more than 100 invited presentations. He is a Fellow of the Society of Cosmetic Chemists (SCC) and has received numerous technical awards from the SCC including the Maison G. de Navarre Medal Award, the SCC's highest honor for technical achievement. He was editor of the Journal of the Society of Cosmetic Chemists from 1991 to 1997, chairman of the International Society for Bioengineering and the Skin from.2000-2005 and is currently President of the SCC.

Joachim Fluhr, MD
Dept. of Dermatology, Charité University Clinic, Berlin, Germany – Joachim.Fluhr@charite.de

Joachim W. Fluhr, M.D. is a board certified dermatologist and an active researcher in the field of skin physiology and epidermal barrier function. He received his medical training in Mainz (Germany) and Strasbourg (France) and completed his dermatology residency in Karlsruhe (Germany). He served as a an attendant in the department of dermatology at the University of Jena for more than 4 years before working during 3 years in industry as medical director of a dermatology CRO overseeing clinical phase I-III studies. Since 2011 he works as an attendant at the department of dermatology at Charité University Clinic in Berlin.

His research interest is focused on mechanisms related to epidermal barrier function, non invasive assessment of skin physiology parameters, in vivo Raman spectroscopy and the anti-oxidant network of the epidermis. In this context he worked in the laboratories of Enzo Berardesca (Italy), Peter Elias & Ken Feingold (San Francisco) and Juergen Lademann (Berlin). From 2002-2007 he was the head of the skin physiology laboratory University of Jena.

Dr Fluhr published more than 120 original papers in peer reviewed journals, more than 25 book chapters and edited 4 books. Currently he serves as associated editor of two Medline-listed journals and as editorial board member in two journals in the field of dermatology and cosmetology.

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½ Day Workshop – "To Design a Perfect Research Study"

James P. Bowman, MS
Senior Technical Director / Biostatistician, Hill Top Research – jbowman@hill-top.com

For over 30 years, Jim Bowman has been involved in the statistical and technical aspects of clinical testing at Hill Top Research. Currently, as Senior Technical Director/Biostatistician, he coordinates all of Hill Top's statistical services, serving as a consultant to clients on the design and analysis of their research projects. His experience includes all areas of personal care clinical research. He has contributed to publications on antiperspirancy, deodorancy, comedogenicity and cumulative irritation testing as well as oral care and microbiology testing. For five years he was Assistant Operations Manager of Hill Top's New Jersey lab and for three years he was Director of Operations for Hill Top's Ohio branch. This operations experience is an invaluable resource when consulting with clients. He is a member of the American Statistical Association, Society of Cosmetic Chemists (SCC), International Association of Dental Research (IADR) and the American Society for Testing Materials (ASTM). Mr. Bowman holds a B.S. in Mathematics and Statistics from Miami University and his M.S. in Biostatistics from the University of Cincinnati.

Judy Woodford, PhD
Group Leader, Kao Brands Company – judy.woodford@kaobrands.com

Dr. Judy Woodford has led the Product Development Global Claims Group at Kao Brands Company since its establishment in 2008. This team is responsible for the support of product performance claims including generation of clinical and technical data; guidance to the creative teams during copy development and provision of substantiation to external agencies. The team supports 14 body, face and hair personal care product brands in markets across the globe. Prior to 2008 she led the skin care clinical testing group and was involved in product claims testing, formulation guidance testing and product safety, in addition to claims development and approval activities.

Dr. Woodford graduated with a B.S. degree in Chemistry from the University of South Florida in 1986 and a Ph.D. in Chemistry from the Ohio State University in 1991. Prior to joining Kao Brands in 1994 she completed Post-Doctoral Fellowship position at the University of Cincinnati. Dr. Woodford is currently serving as a member of CTPA Claims Advertising Group, CCTFA Advertising Committee and ISBS Executive Committee.

KEYNOTE SPEAKERS

Barbara Gilchrest, MD

Barbara A. Gilchrest, M.D., received her bachelor's degree in Mathematics from the Massachusetts Institute of Technology (MIT) in 1967 and graduated cum laude from the Harvard Medical School in 1971. She completed two years of clinical training in internal medicine and three years of dermatology residency, including a one year photobiology fellowship, in the Harvard-affiliated hospitals. She concluded her training with a research fellowship at MIT.

In 1977 Dr. Gilchrest joined the Department of Dermatology and Division on Aging at the Harvard Medical School, where she established a tissue culture laboratory to study the aging process in human skin, with support from the National Institute on Aging (NIA). In 1983 Dr. Gilchrest joined the USDA Human Nutrition Research Center on Aging at Tufts University, as Chief of the Cutaneous Gerontology Laboratory to continue and expand her work on skin aging.

From 1985 until 2008, Dr. Gilchrest served as Professor and Chairman of Dermatology at the Boston University School of Medicine and Dermatologist-in-Chief at the Boston Medical Center, where for many years she directed a large laboratory, the joint BU/Tufts dermatology residency program and an NIH-sponsored post-doctoral research training program. She remains as Professor on a part-time basis while devoting herself primarily to development of treatment concepts arising from her laboratory-based research effort at BU that involved cellular responses to ultraviolet irradiation, the molecular basis of aging, melanogenesis (pigmentation), and other DNA damage responses.

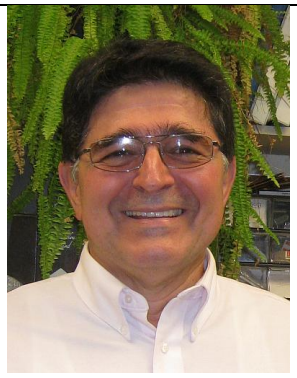
Dr. Gilchrest is the author of over 400 scholarly articles, reviews, abstracts, and textbook chapters; and author or editor of eight books. She is a past President of the Society for Investigative Dermatology (SID, 1999-2000), the Women's Dermatologic Society (1987-88) and the Association of Professors of Dermatology (2002-04). Dr. Gilchrest has also served as a Director of the American Board of Dermatology (1986-96); as a member of several NIH study sections, the National Advisory Council on Aging (NIA, 1988-93) and the Board of Scientific Counselors of the National Cancer Institute (2004-09); on the Board of Directors of the SID (1987-92) and the American Academy of Dermatology (1995-99); as associate editor or editorial board member of several major clinical and research journals; as a consultant or scientific advisory board member for large pharmaceutical companies and biotechnology start-up companies; and as a member of the MIT Corporation (1995-2005). She is a member of the Institute of Medicine of the National Academies of Science.

KEYNOTE SPEAKERS – Cont'd

Robert Lavker, PhD

Dr. Lavker has spent the last 43 years studying various aspects of cutaneous biology. His major research endeavors cover 2 broad areas: the biology of epithelial stem cells and the roles of microRNAs in epithelial homeostasis. He has published over 140 original scientific papers and has considerable administrative abilities. Prior to joining Northwestern University, Dr. Lavker was a member of the faculty of the University of Pennsylvania for 26 years. He has had continuous NIH funding since 1982 and is currently the Principal Investigator on 2 NIH grants. Dr. Lavker is also co-P.I. of the NU-SDRC and co-Director of the NU-SDRC Pathology Core. As Director of Research, Dr. Lavker has played an important role in the research training of individuals within the departments of dermatology at the University of Pennsylvania and Northwestern University.

In addition to Dr. Lavker's scientific and teaching responsibilities, he holds and has held numerous leadership positions. Dr. Lavker served as Associate Chairman of the Department of Dermatology at the University of Pennsylvania and administered all aspects of research from 1993-1994. Dr. Lavker served on the Northwestern University Medical School's Committee on Appointments and Promotions from 2005-2009 and was the was Chair of this committee from 2007-2009. Dr. Lavker also served as the Medical School representative on the University of Pennsylvania Provost's Committee on Academic Budget and Planning. At The Feinberg School of Medicine, Dr. Lavker is a member of the Research Council, which has auspices over all research-related activities on campus. Dr. Lavker served on the Board of Directors of the Society for Investigative Dermatology from 1997-2000, and currently is an Associate Editor of the *Journal of Investigative Dermatology*.



Nik Kollias, PhD

Dr. Nikiforos Kollias is a Distinguished Research Fellow for Johnson & Johnson Consumer Products World Wide Company. He heads the Measurement Sciences group, formerly known as the Models and Methods group, in developing optical techniques to assess skin structure and function as well as light based therapies.

Dr. Kollias received his BA in physics from UCLA and Ph.D. in solid state physics from the University of Wyoming. He spent five years teaching at the University of Wyoming and did research in low temperature physics and Raman scattering before joining the teaching staff at the University of Kuwait. In Kuwait, Dr. Kollias developed treatment phototherapy protocols for psoriasis and vitiligo and developed methods to study constitutive and facultative human pigmentation. He then joined the staff at the department of dermatology at Massachusetts General Hospital/Harvard Medical School where he did research on human photobiology, UV phototherapy, photodynamic therapy and on skin spectroscopy in the UV, visible and IR.

Dr. Kollias has published some 130 scientific papers and holds approximately 15 US patents on methods of treating and/or assessing the skin. He has twice been awarded the Johnson & Johnson Excellence in Science Award.

KEYNOTE SPEAKERS – Cont'd

Joachim Fluhr, MD

Joachim W. Fluhr, M.D. is a board certified dermatologist and an active researcher in the field of skin physiology and epidermal barrier function. He received his medical training in Mainz (Germany) and Strasbourg (France) and completed his dermatology residency in Karlsruhe (Germany). He served as a an attendant in the department of dermatology at the University of Jena for more than 4 years before working during 3 years in industry as medical director of a dermatology CRO overseeing clinical phase I-III studies. Since 2011 he works as an attendant at the department of dermatology at Charité University Clinic in Berlin.

His research interest is focused on mechanisms related to epidermal barrier function, non invasive assessment of skin physiology parameters, in vivo Raman spectroscopy and the anti-oxidant network of the epidermis. In this context he worked in the laboratories of Enzo Berardesca (Italy), Peter Elias & Ken Feingold (San Francisco) and Juergen Lademann (Berlin). From 2002-2007 he was the head of the skin physiology laboratory University of Jena.

Dr Fluhr published more than 120 original papers in peer reviewed journals, more than 25 book chapters and edited 4 books. Currently he serves as associated editor of two Medline-listed journals and as editorial board member in two journals in the field of dermatology and cosmetology.

Howard I. Maibach, MD

Howard Maibach, MD is a Professor of Dermatology at the University of California, San Francisco (UCSF). He has written and lectured extensively on dermatotoxicology, dermatopharmacology and dermatotoxicology. His current research programs include defining the chemical-biologic faces of irritant dermatitis and the study of percutaneous penetration. When he is not in the lab conducting research, in the classroom teaching, or giving lectures worldwide, he is seeing patients at the Environmental Dermatosis Clinic (of the Dermatology Clinic), mostly providing second opinions on allergic contact dermatitis. He has been on the editorial boards of 30 scientific journals and is a member of 19 professional societies including the American Academy of Dermatology, San Francisco Dermatological Society, North American Contact Dermatitis Group, and the International Commission on Occupational Health. Dr. Maibach has over 100 books and 2,400 manuscripts in his bibliography.

Grand Hyatt Tampa Bay, Tampa, Florida April 6-9, 2011

TECHNICAL SHOWCASE

We are pleased that the leading manufacturers will be showcasing their latest innovations in non-invasive instruments and imaging systems in concert with our meeting. This will be an unmatched opportunity to see the state of the art for the entire industry, all in one location.

LISTING OF EXHIBITORS

ACADERM, Inc.
Accurex Measurement, Inc.
AMA Laboratories Inc.
BrighTex Bio-Photonics
Canfield Imaging Systems
Clinical Research Laboratories, Inc.
Cortex Technology
Courage+Khazaka electronics GmbH
CuDerm Corporation
cyberDERM inc.
Delfin Technologies, Inc.
Hill Top Research
Lucid, Inc.
Michelson Diagnostics Ltd
Perimed Inc.
STE Inc.

Detailed contact information may be found on the pages to follow:

ACADERM, Inc.

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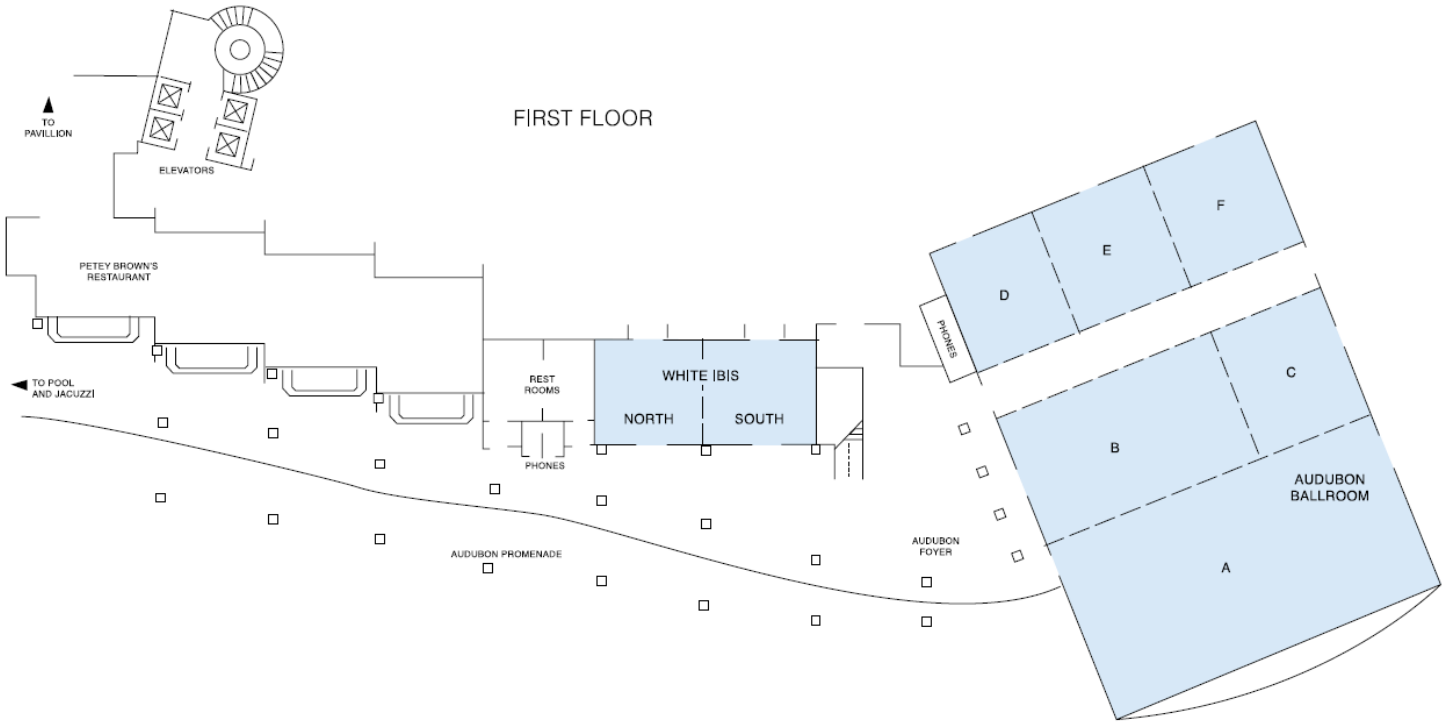

ABSTRACTS

(**O-01)**
Historic perspective of Clinical Research

Neelam Muizzuddin, PhD

Three major events had the biggest impact on shaping federal regulations that are in force today, namely the Doctors' Trial, The Nuremberg Code and regulations after it was established that Thalidomide caused birth deformities. The Declaration of Helsinki, was developed by the World Medical Association (WMA) as a set of ethical principles for the medical community regarding human experimentation. On April 18, 1979 The *Belmont Report* was created entitled "Ethical Principles and Guidelines for the Protection of Human Subjects of Research" and is an important historical document in the field of medical ethics which focuses on protecting the autonomy of all research subjects allowing for informed consent. In addition, the important factors in an informed consent will be discussed.

(**O-02**)
Techniques for evaluating instrumental performance

Gary Grove, PhD

It is generally appreciated that there are various instruments such colorimeters, evaporimeters, conductance meters, etc. that measure different aspects of skin structure and function noninvasively which are now readily available from several commercial sources. Indeed, many of these instruments have become so user friendly, that little or no training is required before the operator can begin to take measurements. Seldom is any concern given to whether or not the instrument was properly calibrated, the measurements correctly performed or even the instrument was suitable for the application for which it is being utilized. In this presentation, we will introduce some basic concepts from metrology, the science of measurement. Chief among these is the use of traceable physical standards to determine the accuracy, precision and reliability of the measurement. Methods for evaluating the performance of the measurement device and operator competence will be presented and illustrated with case studies of some of the more popular devices.

(**O-03**)
Research studies in the real world

Randy Wickett, PhD

Conducting skin research studies in the “real world”, i.e., settings such as factories, hospitals, clinics and intensive care units presents unique challenges but may be necessary to achieve study goals. In clinical research laboratories it is possible to control many variables that may affect biophysical measurements on skin. Environment can be controlled and subjects can be equilibrated to that environment. This may not be possible in a work place. However, real world studies may be more appropriate given that both the skin exposure and interventions designed to modify the results of exposure will occur in the workplace with its “uncontrolled” environment. We have been conducting skin research in hospital settings for several years on both patients and staff. This talk will focus on our studies on staff in the Neonatal Intensive Care Unit at Cincinnati Children’s Hospital Medical Center to illustrate the strategies, general requirements and issues that can occur. The first step is to ensure cooperation and “buy in” from both the staff and the supervisory personnel and to manage the perceptions of “time away from patient care”. Second, the study schedule must be adjusted to fit the work schedule of the subjects. This requires creativity in the research design to reflect realistic product usage and may require making measurements at either the beginning or end of shifts because the subjects may not be able to take time off to equilibrate during the work period. This will mean long hours for those making the measurements, e.g. 6 am and again at 6 pm for several hours. Equilibration times will have to be adjusted and environmental control will not be a good as in a testing lab. It is also necessary to find a space to safely do the measurements, securely store equipment and provide adequate control of aspects such

as “time from last product application” and to control the environment as much as possible. Some changes in measurement technology may be required providing a role for groups such as the ISBS. For example, we find that closed chamber TEWL measurements may be more reliable than open chamber due to inability to control air flow. Photography will require excellence in standardization for lighting and subject positioning to color correct the images and insure the ability to compare them over the treatment period. Electrical measurements (Corneometer® or NOVA DPM®) are more forgiving than TEWL even under less than ideal conditions since they rely on probe contact for moisture determination. Study personnel must also be sensitive to high level of stress that subjects may be under due to their work. Flexibility, persistence, patience and the ability to negotiate when subjects are unexpectedly called to duty are highly desirable traits in study personnel.

(**O-04**)
From bench to skin-side: The “soft” requirements to turn a concept into a successful clinical study

Joachim Fluhr, MD

New molecules both for topical drugs and cosmetics are developed by high-throughput screening assays and in in vitro methods. Subsequently these new products need clinical validation in healthy volunteers or defined patient populations. The controlled studies for efficacy testing both in topical drugs and cosmetic studies have to follow specific regulatory and ethical requirements. Furthermore published guidelines should be integrated in the protocol design in cosmetic testing especially for non-invasive biophysical instrumentation. Choosing meaningful endpoints in study design based on the original mechanisms discovered in the in vitro studies will be discussed in this presentation. Another important point, factors that influence the accuracy of in vivo measurements and the critical evaluation of the results on the background of these influencing factors is of great importance. Examples in developing meaningful test designs based on new concepts will be presented and discussed.

(**O-05**)
Skin Statistics Basic and Applied

James P. Bowman

This talk will provide an understanding to the team approach to designing studies, discuss ways to get involved with your data (i.e. don’t leave it all to the statistician), explain the meaning of a significance test and continue to re-iterate the message to “Involve your local statistician”.

The outline for the talk is as follows:

- Study Design
- Data Description
- The essential nature of a Significance Test
- Non-Significant p-values
- Statistical Tools available
- Types of statistics used in skin testing
- What can go wrong when you choose the wrong test? (and don’t use a statistician)
- Clinical vs Statistical Significance

(**O-06**)
Elements of a Perfect* Clinical Claims Support Study Design

Judy Woodford, PhD

At first glance, it seems easy to set the basic elements of a perfect* clinical claims study: subject qualification, panel size, product application, measurements, calculations. But how do you know what factors are impacting these elements? Why would this study which is just fine for formulation guidance, not work so well for claims support? Why might this study be sufficient in the US or Canada, but not in the UK? How do you choose the

proper subjects? How do you figure out the best measurement tool? How do you determine the best timing for applying the product and taking measures? What are suitable controls? This session will explore how your internal and external clients influence good claims study design.
*Study design accepted by the relevant external facility in support of Marketing's most highly desired claims wording.

(**O-07**)
Photoaging: New Concepts for Old Skin

Barbara A. Gilchrest, MD
Department of Dermatology, Boston University School of Medicine, Boston, MA

Photoaging is the superposition of chronic UV damage on the intrinsic aging process in skin. In addition to ultraviolet radiation, carcinogens present in cigarette smoke and air pollution may aggravate or accelerate these unwanted age-associated changes. Indeed, most changes in habitually exposed skin are due to environmental factors rather than to chronologic aging, but the underlying molecular mechanisms for both processes appear to overlap substantially. Both result from the interrelated phenomena of signaling imbalances that affect gene transcription, oxidative stress, cumulative DNA damage, and telomere shortening. In particular, recent insight into the role of telomeres in cellular senescence (aging) and DNA damage responses have suggested that telomere-based protective responses are centrally involved in both intrinsic aging and photoaging, acting to protect the genome while reducing the risk of UV-induced skin cancer.

Although photoaging has traditionally been viewed as a "cosmetic problem," in contrast to the premalignant and malignant lesions that constitute a major socioeconomic burden for society, it is now clear that there is a continuum between truly normal skin and skin cancer. At the molecular, histologic and clinical levels photoaged skin occupies much of the spectrum and, accordingly, treatments developed for eradication of cancers and precancers also ameliorate "cosmetic" photoaging changes. Like prophylactic use of high SPF sunscreens, intermittent field therapies, when clinically indicated, appear to not only reduce skin cancer risk but also improve skin appearance. This information should be used to motivate patient compliance with sometimes trying cancer-prevention regimens and to educate third parties regarding the medical benefit from treatment of photoaged skin.

(**O-08**)
***In vivo* method development for detecting micronized sunscreen particles on adult and infant skin**

Georgios N. Stamatas [a], M. Catherine Mack [b], Fanny Le Goff [a], Elise Boireau [a], Wei Song-Clauzier [a]
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Sunscreens containing light scattering filters, ZnO and TiO_2 particles, are used as alternatives to those containing light absorbing filters, particularly for use on baby and children skin. Although there is considerable evidence by *in vitro* or *ex vivo* experiments that ZnO and TiO_2 nanoparticles do not penetrate adult skin, there are no *in vivo* data and no data on infant skin. To this end we developed two methods based on reflectance confocal laser scanning microscopy (CLSM) and confocal Raman microspectroscopy (CRM). CLSM was modified to minimize the native reflectance signal of the skin in order to increase the contrast of the reflected signal due light scattering by the sunscreen filter particle. In CRM we followed the characteristic signals of TiO_2 and ZnO in the fingerprint region. Both methods were used to construct intensity profiles of the particle-related signal through the skin. The methods were first tested in adults and both demonstrated that the sunscreen particles were not detected at significant concentrations beyond 6-7 microns in the SC. The methods were then applied on infants and confirmed these observations. CLSM is not as specific as CRM, but it provides the structural information of where the particles end up: top of the SC and in the microrelief lines. The detection limit of each method was established by analysis of serial dilutions of the sunscreen product in an appropriate lipid-base solvent. Both methods have a detection limit of about 1 part per thousand. In

conclusion, these methods provide *in vivo* confirmation of previously published *ex vivo* experiments on adult skin and demonstrate for the first time on infant skin that there is no statistically significant penetration of micronized particles beyond the stratum corneum.

(O-09)
Regional Variation in Skin Function: Man and Animal

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Pharmacologists and toxicologists often model skin as a single function organ. This presentation capsules a half-century of observations, utilizing quantitative metrics (such as electrical properties, percutaneous penetration, molecular markers, etc.) suggesting the contrary: i.e., that in embryologic evolutionary development, we have evolved into a highly complex regional anatomy functional mosaic -- whose details are just now coming into focus.

(**O-10**)
Measuring the skin with light

Nik Kollias, PhD
Johnson and Johnson Consumer Products Co., Skillman, NJ

Electromagnetic radiation in the range 270-2,000 nm i.e. the ultraviolet through the near infrared has been used to study skin structure and function *in-vivo*. The ultraviolet part of the spectrum has proved particularly useful in information extracted from fluoresce measurements and the visible and near infrared parts of the spectrum in information extracted from reflectance measurements. Spectroscopic measurements in these spectral ranges allow the simultaneous assessment of multiple chromophores. In the visible these include the blood chromophores (oxy- , deoxy-, met-hemoglobin and bilirubin) and different forms of melanin pigmentation. In the ultraviolet the fluorophores include elements of the structural matrix as collagen (two types) and elastin cross links as well as epidermal markers such as keratin cross links and tryptophan (a marker for proliferation). In the near infrared water (edema) is the important chromophore along with the hemoglobin moieties and lipids with the additional property of sampling of the skin at greater depths than either the visible or the ultraviolet, because of deeper penetration. When taken together assessment of all these parameters allows determination of the health status of the skin and dynamic testing allows the evaluation of the responses of skin to insults; e.g. Ultraviolet radiation, irritants, allergens, gravity and others. By dynamic testing we mean the intensity of the skin's response together with it's return to the equilibrium state. The complicating factors include the diversity and redundancy of functions present in biological systems and individuals - these factors need to be addressed and incorporated in any generalization we make about skin. We are at a state where such a matrix of optically determined measurable parameters may provide a matrix of values that help define the structural and dynamic state of the skin. The variation of these parameters with position on the skin may be documented with specialized imaging techniques of both reflectance and fluorescence and in a range of scales from macro to micro in an attempt to correlate the skin's phenotypic expression with physiology and cellular responses. The advent of multiphoton excitation, and imaging based on optoacoustic detection and microscopy based on non-linear optical processes provide significant enhancement factors in the determination of molecular distribution and expression at the cellular level with sub-micron resolution. Thus "light" is a powerful tool for probing the skin's structure and function.

(**O-11**)

Influence of skin pigmentation in polarization spectroscopy imaging for assessment of erythema and blanching

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Background: The local concentration of red blood cells (RBCs) in the skin microcirculation can be mapped by analyzing the components of the red and green plane in a photo captured by a digital camera equipped with cross-polarizing filters to eliminate the adverse effects of direct surface reflections. Since RBCs mainly absorb light in the green wavelength region, areas in the green plane of the photo corresponding to a high RBC concentration display attenuated values, while corresponding areas in the red plane are virtually unaffected. By the use of an algorithm that calculates the relative difference between each element in the red and green plane, an RBC concentration map can be constructed in which the values of the individual elements scale linearly with the local RBC concentration in the skin.
Purpose: Since the light eventually reaching the photo-detector array passes through the epidermal layer twice, the spectral content and thereby the RBC map is, however, influenced by the amount of melanin in this layer. This presentation discusses the extent of this influence and suggests measures to compensate for the influence of epidermal layer pigmentation on the RBC concentration maps.
Methods: A two layer Kubelka-Munk mathematical model was used to assess the influence of melanin in the epidermal layer on the RBC concentration maps.
Results: The melanin content in the epidermal layer primarily adds an offset - the value of which relates to the amount of melanin in the epidermis - to the elements of the RBC concentration map, while the sensitivity to RBC concentration remains virtually unaffected. In short term studies of the vascular effect of topically applied vaso-active agents, the melanin content of the epidermal layer can generally be assumed to remain constant. By subtracting each element of the first RBC map in a sequence of maps from the corresponding elements of the remaining RBC maps, changes in local RBC concentration can therefore be quantified independently of the epidermal melanin content at least for low and moderately pigmented skin. The results from the theoretical considerations were verified by mapping the development of erythema following topical application of methyl nicotinate to skin sites including areas of both high and low pigmentation.
Conclusion: Changes in local RBC concentration can be quantified independently of the epidermal melanin content for low and moderately pigmented skin.
Key words: Erythema, polarization spectroscopy

(**O-12**)

Ageing signs evaluation in 3D on the face

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Purpose: Ageing characterization on the face has been widely developed using 2D imaging by means of visual score, and more over by the quantification of ageing signs density and severity (Atlas of facial aging signs among caucasian women by Roland Bazin and Eric Doublet). By experience we know the specific areas where skin aging shows the most visible signs. Specialized in 3D non contact measurement using fringe projection technique, we think there is a space for 3D characterization of those signs which would help visual score providing more sensitivity to evaluate them, to objectively quantify them and even more classify those signs.
Methods: 250 volunteers, Caucasian type, all skin photo type, from 25 to 70 years old has been measured and classified every 5 years. Having acquired in 3D the full face of all of them, we like to describe this method which uses automatic extraction of the zones of interest on the face, compensate local shape of individual morphology and provides the amplitude of the wrinkles or folds in these different regions. We also have developed some global approach to quantify globally the severity and density of those wrinkles and folds
Results: We will provide results, and correlation compared with the 2D reference method using visual score. We also will present the tendency versus the age of each region (zones) and globally

Conclusions: An finally we will conclude with the perspectives and potential of such a 3D analysis technique and method of ageing signs of the face which can widely being used to support claim
Keywords: Fringe projection technique, Imaging, Skin aging, wrinkles and folds, morphology,3D analysis

(**O-13**)
The examination of nitric oxide-accelerated wound healing by laser Doppler perfusion imaging of percutaneous sulfur mustard lesions

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Background: Exposure to liquid sulfur mustard (HD) produces skin lesions which can incite long-lasting physiologic complications and cosmetic disfigurements. Efforts are ongoing in the search for more comprehensive means to ameliorate the effects of exposure to HD.
Purpose: A variety of noninvasive biophysical measurements are employed in our evaluation of wound healing. Recently laser Doppler perfusion imaging (LDPI) was added to that battery to examine changes in both wound size and microvascular blood perfusion within and around the wound site. Nitric oxide (NO) provides vital assistance in wound healing by modulating inflammation, promoting angiogenesis, regulating tissue remodeling and serving as an antibacterial. In addition to excessive inflammation, the oxidative stress of HD exposure significantly diminishes NO levels. We therefore hypothesized that the application of exogenous NO to cutaneous HD injuries would result in decreased inflammation and accelerated wound healing.
Methods: For this study, NO delivering nanoparticles suspended in a topical gel were evaluated as a post-exposure topical treatment for HD on weanling Yorkshire swine at 0.1% (w/w, nanoparticles/gel) (n=6) and 1.0% (n=6). LDPI was performed pre-exposure, three days post-exposure, and seven days post-exposure.
Results: Wounds treated with 1.0% (w/w) NO delivering nanoparticles in a topical gel presented the smallest mean wounded area at three days post-exposure. A reduction in perfusion of the wound area was observed between three and seven days post-exposure in 67% of sites treated with the 0.1% NO-gel and 100% of sites treated with the 1.0% NO-gel. Treatment with NO also produced a leveling of perfusion between the wounded tissue and surrounding area at seven days post-exposure, which was not observed in the positive controls.
Conclusions: These results indicate the 1.0% NO produced an early benefit to the HD wound both in mediating the initial inflammatory response and accelerating progression of the wound through the inflammation phase and into the repair phase of healing. The corroboration of these results with previously validated biophysical measurements, clinical observations, and histology provide evidence that LDPI can prove an effective analytical tool in evaluating the initial stages of wound healing.
Disclaimer: The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense. The experimental protocol was approved by the Animal Care and Use Committee at the United States Army Medical Research Institute of Chemical Defense and all procedures were conducted in accordance with the principles stated in the Guide for the Care and Use of Laboratory Animals (National Research Council, 1996), and the Animal Welfare Act of 1966 (P.L. 89-544), as amended. This was research generously supported by Novan Inc (RTP, NC). We would like to thank Novan Inc. (Dr. Nathan Stasko, CEO) for generously funding this research.
Key words: laser Doppler perfusion imaging, nitric oxide, sulfur mustard, wound healing

(**O-14**)
Modern Wrinkle Analysis: Shadow Analysis with the CK Visioline

Tim Houser, Gary L. Grove PhD, Randy Wickett PhD
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Background: Since the earliest development of instrumentation to measure the human skin there has been an interest in the analysis of wrinkles in the skin and how they are altered by the application of anti-aging products. Techniques such as stylus profilometry have yielded to novel methods such as optical profilometry

and the budding field of 3D imaging for skin analysis. With progress being focused on more difficult techniques to quantify changes in skin wrinkling a need has developed for an instrument which provides easy and quick skin replica analysis which is reproducible and customizable to particular needs.
Purpose: The intent of this research is to validate the CK Visioline for this purpose and provide an assessment of shadow analysis as an alternative to other methods of wrinkle analysis.
Methods: Validation was performed via analysis of a custom set of physical standards as well as of replicas taken from individuals representative of each point on a 0-8 expert grader scale of skin wrinkling. Analysis of these replicas was used to assess the impact of calibration and changes in software settings (such as threshold and classification) on the results as well as to compare the measured results to the grading scale.
Results: The results of this research show a strong correlation between expert grader ratings of skin wrinkling and the "Area Ratio" value reported by the device. This research also revealed some minor flaws with other reported values (such as form factor) which indicate that extra care should be taken when trying to use these data.
Conclusions: It is apparent from this research that shadow analysis is valuable for quick and easy analysis of skin surface replicas. The best data from analysis is the "Area Ratio" value with the "Form Factor" value requiring extra attention to ensure accuracy. The Visioline is also designed to tailor your data to specific needs, such as analyzing only wrinkles of certain sizes or segmenting the data between size ranges. Other features allow you to adjust replicas during analysis to maximize the quality of the data when dealing with imperfect replicas. Shadow analysis is shown to be a good means of assessing the relative efficacy of one product or formulation over another or assessing changes over time and may be useful at quantifying those changes. This should be helpful early in product development to make quick and easy in-house assessments.
Key Words: Imaging, shadow analysis, wrinkling, instrument validation

(**O-15**)
A Framework for Learning Common Skin Imaging Analysis Tasks

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Background: Many tasks in skin imaging analysis can be generalized into a single formulation: "for each pixel in the image, assign a label from a set of mutually exclusive labels". In the realm of cosmetics, this generalization encompasses many complexion analysis tasks such as locating/grading structures such as wrinkles and acne, or measuring the degree of porphyrin concentration. In the realm of computer aided diagnosis, this generalization encompasses such tasks as detecting occluding artifacts like hair or oil bubbles, segmenting lesions and identifying dermoscopic structures.
Purpose: To explore probabilistic models capable of performing this generalized task, and to explore ways to automatically infer model parameters given a set of image/label example pairs so that the system can quickly "learn" new tasks.
Methods: The first model is based on maximum a-posteriori (MAP) estimation, which uses linear discriminant analysis to automatically determine model parameters. We call this the MAP model. The second model is based on conditional random fields (CRFs), and uses maximum likelihood estimation and regularized gradient descent to determine model parameters. We call this the CRF model.
Results: We have taught the MAP model how to detect occluding hair, with performance comparable to more specialized algorithms. We then taught the framework how to segment skin lesions. The performance was compared to 5 other previously published specific methods. Our framework performed comparably to four and outperformed the fifth. Additionally, the probabilistic nature of our approach allows it to operate over the entire range of sensitivities, as well as create visualizations of confidence intervals for feedback to the user. We then apply the CRF model to the same tasks and achieve slightly better accuracies; however the training time (time needed to infer model parameters) increases from minutes to hours.
Conclusions: Probabilistic models, with automatic and empiric ways to determine model parameters is a promising way to automatically learn and perform a variety of tasks in skin imaging analysis.

Key Words: Computer Vision, Image Labeling, MAP estimation, CRF parameter inference

(**O-16)**
Epidermal barrier and its modulation: The skin as defender and sensor of the human body

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The epidermis is the outer part of the human body representing the interface to the external, sometimes harsh and potentially harmful environment. Exogenous stressors like chemicals, radiation, UV-exposure have an impact on the skin and ultimately to the human body; recently seen as the result of natural and man-made disasters. Skin as the most external organ is approachable for an assessment with biophysical instruments. The influences of nutrition, life style or alterations due to systemic or chronic dermatological diseases are reflected by changes in skin physiology.

Molecular mechanisms and their modulation are conventionally studied *in vitro* (e.g. in cell culture models) or using invasive biopsy techniques and subsequent immunological assays and molecular biology techniques (e.g. RT-PCR). Nanoscale-range technologies are now implemented into skin research. New methods include multidimensional imaging and image analysis of digital pictures, *in vivo* multiphoton spectroscopy, optical coherence tomography, atomic force microscopy, near-infrared spectroscopy (NIR), *in vivo* Raman Micro-Spectroscopy, *in vivo* Reflectance-Raman-Spectroscopy and Confocal Micro-Spectroscopy coupled with a coherent anti-stokes Raman spectroscopy (CARS) system.

The goal of these new technologies is to obtain multidimensional imaging for quantitative and qualitative studies in humans *in vivo* exploring morphological and functional changes induced by external stressors and diseases. These techniques are available in specific research groups ideally associated with comprehensive clinical skin disease centres.

The lecture will give new insights in studying epidermal barrier function as a response to external stressors or its protection with some examples of skin acting as a biosensor of systemic changes of the organism e.g. in the anti-oxidative network.

(**O-17**)
Clinical scoring and instrumental analysis to evaluate the skin types and efficacy of dermocosmetics

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Considering the biology of the skin and the intended use of the active ingredients, is essential to choose an appropriate cosmetic formulation for both the stability and skin penetration of these as to obtain the expected pharmacodynamic effect, which means that skin type influences decisively in the choice of raw materials and the type of cosmetic vehicle to be formulated. This way, the biophysical and skin image techniques, combined with clinical evaluation by a dermatologist is very useful for the characterization of skin type, and therefore to choose the appropriate cosmetic formulation to be applied on the skin. Thus, the aim of this work was to characterize clinically the skin types by dermatological evaluation and through biophysical and skin image techniques, allowing the choice of the appropriate type of cosmetic product for each skin type and evaluate the immediate effects of the cosmetic treatment. For this purpose, 26 female volunteers, between 20 and 58 years old participated of the study. Clinical scoring was performed by a dermatologist, who classified the skin as normal to dry skin (Group 1) and combination and oily skin (Group 2). The objective measurements, using non-invasive techniques, were made in terms of skin hydration (Corneometer® CM 825), transepidermal water loss - TEWL (Tewameter® TM 210), pH (pHmeter® PH 900), oiliness (Sebufix® F16), and skin microrelief (Visioscan® VC98). In addition, in order to analyze the immediate effects of cosmetic products under study, it was performed an application of a gel cream containing vitamin A, E, C and panthenol and *Ginkgo biloba* at

the volunteers classified as Group 1 and a gel cream containing *Spiraea ulmaria* extract, panthenol and α-bisabolol at the volunteers classified as Group 2. Before and after 2 hours of application of these formulations, were done measurements of the parameters above mentioned. The results of this study demonstrate that skin classified as normal to dry presented different clinical characteristics when compared with the skin classified as combination and oily skin, which presented higher sebum secretion, higher TEWL and slightly lower values of hydration. The immediate effects of the cosmetic treatment of Group 1 was the improvement skin hydration and decrease of TEWL and in Group 2 the cosmetic treatment was able to improve skin microrelief and hydration. Thus, the biophysical and skin image techniques are effective tools to help characterize the type of skin, assist in clinical dermatology and useful to choose the appropriate cosmetic product, which is essential to provide the desirable cosmetic benefits as well as improve skin conditions.

(**O-18**)

Stratum corneum changes after damage with sodium lauryl sulfate

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BACKGROUND: Raman spectroscopy is a noninvasive method that allows for the *in vivo* investigation of biochemical compounds in skin at varying depths. The stratum corneum can be damaged by both chemical and mechanical means, requiring upwards of 17 days to recover. Relatively little is known regarding the biochemical steps required to restore the SC barrier after damage.
PURPOSE: To follow the recovery of SC after damage with sodium lauryl sulfate.
METHODS: In the study described here, sodium lauryl sulfate (SLS) was applied to the volar aspects of the forearms of 12 female subjects' skin to induce barrier damage. A deinozied water challenged site was used as the vehicle control. NMF, lipid, and water profile measurements were taken on each test site using a Raman spectrometer (Model 3510 Skin Analyzer, River Diagnostics, Rotterdam, Netherlands). Water profiles were quantitative, while NMF and lipid profiles were semi-quantitative. Transepidermal Water Loss (TEWL) and Chromameter measures were also collected.
RESULTS AND CONCLUSIONS: Immediately following SLS-induced barrier damage, Raman spectroscopy revealed significant decreases in all amino acid components of NMF except proline, ornithine, and urea. A significant increase in ceramide 3 was observed, the increase being most pronounced near the surface. Most components had returned to indistinguishable levels to the control by Day 12. The study provides insight into the biochemical processes used by the stratum corneum to resolve damage. This data will help define further research for improving skin healing and limiting damage.

(**O-19**)

Multivariate validation of injury consistency in an established swine model for cutaneous sulfur mustard exposures

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Background: The use of a reliable animal injury model is a necessary component in the study of cutaneous sulfur mustard (HD) injuries. However, the successful execution of any *in vivo* wound healing study is often dependent on extraneous systematic factors (i.e. confounding variables) that, if not properly accounted for, might have serious effects on study outcomes. These unintended factors may include differences due to animal vendor, research technician, anatomical site, animal-to-animal variations, and environmental conditions. Generally, sourcing animals from the same vendor, following strict standards of operation (SOP), including internal negative (NC) and positive (PC) controls, and randomizing the anatomical locations of experimental and control injuries should aid in minimizing these effects. However, logistics often dictate that these studies be conducted in manageable batches, thereby introducing additional systematic effects (e.g., effects due to

experiment batch, run order, or time of study). Together, these systematic effects become especially important when attempting to draw conclusions from studies that may have taken place over a period of months to years.
Purpose: To evaluate our hypothesis that our established swine model produces reliable superficial dermal HD injuries, we conducted an injury validation study to confirm the equivalency of cutaneous HD injuries investigated in our lab between 2004 and 2009.
Methods: Between 2004 and 2009, we conducted 18 wound healing studies involving 188 weanling Yorkshire swine acquired from 4 animal vendors. Each animal received a NC (non-exposed) and PC (HD-exposed) site in one of four predetermined ventral locations. Each site was evaluated using bioengineering, visual scoring, and histological methods up to 16 days post-exposure. Multivariate analysis of the NC and PC sites was performed to validate that the effects of cutaneous HD exposure were independent of animal number, animal vendor, experiment number, site location, time of year, and year of study.

Results: When all data were normalized to each animal's internal NC, we confirmed that all cutaneous HD injuries were statistically equivalent and independent of the systematic factors ($p<0.05$) during the five-year period.
Conclusions: Our established injury model in the weanling Yorkshire swine reliably produces equivalent superficial dermal HD lesions irrespective of systematic factors inherent to wound healing research.
Keywords: Validation, Multivariate analysis, Bioengineering, Claims support, Population variation

The opinions or assertions contained herein are the private views of the author(s) and are not to be construed as official or as reflecting the views of the Army or the Department of Defense.

The experimental protocol was approved by the Animal Care and Use Committee at the United States Army Medical Research Institute of Chemical Defense and all procedures were conducted in accordance with the principles stated in the Guide for the Care and Use of Laboratory Animals (National Institutes of Health, 1996), and the Animal Welfare Act of 1966 (P.L. 89-544), as amended.

(**O-20**)
Effect of an anti-inflammatory blend on reducing skin irritation caused by UVB or a chemical irritant

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Background: Hydrocortisone, is typically used for reduction of topical inflammation. It is of considerable interest to develop a topical agent, containing no hydrocortisone that can both reduce the onset of chemically or environmentally induced skin irritation and ameliorate this irritation once it occurs.
Purpose: A blend of ingredients with anti-inflammatory activities has been developed that outperforms topical 1% HC with regard to UVB induced or Balsam of Peru (BOP) induced skin irritation. This blend contains an inhibitor of histamine release, inhibitors of the PLA2, 5-LO, COX-2, collagenase, elastase and PDE IV enzymes, neutrophil chemotaxis and adhesion blockers, a histamine receptor blocker and an inhibitor of NF□B activation.
Method: A cosmetically acceptable oil/water emulsion containing the anti inflammatory ingredients was prepared and applied to human subjects either 20 minutes before exposure to the irritant (UVB or BOP) or after irritant exposure once erythema was achieved. It was also tested for the reduction of lactic acid induced stinging after one treatment and multiple treatments.
Results: When applied before the irritant, this blend was able to reduce BOP induced erythema by 82% and UVB induced erythema by > 90%. When applied after the irritant, the blend was able to reduce existing UVB irritation by 22% and existing BOP induced erythema by 28%. This blend was also found to be more effective than 1% hydrocortisone at reducing existing UVB induced erythema. As well as "sting" induced by 10% lactic acid.
Conclusion: A blend of ingredients has been developed that is more effective than topically applied 1% hydrocortisone at reducing the cutaneous irritation/inflammation.
Key words: erythema, sting, hydrocortisone, UV

(**O-21**)

Quantitative measurement of dark circles around eyes by image analysis of VISIA-CR photographs

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Background: The appearance of under eye dark circles is a common concern of many people. Various products have been developed that are aimed to mitigate the concern. Meaningful evaluation of treatment efficacy becomes an important topic. Conventionally, under eye dark circles are assessed by clinical visual grading with which subjectivity is a major concern for accuracy. In this study, a quantitative measurement of under eye dark circles using image analysis of VISIA-CR photographs is presented.
Purpose: This study was aimed to establish an accurate and consistent method that can quantitatively measure the severity of under eye dark circles.
Methods: Image analysis of VISIA-CR photographs was employed in this study. Appropriate settings of photographic conditions were selected with a set of standard color plates included in each picture. Post capture image color correction was carried out using a set of in-house developed algorithms to ensure the colors in the picture were accurate against the standards. The region of interest of eye area skin was carefully selected and the procedure was automated to ensure exact match of eye area features between pictures taken at different times. The reflective intensity of the skin was then measured in a fashion which scans across the selected region of interest to produce an intensity profile using a set of in-house developed plugins in ImageJ.
Results: The eye area reflective intensity profile accurately captures the severity of under eye dark circles. A step change of 1.28% was visibly shown by the profile when a small area of the picture was artificially adjusted to a slightly higher brightness which was originally not visible in the picture to the naked eye. The features of eye were aligned accurately between photos before and after a 12 week clinical study. A 30 photo validation study using manikin showed excellent reproducibility of under eye skin intensity with a maximum percent error less than 0.78% (average %error=0.12%). The method was then used in a 5-member pilot clinical study and the lightening effect in under eye area skin was quantitatively detected.
Conclusions: The image analysis method can quantify the severity of under eye dark circles using skin reflective intensity from VISIA-CR photographs. The unique eye alignment procedure makes it possible to accurately compare before and after results in almost identical region of interests. It is a useful method capable of providing claims support with quantifiable clinical efficacy.
Key words: under eye dark circles, image analysis, VISIA-CR, reflective intensity

(**O-22**)

An Evaluation of Exaggerated Use Methods for Testing Mechanical Irritation Potential on Skin

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Background/purpose: There are many methods that test consumer products (i.e. bath and facial tissue, adult incontinent products, diapers and wipes) for potential consumer discomfort attributed to regular use. Usage tests may provide the most accurate assessment of end use results, but these tests are very costly and time intensive, which makes them unsuitable for screening multiple design options during the product development phase. For this, exaggerated use methods have proven to be successful alternatives. However, continuous improvements in materials have uncovered limitations to current exaggerated use methods' abilities to detect and measure differences in increasingly skin friendly materials. This in turn has limited a developer's ability to differentiate products for adverse effects on the skin. In efforts to find a cost and time effective test method for screening modern materials, in this case diapers for softness, exaggerated use methods which evaluate materials for mechanical irritation to the skin were compared and a new, more sensitive method developed.
Key Words: skin irritation – mechanical irritation – exaggerated use – consumer products

(O-23)
Epithelial Stem Cells and Generative Medicine

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Self-renewing tissues such as the epidermis, hair follicle and the corneal epithelium are, by definition, regulated by stem cells. The primary characteristics of such cells are the ability to indefinitely self-renew and upon division, give rise to progeny (transit amplifying or TA cells), which have proliferative capability. Additionally stem cells are relatively undifferentiated, reside in preferential locations (niches) and are often pluripotent. The bulge region of the hair follicle is a major repository of skin keratinocyte stem cells. These cells are multipotent because they give rise not only to the hair follicle but also to the epidermis and sebaceous gland. Stem cells are responsible for maintaining tissue homeostasis by providing a constant supply of cells to replace those that are lost during normal self-renewal and following injury. One of the prototypical examples of the use of stem cells in regenerative medicine is corneal transplantation, where: (i) small pieces of the limbal epithelium (the site of the corneal epithelial stem cells) are isolated; (ii) the proliferating cells are expanded in vitro to form an epithelial sheet; (iii) this sheet is transplanted on the damaged cornea; and (iv) 20/20 vision is usually achieved. In addition to the regeneration of self-renewing epithelia, stem cells can be genetically modified to correct inherited genetic diseases of the skin such as junctional epidermolysis bullosa and epidermolytic hyperkeratosis. The use of induced pluripotent stem cells (iPS) holds great promise in treating these types of diseases and is a key to “personalized medicine”, as the iPS cells can be generated from the same patient who has the disease thereby minimizing problems of immune rejection.

(**O-24**)
Advances in Measuring the Water Content of Dry Skin by In-Vivo Confocal Raman Spectroscopy

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The evaluation of dry skin is an important parameter in cosmetic and clinical trails. The standard method in addition to the objective visual evaluation by a trained rater is measuring the capacitance of the skin which shows a good correlation compared to the visual evaluation. It was shown that in some cases these measurements do not represent the moisture of the skin properly due to the fact that capacitance is not only influenced by water but also by components of test products and especially by the skin roughness. In fact the physical water content is not measured directly. This problem was solved by the development of in-vivo confocal Raman spectroscopy. This technique allows the evaluation of the water profile in the stratum corneum (SC) and to calculate several parameters like water content in the SC, the SC thickness and the water gradient within the SC.
However the standard process of measuring the water profile is difficult for dry and especially for very dry and flaky skin. In normal skin condition a direct optical contact between the window and the skin surface is given without changes of the reflectance index. This direct optical contact is essential for the light transmission and proper measurements. In case of flaky skin the number of air filled holes between window and skin increases so that light transmission is not assured. The standard process to measure the water profile instructs the operator to exclude areas without direct optical contact. According to this the stratum disjunctum can not be evaluated by this process, but even this intermediate layer is essential for the correlation between clinical scores and technical parameters. Consequently parameters measured by Raman spectroscopy do not correlate necessarily with capacitance measurements and clinical scores.
We developed a method with a special non polar, minimal penetrating index matching fluid to provide a direct optical contact between the window and the skin surface thereby avoiding air filled holes. This preparation method leads to proper representation of the physical water content of the outer parts of the SC including the stratum disjunctum. Furthermore this method is suitable to assess dry and very dry skin by confocal Raman spectroscopy.

(**O-25**)
Assessment of ageing effects using non contact device: the Tonoderm,®

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Background: of the various dermatological evaluation methods involving touch, palpation is one of the most used to evaluate the skin properties. Indentation technique is the closest instrumental test to perform this type of clinical movement. However, the contact between the probe and the skin forces one to take into account the adhesive behaviour of the skin, which is physically very complex. Moreover, most areas of the body are not flat in shape, which highly complicates the measure due to the positioning of the probe. Thus, it could be very interesting to use a non contact device to assess the mechanical properties of the skin.
Purpose: the aim of this work is the development of a new non contact device to assess the mechanical properties of the skin. Validation has been performed and the ability of the device to discriminate two different tissues has been assessed.
Methods: the device stretches the skin using an air flow through a 2 mm diameter pipe. The flow is controlled by a thermal mass flow. The total force applied varies from 0.4 to 20 g. The maximal depth, varying from 200 µm to 2 mm, is measured using a high accuracy laser sensor. The whole device is controlled by a specific program, allowing constant force or constant depth tests, in order to observe the creep, the relaxation and the natural motion of the skin. Validation was performed on inert materials. In order to evaluate ageing effects, an *in vivo* study was performed on two groups of healthy young and mature women, respectively 23.2±1.6 (group 1, 14 subjects) and 60.4±2.4 (group 2, 14 subjects). Then, in order to evaluate the ability of the device to assess product effects, an *in vivo* study of a cosmetic cream applied on the cheek of 21 subjects at T0 and T4 weeks was performed.
Results: a comparison with classical indentation tests on inert materials confirms the validity of the Young's modulus measured with this new device. *In vivo* results show a statistically significant difference for the measured parameters between the two groups with ageing. The Young's modulus found varies from 7 for the mature group to 15 kPa for the young group. The study of the effect of the cosmetic cream performed on the cheek shows the capability of the device to quantify product effects with a significant increase of the Young's modulus between T0 and T4 weeks.
Conclusion: the developed device is able to discriminate ageing and product effects. The non contact principle permits to access to most of body areas like the cheek without the interference of the adhesive behaviour of the skin. The use of this non contact technique could be extended to sensitive skin and to wounded skin for example burn or reconstructive tissues.
Key words: skin mechanical properties, non contact, ageing.

(**O-26**)
Infrared Thermography to Measure Heat Transfer to Skin from a Heated Device

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Method: Thermograms were captured at several locations on the face including the forehead, crow's feet, outer canthus of the eye and in the nasolabial fold.
Results: Infrared thermography provided objective data for establishing a proper probe temperature to meet safety requirements. Data also suggested that increases in skin temperature were transient and varied with probe temperature. There was little variation between facial skin sites for a given probe temperature. Induced skin temperatures were dependent on the duration of skin contact with the heated probe and whether or not a topical product was applied. Both clinical redness and subjective heat sensation were dependent on temperature and skin site.
Conclusion: The results demonstrated a method using thermograms from an infrared camera can provide fast and accurate data to characterize heat transfer to skin from a heated device.

Key Words: thermography, infrared, skin temperature, heat transfer.

(**O-27**)
A clinical comparative evaluation of two techniques to measure facial lines/wrinkles

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Background: The measurement of facial fine lines and wrinkles is used in clinical research product claims settings. Silicone replication (replicas) under standard conditions provides information on the number, length and width of facial fine lines and wrinkles. These quantitative values provide invaluable information regarding the severity of fine line and wrinkles as well as a quantitative measurement of a products utility over time to reduce facial skin abnormalities. Recently, image analysis systems have been developed for the collection of facial fine lines and wrinkles information. It is imperative that newly developed instruments used for facial fine lines and wrinkle measurements are valid and reliable. Information regarding both validity and reliability, however, is not available for replicas or any image analysis systems. In addition, because few instruments are compared under standard conditions, it is difficult to determine how much of the total variation is due to physiologic rather than instrument variation.
Purpose: The silicone replica technique (CuDerm, TX) to measure facial fine lines and wrinkles has been a well-established reference technique used over the past 15 years. However, although often viewed as the industry “gold standard” the validity and reliability of this technique has never been closely examined; furthermore, image analysis may offer benefits over replicas that have not been examined. Thus, there is a need to validate new systems that either closely mimic or improve upon the validity and reliability of the silicone replica technique, which is the objective of this study.
Methods: A five day, monadic evaluation completing with no less than fifteen subjects. The study will be twelve days in duration, including a seven-day washout period, with subjects using one test product according to package insert directions. Bilateral crow’s feet fine lines and wrinkles will be evaluated for validity and reliability of two techniques; silicone replicas and Clarity Pro R&D image analysis at baseline and again after five days of treatment. Visits will occur at days minus seven (washout), day zero (baseline) and Day 5 (final visit).
Results & Conclusions: This study is in progress and data is to be available in mid-February.

(**O-28**)
Appearance of the cheeks with age and relationship to physical properties of the skin

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Background: Many studies have focused on changes in facial appearance that occur with aging, such as crows feet and sagging, but few studies have examined changes in the cheek that occur with age.
Purpose: The objective of this study was to clarify changes in the cheek that occur with age and assess the relevance of these changes to physical properties of the skin.
Methods: Experiment I. Subjects comprised 140 healthy Japanese women (mean age, 49.0 years; range, 19-82 years). Using a photograph of the cheek, aging appearance was graded on a 5-point scale. Experiment II. Subjects comprised of 40 healthy Japanese women (mean age, 38.1 years; range, 20-56 years). We evaluated the aging appearance with a photograph of the cheek. Measurements were taken at the cheek using a Venustron tactile sensor to assess skin softness, a Cutometer for skin elasticity, a SPEX SkinSkan spectrofluorimeter to evaluate the amount of advanced glycation end products (AGEs) in the dermis (AGEs index), and a portable full-band reflectance spectrophotometer for L*, a* and b*. A surface micro-texture of the silicone replica from the cheek was measured in three-dimensional parameters using TalyMap. Using tape-stripped stratum corneum (SC), levels of AGEs in the SC were assessed by immunohistochemical staining. Experiment III. Subjects comprised 87 healthy Japanese women (mean age, 49.2 years; range, 20-79 years). Aging appearance of the cheek was evaluated with photographs. Measurements were taken at the cheek

using a Reviscometer to assess skin mechanical directionality and a Cutometer for skin elasticity. Evaluation of skin sagging was performed by making marks on the face of the subject and taking photographs of the face while the subject was in a supine and a sitting position.
Results: A significant correlation between aging appearance of the cheek and the subject's age was found. No significant correlations were seen between aging appearance of the cheek and skin softness, AGEs in the SC, mean surface roughness (Ra), surface isotropy, a*, b*, maximum resonance running time (RRT), minimum RRT, and mean RRT. In contrast, aging appearance of the cheek closely correlated in a linear fashion with skin elasticity, AGEs index, average distance between skin surface furrows (RSm), L*, skin sagging, and anisotropy (RRTmax/RRTmin).
Conclusions: We found a method to evaluate the aging appearance of the cheek using photographs. We suggest that aging appearance of the cheek may involve a decrease in skin elasticity, an increase of the amount of AGEs in the skin, loss of brightness, sagging, disorder in surface texture, and changes in skin's mechanical directionality.
Key words: aging appearance, cheek

(**O-29**)
The Critical Role of Instrumentation in Intellectual Property

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Skin-property measurement and imaging techniques play a significant part in the development of dermatologic products. Whether to evaluate potential active agents or to support a product claim for regulatory approval, instrumentation is utilized throughout the skin-care product life-cycle.
In patent law, a recent decision by the U.S. Supreme Court dramatically changed the way the "obviousness" of a patent application is evaluated. As a result, there is an increased need to demonstrate that your product possesses unexpected or surprising properties in comparison to what was previously available in the field. In addition, in the rapidly developing area of nanotechnology, using standardized techniques to characterize and measure these "nanoscale" products are crucial before filing a patent application to protect them.
This talk will discuss the critical role that instrumentation plays in the support of patent applications and some of the considerations that should be taken so as to make the most of the data that can be generated from characterizing the skin.

POSTERS

(P-01)
A new level of clinical photography: development of the USR-CliP (Unit for Standardized and Reproducible Clinical Photography)

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Clinical photography is a widely used and well accepted parameter in clinical trails. The images are used for documentation, for scoring by experts and lay people and also for color or image analysis. Skin, however provides some challenges for photography because of low contrast, partial translucency etc. Reproducibility of positioning, illumination and the capture process is a mandatory prerequisite for high quality clinical photography. However off the shelf camera systems and even dedicated professional systems often fail to meet these conditions. Especially failure of control of automated functions like color or luminance enhancers may cause problems in clinical studies. Tools for the exact positioning of volunteers and equipment is often lacking and changes in light intensity and color over the course of a study can impair the value of photographic time series.
Based on a 31M Pixel professional camera system we developed an optimized photographic unit which fulfills all requirements associated with clinical images. It is equipped with a mid-size CCD Chip and a color temperature controlled flash unit enabling color reproducibility even over long time periods. Biases of color due to wall reflections are limited to a minimum degree as the system is located in a dedicated room with dark walls. The system features online overlay images and further specific positioning functions for the volunteers and also for the camera and system illumination to guarantee accurate reproducibility of all settings.
Thanks to these features, the USR-CliP represents a system for clinical photography with optimal repositioning of the volunteers, a minimization of optical distortion and a consequent optimization of color reproducibility.
The poster provides an overview of the different application fields of the USR-CliP with presentation of accordingly high resolution macroimages (visual effects documentation of decorative cosmetics in healthy volunteers, camouflage of a rosacea patient, macrophotography of a volunteer suffering from herpes and images for tooth color determination). It further shows results of a color measurement of (i) the skin of 65 volunteers during a time period of 3 month and (ii) a color standard within 115 images. The results illustrate that the stability in the luminance (L* values) as well as for a* and b* color values is high in volunteers images and for the color standard.

(P-02)
In vivo tension test using full field optical measurement: ageing effects.

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Background: the assessment and the knowledge of the mechanical properties of the skin are very useful for clinical or cosmetology research. Among the skin's different characteristics, the anisotropy is an important parameter, for example, for surgery incision. Due to the fact that it is a directional test, tension is very useful in understanding this anisotropic behaviour.
Purpose: the aim of this work was to develop a device combining mechanical and optical measurement to perform an *in vivo* tension test in order to improve the understanding of the biomechanical properties of the skin, in particular the anisotropic aspect.
Methods: an *in vivo* extensometer composed of one static and one movable pad has been developed. Each pad is fixed on a tangential and a normal force sensor and is linked to the skin using double sided adhesive tape. A micro metric motorised translation stage, controlled by computer, allows for a movement with a velocity ranging from 0.1 to 1.5 mm/s with an accuracy of less than 1 µm. A camera placed over the stressed area

records frames during the test. A complete Digital Image Correlation procedure was developed to calculate the displacement fields. Validation of the device and the method has been performed. An *in vivo* study was performed in order to evaluate the ageing effects. The measurements were performed on the volar forearm of two groups of healthy young and old women, respectively 23.2±1.6 (group 1, 14 subjects) and 60.4±2.4 (group 2, 14 subjects). Extension tests were performed with distortions of 5, 10, 15 and 20 % and according to 4 directions, with angles of 0, 45, 90 and 135° with respect to the axis of the forearm.
Results: experimental results were combined with a numerical finite element model under an inverse analysis to determine the complete mechanical properties of the skin. An orthotropic elastic material was considered. Validation of the model using the combination of the 4 directions tests shows that the five constitutive parameters of the orthotropic law can be calculated. Values of the Young's modulus E_1 and E_2 are higher for the young group compared to the mature group. Differences on the modulus G_{12} and the Poisson ratio v_{12} are also found. **Conclusion**: The developed method allows the assessment of all the constitutive parameters of the skin considering an orthotropic elastic material. Perspective of this work is to improve the geometrical parameters of the model used in order to have more realistic boundary conditions.
Key words: anisotropy, mechanical properties, tension test.

(P-03)
Assessment of skin softness using an acoustic method.

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Background: the assessment of the softness of a material is a very complex problem. In the cosmetic domain, the clinician usually touches the skin and tries to assess the softness of the tissue according to its own subjective sensations. Standardisation and reproductive evaluations between different experimenters are also very difficult to obtain. It could be very interesting to measure the sensation perceived by the experimenter in order to have quantitative and reproducible data in order to compare different studies.
Purpose: the aim of this work is to present a new technique based on the acoustic measurement of the sound induced by the touch movement and to evaluate the correlation of the measurement with the experimenter's evaluation by touch.
Method: the sound is produced by the contact between the finger of an experimenter and the tested material. The measurement is performed using a specially developed device called Acouskin®. It is composed of a rigid part which amplifies the sound, and a measurement part which records the acoustic signal. Treatment of this acoustic signal is then performed. The average sound level and the distribution of the sound in the frequency domain are calculated. Tests on inert materials of varying roughness have been performed. An *in vivo* study of a cosmetic cream applied on the cheek of 21 subjects was performed in order to evaluate the capability of this new method to assess product effects.
Results: all the tests performed on inert materials show the correlation between the perception of softness evaluated by the experimenter and the average sound level. An *in vivo* study of the effect of a cosmetic cream shows a significant decrease of the average sound level after applying a cosmetic product.
Conclusion: the developed method is able to objectively evaluate the softness of the skin and to compare this softness to another materials. Perspective of this work is the study of the frequency distribution of the sound according to the material properties.
Keywords: softness, acoustic measurement.

(P-04)
***In vitro* antioxidant activity and clinical efficacy of cosmetic formulation containing chamomile extract**

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Botanical extracts have attracted great interest in the cosmetic area due to its rich composition and medicinal properties. Among these extracts it can be mentioned the *Matricaria chamomilla* L. extract, which has been

commonly used in cosmetics. This extract has had its use recognized and it has being well studied once it presents therapeutic properties due to its rich composition. However, there are only a few studies about its topical application. This way, the aim of this study was to evaluate the antioxidant activity of *Matricaria chamomilla* L. extract and to evaluate the clinical efficacy of a cosmetic formulation containing this extract. In order to evaluate the *in vitro* antioxidant activity of *M. chamomilla* L. a chemiluminescence assay was performed. For the clinical evaluation, one formulation based on ammonium acryloyldimethyltaurate/ vinylpyrrolidone copolymer (A/VPC) was developed and supplemented or not (vehicle) with 5% *of M. chamomilla* L. extract. In order to evaluate the immediate effects, it was analyzed the skin hydration (Corneometer® CM 825), transepidermal water loss (Tewameter® TM 210), the viscoelastic properties (Cutometer® CM 525), skin microrelief (Visioscan® VC98) and skin sensitivity (Neurometer® CPT/C) on the region of the volunteer's face skin, before and after 2 hours of the following formulations application: vehicle (F1) and vehicle + M. chamomilla L. extract (F2). For the long-term study, the volunteers applied the formulations twice a day in the forearms and face skin; after 15 and 30 day-period of application, the parameters above mentioned were measured and the skin dermis echogenicity and thickness were also evaluated by 20mHz ultrasound (Dermascan C®). The results showed that *M. chamomilla* L. extract has antioxidant activity and the formulations studied demonstrated immediate moisturizing effects, but only the formulation containing *M. chamomilla* L. extract provides such effects in long-term study. Regarding the perception threshold, results suggest that the chamomile extract can act on skin sensitivity, with respect to the tactile perception by the increase of fibers Aβ perception and the decrease of the sensibility of fibers C, responsible for slow and prolonged pain. In addition, changes in dermal were not observed in a 30-day period, which can suggest that the formulation studied showed efficacy in epidermis only and a long term study can be suggested to obtain effects in dermis. Finally, chamomile extract can be suggested for the application in cosmetic products, once it has antioxidant effects, promotes a pronounced hydration effect and keeps skin physiological balance.

(P-05)
Seasonal Effect on Reproducibility of the Relative Hydration Potential of Wash-off Products

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Background: The single application test for determination of skin benefits by moisturizers has been reported as early as 1992 and was adapted for personal cleansing products by Oddo et al (1997) and Patrick and Tallman (1998). These tests reflect the short term benefits consumers experience after bathing. Lukacovic et al reported the sensitivity of washing studies for evaluating relative mildness of personal cleansing products to be sensitive to weather conditions during the study period. When the dew point was greater than 4 ^{o}C they found it difficult to detect differences in the relative mildness of bar soaps leading to the recommendation that these studies be conducted at lower dew points. This general principle has often been applied to all manner of washing studies. However, in the studies reported here, the results were considerably less sensitive to weather effects. Because of the brevity of the study period, the dew points in the conditioning period prior to the study are more relevant to skin condition than those during the study.
Purpose: These studies were conducted to evaluate the impact of weather on the reproducibility of moisturization effects on acute washing studies.
Methods: Studies were conducted from fall 2010 through spring 2011 with a set of liquid hand soaps and body washes. Approximately 20 female subjects, 18-55 years of age, with mild to moderate dryness on the lower legs were enrolled on the study. Test sites were washed by technicians according to a standardized protocol Oddo et al (1997). Relative skin hydration was measured by conductance (Skicon 200E) and capacitance (Corneometer CM 825) at baseline and 0.5, 1, 2 and 3 hours post-treatment. Evaluations by expert graders were also conducted for visual dryness. Moisturization was defined as significantly higher relative skin hydration than the vehicle, water.
Results: These studies showed the same product performance profile and comparable statistical differentiation under different climatic conditions. These results suggest that acute washing tests are not as sensitive to dew point as repeated washing tests and can effectively be conducted at dew points above 4 ^{o}C.
Key Words: Skin hydration, body wash, dew point

(P-06)
Comparative effects of an anti-inflammatory blend on reducing skin irritation caused by UVB or a chemical irritant to 1% hydrocortisone.

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It is of considerable interest to develop a topical agent, containing no hydrocortisone (HC), that can both reduce the onset of chemically or environmentally induced skin irritation and ameliorate this irritation once it occurs. A blend of ingredients with anti-inflammatory activities has been developed that outperforms topical 1% HC with regard to UVB induced or Balsam of Peru (BOP) induced skin irritation. This blend contains an inhibitor of histamine release, inhibitors of the PLA2, 5-LO, COX-2, collagenase, elastase and PDE IV enzymes, neutrophil chemotaxis and adhesion blockers, a histamine receptor blocker and an inhibitor of NF□B activation. A cosmetically acceptable oil/water emulsion containing the anti-inflammatory ingredients was prepared and applied to human subjects either 20 minutes before exposure to the irritant (UVB or BOP) or after irritant exposure once erythema was achieved. When applied before the irritant, this blend was able to reduce BOP induced erythema by 82% and UVB induced erythema by > 90%. When applied after the irritant, the blend was able to reduce existing UVB irritation by 22% and existing BOP induced erythema by 28%.

(P-07)
SebumScale: a quick microbalance method for direct quantification of oily skin

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Background: Current sebum excretion methods are indirect and apply mostly a photometric method. After a touch of glass or plastic sensor with the skin the optical transmission changes due to attached sebum.
Purpose: To provide a method for a quick measurement of the mass of excreted sebum in quantitative units.
Methods: A fully portable and battery operated device SebumScale (patent pending, Delfin Technologies Ltd., Kuopio, Finland) was developed. The device applies a microbalance technique. When the quartz crystal of the microbalance touches the skin, the attached sebum will change the quartz oscillation frequency being proportional to the amount of sebum on the surface of the crystal. The amount of collected sebum was measured in a sensitive laboratory scale. Sebum excretion in forehead of test persons was followed for two hours after degreasing.
Results: An excellent correlation was found between SebumScale device readings calculated from the sebum-induced changes in quartz crystal oscillations and a gravimetric method ($p < 0.001$). Individual sebum excretion at 2 h being in a typical range of healthy human skin varied from 15 to 50 $\mu g/cm^2$.
Conclusions: The microbalance technique can be applied in a quick and accurate estimation of sebum excretion rates in quantitative units.
Key words: oily skin, sebum excretion rate

(P-08)
Applications of the new Colorimeter CL 400 for skin colour measurement

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Background: The needs of measuring changes in the skin colour are of great importance in cosmetic and pharmaceutical efficacy tests. The physical properties of the skin make skin colour measurement very complex. Established devices like Chromameter are now commercially available to express the skin colour as an xyz-value (tristimulus) and calculated into L*a*b related values. A new CL 400 colorimeter probe (CK

electronic GmbH, Germany) permits to obtain very reproducible results ideal tool for comparison measures; it is economic, extremely easy to handle and short measuring time (1s).
Purpose: The aim of this work was to compare skin colour values obtained from CL400 probe with respect to Mexameter MX18 in order to understand the applications and the limits of the two CK probes.
Methods: 20 healthy tanned volunteers were enrolled in according to Helsinki declaration (Ethical Principles for Medical Research Involving Human Subjects).
The evaluation of skin colour, erythema index and skin brightness were performed before and after 7 wash cycles using a body wash product onto damp skin with a sponge, followed by aqueous rinsing and drying without rubbing. One skin zone was treated only with water, as control. The instrumental assessment of skin parameters was performed with Cutometer MPA580 equipped with Skin Colorimeter CL400 and Mexameter MX18 probes.
Results: Results highlight the correlation between the CIE colour space and the human skin for the CL400 colorimeter; the L-value (brightness) is inversely proportional to the pigmentation. The higher L*, the less pigmented. The a*-value is proportional to the redness (erythema/microcirculation).
However the melanin content is better measured by a Mexameter probe; in fact the
results show a correlation between the increase in brightness and the reduction of melanin content, measured by CL400 and MX18 probes, respectively.
Conclusions: In conclusion, this work highlights that the simultaneous use of the two probes allows an optimization of the measurement of parameters related to skin colour. In fact, the CL400 colorimeter probe is a useful device to express the erythema index and the skin brightness, such as already marketed established devices, but the melanin content is more accurately measured with the Mexameter probe.
Key words: skin colour measurement, colorimeter, efficacy test, erythema, melanin content

(P-09)
A Comparison of Hair Removal Methods Prior to Sulfur Mustard Exposure

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Background: Our group conducts comprehensive research to determine the efficacy of candidate treatment regimens that promote improved healing of cutaneous sulfur mustard (HD) injury. Under current protocol, a depilatory agent (Magic® Shaving Powder, SoftSheen-Carson, LLC, New York, NY) is used to remove hair prior to HD exposure, ensuring complete contact of the dosing template with the skin surface. Scientific literature has indicated that depilatory agents enhance delivery of transdermal drugs.
Purpose: The goal of this study was to determine if application of this agent prior to chemical exposure would exacerbate the degree and depth of sulfur mustard injury when compared to hair removal using only traditional clipping methods.
Methods: Four experimental sites were assigned on the abdomen to each of five weanling Yorkshire swine. Twenty four hours prior to exposure, hair was removed from each site using a depilatory agent or electric clippers. At 48 hours post-exposure, non-invasive bioengineering tools and clinical assessments were used to monitor mechanical, cosmetic, dimensional, and physiological properties of all experimental sites. Following euthanasia, tissues were collected for routine histopathological evaluation.
Results: Statistical analyses ($p<0.05$) indicated that no significant difference in depth or degree of HD injury was attained using either a depilatory agent or electric clippers to remove hair.
Conclusion: These consistent results will allow for further screening of transdermal drugs, and eliminate current dependence on depilatory agents and their potential influence on the pharmacokinetics of promising candidate therapeutics.
Keywords: skin, hair, wound healing, sulfur mustard, depilation, percutaneous, therapeutics
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The views expressed in this poster are those of the author(s) and do not reflect the official policy of the Department of Army, Department of Defense, or the U.S. Government.

The experimental protocol was approved by the Animal Care and Use Committee at the United States Medical Research Institute of Chemical Defense and all procedures were conducted in accordance with the principles stated in The Guide for the Care and Use of Laboratory Animals (National Research Council, 1996), and the Animal Welfare Act of 1966 (P.L. 89-544), as amended. The facility where this research was conducted is fully accredited by the Association for Assessment and Accreditation of Laboratory Care International.

(P-10)
A TRIAL TO DEMONSTRATE THE POTENTIAL OF AN INGREDIENT TO REDUCE PROPIONIBACTERIUM ACNES

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Background: This study was intended to evaluate the effectiveness of a test ingredient in a panel of fifty subjects randomized in a 1:1 ratio to test and control products. Data from this study will be analyzed to determine whether the test product was effective in the reduction of P. acnes and evidence of its effects on facial skin, and whether it was more effective than another product in the reduction of P. acnes and its effects on facial skin.
Purpose: The objective of this study was to evaluate the anti-acne potential of one test ingredient during normal usage conditions using clinical and bio-instrumental assessments, BTBP Clarity Pro R&D technology.
Methods: This was a four (4) week study, with a one-week washout period prior to baseline, wherein subjects were to discontinue use of all topical facial products, anti-aging and anti-acne medications (topical or systemic), and anti-inflammatory medications. Visits occurred at baseline and week four. Visual and instrumental evaluations were performed by qualified IRSI staff.
Results & Conclusions: The test ingredient demonstrated statistically significant outperformance in the reduction of Propionibacterium acnes (p acnes) on facial skin following four weeks of treatment compared to control product. A statistically significant reduction was shown in the total counts of acne lesions, spots/scars (pigment) and pores after four weeks of treatment. The test ingredient demonstrated superior reduction in post inflammatory hyperpigmentation after four weeks of treatment compared to control product.

(P-11)
Antimicrobial activity and Clinical Safety of Biocide (Benzalkonium Chloride) Encapsulated in a Starch-Oil Microemulsion

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The wear performance of a benzalkonium chloride containing hand sanitizer lotion produced by an aqueous starch microencapsulation method was studied clinically. The hand sanitizer was formulated with moisturizers and protectant oils to yield a greaseless and cosmetically-acceptable lotion. The results validate its safety and broad-acting antimicrobial and anti-viral efficacy along with a significant four-hour antibacterial persistence on skin. The skin friendly soft feel imparted by the starch-based lotion reduces roughened skin often experienced by end users of alcohol and foam-based hand sanitizers. Safety tests confirmed its lack of oral toxicity and absence of skin irritation or sensitization. Prototypes that incorporate Chlorhexidine in to a starch-oil microemulsion were also studied.

Symposium Notes

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