The PASPCR Newsletter is published three times a year and is intended to serve as a regular means of communication for the members of our Society. The PASPCR Newsletter is distributed via e-mail, in pdf format, on the first of April, August and December and it will continue to be posted on the web-site of the Society.

We hope you had a great time at the 17th PASPCR Meeting, held in Park City, Utah, and organized by Dr. Sancy Leachman. This year we continue our new approach launched in 2011 regarding the meeting report by inviting several participants to share their personal and scientific thoughts on the PASPCR meeting. This section can be found on pages 13-17.

The 18th PASPCR Meeting is scheduled to be held in Madison, Wisconsin, from September 8th to September 11th, 2013, and will be organized by Dr. Vijayasaradhi Setaluri.

In this issue, we continue the “Laboratory Updates” section with a column by Dr. Melissa Harris, and the “Industry Perspectives” section with a column by Dr. Carol Bosko. We also continue the “Clinical Insights” section with a column by Dr. Anand Ganesan.

We hope you enjoy this issue. We encourage you to send us your comments at our email address paspcr.newsletters@gmail.com. Let us know what you would like to see in the letters, suggest sections you think would be useful to include, and recommend any changes that you would like to see.

We also encourage you to let us know about meetings that you think would be of interest to members of the Society. If you attend a scientific meeting at which you heard about work which you think will be of interest to the membership of the PASPCR, please write a few paragraphs summarizing what was presented and share it with us. If you know of training courses that would be of interest to the PASPCR members, please let us know and we will add them to a new section in our Calendar of Events.

Also, keep us updated on any “Members in the News” so we can spread the word of your successes.

This is your Newsletter, and we depend upon you to help us ensure it best serves the Society’s needs. We look forward to hearing your ideas and suggestions and to continue working together to compile the Newsletters for our Society.

The PASPCR Newsletter Editorial Team would like to thank to all our contributors for their columns submitted to us for inclusion in the letters.

We wish you Happy Holidays and a great 2013!

PASPCR Newsletter Editorial Team

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The PASCR Web-Site can be found at: http://www.paspcr.org
The PanAmerican Society for Pigment Cell Research

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Frank Meyskens (Council Member)

The PASPCR Newsletter is published three times a year (April, August and December) by the PanAmerican Society for Pigment Cell Research. All views are those of the authors. For further information or to submit articles, please use the e-mail address paspcr.newsletters@gmail.com.

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CALENDAR OF EVENTS

2012
The 51st Annual Meeting of American Society for Cell Biology
Date and place: December 19-20, San Francisco, CA, USA
Web-site: http://www.ascb.org

2013
The International Investigative Dermatology (IID) Meeting
Date and place: May 8-11, Edinburgh, Scotland, UK
Web-site: http://www.iid2013.org/welcome/

2013
The 18th ESPCR Meeting
Date and place: date to be announced, Lisbon, PORTUGAL
Web-site: To be announced

2013
The Pigment Cell Development Workshop
Date and place: May 6-8, Edinburgh, UK
Web-site: http://devbio.hgu.mrc.ac.uk

2013
The ASPCR-ASDR Meeting
Date and place: May 17-19, Sydney, AUSTRALIA
Web-site: http://www.aspcr.org/

2013
The 18th PASPCR Meeting
Date and place: September 8-11, Madison, WI, USA
Web-site: To be announced

2013
The Annual Meeting of American Society for Cell Biology
Date and place: December 14-18, New Orleans, LA, USA
Web-site: http://www.ascb.org/

2014
The 22nd IPCC
Date and place: September 4-7, Singapore, SINGAPORE
CORPORATE SPONSORS

by Dr. Andrzej Slominski

The PASPCR would like to acknowledge and thank our Sponsors. The list below reflects contributions made during the year of 2012. In the past, financial gifts from our Sponsors have allowed our Society to increase benefits to the membership far out of proportion to the actual dues collected from members. We gratefully acknowledge the contributions for the 17th PASPCR Meeting made through PASPCR as follows (in alphabetical order):

All Resort Transportation

Department of Dermatology at the University of Utah

Huntsman Cancer Institute at the University of Utah

Johnson & Johnson Consumer Companies (Aaron B. Lerner Lecture)

Merck

Morphotek

Myriad Genetics

Prometheus

St. Regis Hotel

- // -

MEMBERSHIP UPDATES

by Dr. Andrzej Slominski

Renewals

Manpreet Randhawa
Johnson & Johnson
Skillman, NJ, USA

Julio C. Valencia
National Cancer Institute
Bethesda, MD, USA

New Members

Jason Hawkes
University of Utah
Salt Lake City, UT, USA

Stephanie Klein
University of Utah
Salt Lake City, UT, USA

John Nip
Unilever
Trumbull, CT, USA

- // -

PASPCR PRESIDENT’S CORNER

It’s that time again…and thanks, again, to Emilia and Prashiela for allowing and encouraging yours truly to contribute.

Speaking of contributions and expressions of gratitude, I hope all of you enjoyed the Deer Valley meeting as much as I did. The dramatic surroundings, the spectacular scenery, and the amazing hospitality certainly helped, but what I enjoyed most about the Deer Valley meeting was the science. We had experts in the ecology and evolution of pigmentation, animal models of melanoma, and melanoma treatment. Three aspects of the meeting stand out for me. First, several of the people who played leading roles (organizers, speakers, session chairs) were local, so in addition to gaining an appreciation for the opulence of the St. Regis, we gained an appreciation for the depth and spirit of the community at University of Utah and the HCI. (Many of us also gained an appreciation for Dr. Leachman’s brisket).

Second, the major themes of the meeting (genetics of pigmentation and new approaches to melanoma) represented two communities that do not often come together under the same roof, but were wonderfully complementary, and reminded us of the important intersection and opportunities for
synergy that come from the juxtaposition of basic science and clinical science. Finally, many of the speakers in Deer Valley were attending a PASPCR meeting for the first time. As many of you know, I am a strong supporter of this strategy; it enriches and broadens the Society experience for those of us who are longstanding members, it’s a great way to recruit potential new members, and it offers a long-term approach for keeping the Society healthy and vibrant. Thanks, Sancy, again, for a terrific meeting. (And thanks for the brisket recipe).

Looking to the future, plans are well underway for the next meeting, which also promises a thoughtful and interdisciplinary approach to pigmentary biology. The peaks of Guardsman pass will yield to pastoral views of Lake Mendota and Lake Monona as Vijay Setaluri organizes PASPCR 2013 at the University of Wisconsin. Madison is a special place for the history of genetics, and I look forward to participating in the meeting, and perhaps experiencing some Badger spirit.

For 2013, we welcome three new PASPCR Council members (Tom Hornyak, Lidia Kos, Julio Valencia) and thank three “old” Council members (Rob Cornell, Mickey Marks, Rich Spritz) as they rotate off. 2013 will also be my last year as Society President, and there are two challenges and opportunities that I hope we can tackle. Our newsletter is terrific, and over the next year I hope we can rebuild and reinvigorate a web-based presence for the Society that matches the vibrancy of the newsletter. Discussions along these lines began at the 2011 meeting in Bordeaux, and we had some creative ideas for ways in which the web could serve as a resource for Society members (bibliographies, protocols, graphics); I hope we can come together in 2013 to implement some of those ideas. Finally, in the same way that we benefitted from diversity of scientific contributions at the Deer Valley meeting, the long-term health of the Society will benefit from serious discussions about diversity of membership and leadership. I look forward to talking about these challenges and developing new approaches to strengthen and enrich our science and our community.

Greg Barsh, M.D., Ph.D.
PASPCR President

Elections Results

Dear PASPCR members,

We are very pleased to welcome Drs. Thomas Hornyak, Lidia Kos, and Julio Valencia to the Council in 2013. Their contributions to pigment cell biology as well as to the Society are already immensurable.

We thank Drs. Robert Cornell, Michael Marks, and Richard Spritz for their service the past three years on the Council!

We look forward to another colorful year with you on board.

Caroline Le Poole, Ph.D.
President-elect

LETTER FROM THE PASPCR SECRETARY/TREASURER

Dear PASPCR members,

We are still under the impression of an excellent organization of the XVIIth PASPCR Conference in Deer Valley, Utah. Thank you Sancy and local organizers for your hard work, hospitality and choice of the place, which was outstanding. In my opinion, the conference was a great scientific success that resulted in an increased membership in our Society. It will be a big challenge to Dr. Vijay Setaluri, Chairman of the PASPCR meeting in 2013 (September 19-22) in Wisconsin, to match this success. However, we will and are already helping the team from Wisconsin and believe that next meeting will also be very successful.

Below, I would like to provide some statistics on the past meeting. Fifteen applications were submitted for travel awards and the recipients were: Shweta Aras, Andrew Cullinane, Hee-Kap Kang Tae-Kang Kim, and Joanne Soong. Two additional awardees (Dr. Zorica Janjetovic and Dr. Ivana de la Serna) had to decline due to the family reasons. If you plan to apply next year for travel grants, please join the Society in a timely fashion in order to be considered.
We also started a new award - “Estela Medrano” Award in memory of Dr. Medrano. The first recipient is Professor Hopi Hoekstra for her outstanding work presented during the XVII\textsuperscript{th} PASPCR Meeting. She will receive a plaque and the book “Melanins and melanosomes” by Jan Borovansky and Patrick A. Riley.

The winners of the poster competition are: 1\textsuperscript{st} place: Dr. J.M. Huang (Department of Biochemistry and Molecular Biology, University of Maryland School of Medicine, Baltimore MD and Dermatology Branch NCI/NIH, Bethesda, MD, USA) for the presentation “Identification of EZH2 target genes in melanoma”; 2\textsuperscript{nd} place: Dr. J.A. Lister (Department of Human and Molecular Genetics and Massey Cancer Center, Virginia Commonwealth University, Richmond, VA, USA) for the presentation “Functional analysis of Otx and MITF transcription factors in the development of zebrafish retinal pigment epithelium”; 3\textsuperscript{rd} place: Dr. A. Sakata (POLA Chem. Industrial Inc, Yokohama, JAPAN) for the presentation “Melanin-containing keratinocytes show greater adhesion to the basement membrane”.

The first place receives free PASPCR membership for 2013 and printed subscription of the Pigment Cell Melanoma Research, while the second and third place receive free PASPCR membership in 2013 and electronic subscription of the Pigment Cell Melanoma Research. Congratulations and thank you for your good research!

We are happy to inform you that our Society is growing. Please renew you membership in a timely fashion. The first PASPCR members in good standing for 2013 are Dr. Tae-Jin Yoon and Dr. David Norris. The membership renewals are undergoing. For student/postdoc/trainee members, please be informed that the membership fee of $40 is below our costs of electronic subscription of the journal and therefore we subsidize your membership. To other members, we kept the dues unchanged for several years to encourage renewals and growth of the Society. Please recruit more investigators into the Society. The bigger we are the stronger we are and higher is our impact on science and funding. I also congratulate Drs. Hornyak, Kos, and Valencia for their election to the PASPCR Council starting in 2013, and am looking forward to fruitful collaboration. Finally, I thank Drs. Cornell, Marks, and Spritz for their time and effort in service as the Council members for the period 2010-1012.

I thank you again for your support of our Society and I wish you Merry Christmas, Happy Holidays and Prosperous New Year!

Andrzej Slominski, M.D., Ph.D.
Professor of Pathology and Medicine
Secretary/treasurer of the PASPCR and Secretary of the IFPCS
Membership Application

PanAmerican Society for Pigment Cell Research

Please see next page for description of membership categories and remittance required with application. Mail, fax or e-mail completed application and remittance to the Secretary/Treasurer’s office.

Type or print.

Name ________________________________________________________________  Degree(s) __________
last                   first                   middle

Faculty Title (if applicable) ____________________________________________  Yr of Appt ____________

Department _______________________________________________________________________________

Institution _______________________________________________________________

Street Address _____________________________________________________________________________

City, state, zip ___________________________________________________________ Phone (_____ ) __________

Fax (_____ )__________________________  E-Mail ____________________________________________________

Please check category for which you are applying. See next page for definitions and dues schedule.

___ Regular                     ___ Student

Student Sponsorship: Sponsors of Students verify herewith that the applicant is a bona fide graduate student or postdoctoral fellow.

Sponsor signature ______________________ Printed name ____________________________

Sponsor Institution ______________________________________________________________

Area of Research: We would appreciate your providing the following information. Please check your research interests.

___ Cell Biology
___ Biochemistry/Chemistry
___ Molecular Biology

___ Physics
___ Clinical
___ Melanoma

___ Comparative Biology  Other: ______________________________

Please list the clinical areas in which you are certified: ________________________________________________

______________________________________________________________________________________________

Signature and membership start date

I, the undersigned, wish my membership in the PanAmerican Society for Pigment Cell Research to begin January 1, 2013.

__________________________________________________________  ________________
Applicant’s Signature                                      Date

-NEXT-
PANAMERICAN SOCIETY FOR PIGMENT CELL RESEARCH
2013 DUES

INVOICE DATE: November 19, 2012   DUE DATE: December 31, 2012

1. Contact Information (Please be sure all contact information is current and correct, including e-mail address)

   Current Address

   □ Corrections (please print CLEARLY)

   ____________________________________________
   ____________________________________________
   ____________________________________________

   Phone: ________________________________
   FAX: ________________________________
   E-mail: ________________________________

   □ No Corrections Needed

2. Dues (Please mark the appropriate category below)

   □ Regular ($224/yr) ($77 for PASPCR, $28 for International Federation of Pigment Cell Societies and $119 for both printed and electronic subscription to the journal Pigment Cell and Melanoma Research)

   □ Regular ($154/yr) ($77 for PASPCR, $28 for International Federation of Pigment Cell Societies and $49 for an electronic subscription to the journal Pigment Cell and Melanoma Research)

   □ Student ($40/yr) ($12 for PASPCR; $28 for International Federation of Pigment Cell Societies) [includes free electronic subscription to the journal Pigment Cell and Melanoma Research]

   □ Second membership (if IFPCS dues are paid through another local Society) ($77/yr)

Members of the SMR are exempt from the mandatory subscription of the PCMR through PASPCR. After certifying that the subscription has been paid as a part of the dues to the SMR, they pay $105.

3. Method of Payment (Please mark the total amount next to the preferred method of payment)

   $_______ Check  Please send check or money order in U.S. funds drawn only on a U.S. bank. Checks drawn on a non-U.S. bank will be returned.
   Make check payable to: PanAmerican Society for Pigment Cell Research or PASPCR.

   $_______ VISA**  Card #: ____________________________ Exp. Date ________
   $_______ MasterCard**  Card #: ____________________________ Exp. Date ________

   **BE SURE TO SIGN
   Signature: ____________________________

PLEASE SUBMIT YOUR DUES

Return to: Andrzej T. Slominski, M.D., Ph.D., Secretary/Treasurer, PASPCR, Department of Pathology and Laboratory Medicine, University of Tennessee Health Science Center, 930 Madison Avenue, Suite 599, Memphis, TN 38163; Phone: (901) 448-3741; Fax: (901) 448-2435; E-mail: aslominski@uthsc.edu

Please return this form with your payment
LETTERS FROM THE EDITORS

We start our annual letter by expressing our support for all PAPSCR members who have been affected by hurricane Sandy. We wish that our next letter at the end of 2013 be more optimistic and talk about no weather-related disasters.

The current PASPCR Newsletters editorial team concludes its 5th year of activity in 2012. During this time we worked closely for three years with the PASPCR past President, Frank Meyskens, and now for two years with the current President, Greg Barsh. While they have different approaches to leading the Society, this was and continues to be a very rewarding experience for the editorial team.

In this brief letter we will attempt to give you a view into how the newsletters get to be. In other words: “what is the assay for a successful and useful newsletter?” As you know by now, they are distributed the first day of April, August, and December. We made a commitment to the membership to have the newsletters sent always on time despite sometimes setting tight deadlines for our contributors. For the first two or three years of our activity, we extended invitations to potential authors of newsletter articles from one issue to the next. For example, shortly after we distributed an issue, we drafted a Table of Contents for the next issue based on our assessment of contributors’ availability to write. The tasks are split between editors and invitations are extended. After their confirmation of participation to the upcoming newsletters number, a series of reminders are sent until a draft is collated and several rounds of editing take place before the issue is distributed.

In the last two years however, we realized that more advanced planning is needed due to busy schedules and to increasing times needed by industry for their approval of the columns to be included in the newsletters. That is the reason we began approaching you in Park City with a tentative schedule for 2013. Therefore, our current approach is to carefully plan each number 6-12 months in advance in an attempt to reach out to all our members and to other scientists who could help expand the Society’s exposure to other related fields. Of course we greatly appreciate volunteers willing to write a column for the newsletter. So if we have not reached out to you, please feel free to contact us.

While the advanced planning is a relatively new approach, the editorial team still follows the same “recipe for success” it started its journey with: the editors exchange up to 4-5 drafts before the final version of the newsletters is sent to the President and Secretary/Treasurer for their brief review. Andrzej Slominski, the PASPCR Secretary/Treasurer, does an amazing job updating the editors with the recent changes in membership to ensure that all members receive the newsletter. Finally, after the number is distributed, the needed updates are sent to the PASPCR webmaster, Bill Oetting, who then uploads the newsletters, calendar of events, changes in membership, and jobs section (when available).

It’s been a full year for us at the editorial headquarters. This year we introduced the column entitled “Clinical insights” that combines the research and clinical aspects of our work. We also continued the previous series of Laboratory Updates, Industry Perspectives, Let me introduce… We were happy to see that the 2012 PASPCR Meeting followed the same efforts we do of bringing together clinicians, scientists, industry members and regulators towards the noble goal of finding better treatments for pigmentary disorders. With great impressions of this year’s PASPCR meeting still fresh in our minds, we are looking forward to attending the 2013 one in Wisconsin. As always, don’t be shy and contact us with suggestions, comments, feed-back and ideas that you believe are suited and needed to be included in the newsletters. We thank all our contributors and look forward to working with you in the upcoming year. We wish you Happy Holidays and Happy New Year!

PASPCR Editorial Team
17th PASPCR MEETING – DEER VALLEY (PARK CITY), UT, USA

Letter from the Organizer

Dear Pigment Cell Colleagues and Friends,

The Pan American Society of Pigment Cell Research Annual Meeting was held in Park City (Deer Valley), Wed. Sept. 19 through Sat. Sept. 22, 2012. The Society received generous support from the St. Regis Deer Valley and All Resort Express to offset housing and transportation costs which were a huge success and well received.

The meeting began on Wednesday afternoon with both a melanoma and vitiligo patient support session that had plenty of information for the patients from speakers in the field, to an educational fair, to various drug companies that shared new developments in the field. That evening we were privileged to hear from Roger Hanlon, a marine biologist, who spoke on adaptive coloration and patterning in octopus. It was very interesting and informative for both the scientists attending as well as invited guests from the area. There was a welcome reception afterward where everyone was able to mingle outside and enjoy the beautiful mountain air and fall colors.

The theme of the meeting was Genetics of Pigmentation and Melanoma. Thursday and Friday sessions included animal models of melanoma and pigmentation, genetics and developmental biology, natural selection for pigmentary traits, environmental modulation of pigment phenotypes, translational research presentations and more. Saturday was devoted to melanoma and emphasized the role of genetics and genomics in the investigation, prediction and treatment of melanoma. There were also oral abstracts and posters that were chosen to complement all the plenary sessions and they were well received.

We had a great time at the faculty dinner at the High West Distillery in Park City with great food and talk with the invited speakers. The evening was a pleasant event. The Gala dinner had a western flare and was held at the Huntsman Cancer Institute at the University of Utah in Salt Lake City. There was good food, great music and everyone had a fun time kicking up their heels on the dance floor.

We had travelers from all areas of the world: China, Sweden, Taiwan, Japan, Poland, Germany, and the USA. I believe the meeting was well received by all and the science was very informative. It was a pleasure to be a part of the planning of this meeting and we were very pleased to share a little of our part of Utah with everyone.

Sancy Leachman
PASPCR Meeting Photos

Members of the Local Organizing Committee

From left to right: Elizabeth Sexton, Michelle Judd and Kathleen Shafer

The venue – St. Regis Hotel

Lectures

Glenn Merlino – Aaron Lerner Award

Robert Hanlon

Andrzej Slominski

Robert Reed
Richard Spritz  
Mick Jurynce

Social events

Sancy Leachmann – Welcome Reception  
Gala Dinner

PAPSCR Meeting Awards

Travel Awards

Travel award - $800 to cover costs of travel and lodging  
Dr. Andrew Cullinane  
Dr. Tae-Kang Kim

Dr. Ivana de La Serna – could not accept the award due to last minute family reasons  
Dr. Zorica Janjetovic – could not accept the award due to last minute family reasons

Travel award - $300 registration fee waived by the Organizers  
Dr. Shweta Aras  
Dr. Hee-Kap Kang  
Dr. Joanne Soong

- // -
Estela Medrano Award

Dr. Hopi Hoekstra (Harvard University, Boston, MA, USA) for outstanding scientific work presented at the XVIIth PASPCR Meeting (lecture entitled “Pelage and predators”)

On Saturday, September 22, 2012 the first Estela Medrano Award was given to Dr. Hopi E. Hoekstra for her invited presentation at the PASPCR in Salt Lake City, Colorado. Dr. Hoekstra spoke to us about ‘Pelage and Predators’, discussing how skin and pelage blending into the environment can protect animals from predator attacks and what has been done to understand this phenomenon—including wonderful historic anecdotes about early discoveries in the field. Dr. Hoekstra is Alexander Agassiz Professor of Zoology in the Departments of Organismic and Evolutionary Biology, as well as the Molecular and Cellular Biology Department at Harvard University. She holds a bachelor’s degree in Integrative Biology for the University of California in Berkeley (CA) and a PhD in Zoology from the University of Washington in Seattle (WA), defending her thesis a mere 12 years ago.

The award made by the PASPCR Council to Dr. Hoekstra is very much in line with the guidelines, adopted to provide the Medrano award to ‘an individual or individuals who have great promise to make or have made transformative contributions to pigment cell biology that expand new areas of research, and can span traditional discipline boundaries’. For this award, preference is given to individuals at early stages of their careers that embody the characteristics and love of science exemplified by Dr. Medrano. The Council intends to elect an awardee or awardees whenever appropriate to a speaker or speakers during the Annual PASPCR meeting.

The prestigious award consists of a plaque and reimbursement for travel funds, registration and accommodation during the meeting by the PASPCR, as well as a copy of ‘Melanins and Melanosomes’ (Patrick Riley and Jan Borovansky, eds.) offered by Wiley Blackwell (also publishers of our journal PCMR). The PASPCR Medrano Award is intended to commemorate the life and works of our great colleague Estela Medrano, who tragically died in a car accident on August 30, 2010. Estela was Professor in Molecular and Cellular Biology at Baylor College of Medicine as well as Robert C. Fyfe Professor at the Huntington Center on Ageing at the same Institution. Besides her contributions to deciphering the roles of cyclins in senescence, of epigenetic changes in ageing and of Ski in melanoma progression, she was an overall determined, creative and lovely person to be remembered as a remarkable mentor.

Congratulations to Dr. Hoekstra for her many accomplishments, now including the Estela Medrano Award, and many thanks for a wonderful and inspiring presentation at the 2012 meeting in Salt Lake City. As the first speaker to present after the PASPCR meeting was officially opened, the audience was obviously off to a good start for a great meeting.
Poster Awards

**First Place** - free PASPCR membership (2013) and printed subscription of the Pigment Cell Melanoma Res

**Dr. J.M. Huang** (Department of Biochemistry and Molecular Biology, University of Maryland School of Medicine, Baltimore MD and Dermatology Branch NCI/NIH, Bethesda, MD, USA) for the presentation “Identification of EZH2 target genes in melanoma”

**Second and third places** - free PASPCR membership (2013) and electronic subscription of the Pigment Cell Melanoma Res

**Second Place** - **Dr. J.A. Lister** (Department of Human and Molecular Genetics and Massey Cancer Center, Virginia Commonwealth University, Richmond, VA, USA) for the presentation “Functional analysis of Otx and MITF transcription factors in the development of zebrafish retinal pigment epithelium”

**Third Place** - **Dr. A. Sakata** (POLA Chem. Industrial Inc, Yokohama, JAPAN) for the presentation “Melanin-containing keratinocytes show greater adhesion to the basement membrane”

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**PASPCR Meeting Impressions**

By Dr. Pamela Cassidy, Huntsman Cancer Institute, University of Utah

As a chemist and relative newcomer to the field of pigment biology and melanoma, I always look forward to the PASPCR annual meeting as an opportunity to meet the experts in these fields and hear them share their latest discoveries. This year was a special treat because my home institution hosted the affair. The opening day began with patient support meetings for those suffering from both vitiligo and melanoma. Then, after a fascinating lecture by Roger Hanlon of the Marine Biological Laboratory in Woods Hole on adaptive coloration, patterning, and 3D texture in octopus skin, we all enjoyed the Welcome Reception.

Now I have already disclosed that I am a member of the Huntsman Cancer Institute at the University of Utah, so I worry that my opinions of the venue, the St. Regis Hotel at Deer Valley, might appear to be slanted towards favoring the home team. But I think that everyone in attendance at the conference was positively delighted with our surroundings. Dr. Sancy Leachman, the head of the Organizing Committee, really outdid herself in arranging the luxurious accommodations that made our stay so delightful. Even the scenery cooperated with the fall foliage turning several weeks early, peaking just in time to dazzle our out-of-town guests.

The scientific meetings were no less fascinating. Dr. Glen Merlino received the Aaron Lerner Award and delivered a keynote address. Lectures from invited speakers at the Plenary Sessions included the topics of animal models, as well as melanoma treatment and genetics. In Oral Sessions, papers on developmental biology and genetics, environmental modulation of pigmentation, and translational and clinical studies were presented. I was honored to be a speaker in the last session, and was very pleased to forge new acquaintances and even a new collaboration as a result of my opportunity to present our work.
The faculty dinner on Friday night was in downtown Park City at the High West Distillery. My husband and I enjoyed the excellent food and spirits almost as much as we enjoyed talking with Society President Greg Barsh about his research on the genetics of coat color in Yellowstone wolves and pigmentation patterns in domestic cats. For the gala dinner, we all went down into Salt Lake City for a western-style barbeque at our own Point Restaurant on the 6th floor of the Huntsman Cancer Institute. High on the mountainside above the Salt Lake Valley, the dining room affords spectacular views of the Great Salt Lake and the surrounding Wasatch Front. I’ve always considered this one of the best views in the state, and it was really fun to be able to share it with colleagues and friends.

Our Organizing Committee and staff, especially Michelle Judd, Elizabeth Sexton and Dr. Sancy Leachman, deserve our most sincere thanks for a really exciting and successful meeting. We look forward to seeing everyone again next year in Madison!

By Dr. Gertrude-Emilia Costin, Institute for In Vitro Sciences (IIVS)

It’s September 22nd and I have more than an hour to spend at Salt Lake City Airport until I get to board. To spend the time, I decided to write my impressions on the PASPCR meeting that I attended in Park City, Utah, after some years of absence. This year I had the opportunity to present a poster in collaboration and to attend the Council’s meeting as one of its newly elected members - all very good reasons to attend the meeting and enjoy it.

I’ll start my thoughts by saying this: if you’ve been at this meeting you would agree that it was a GREAT one, right? And if you have not attended, you have no idea what you’ve missed. Promise that you’ll be in Wisconsin next year because I know that Vijay is working hard to continue what Sancy started in Park City: to diversify the program, to expose the Society to other fields and to bring together smart brains from so many areas that have one interest or another in pigmentation and melanoma.

What I thought started rather shy on the organizational side ended up a great welcoming meeting in Park City. I soon realized that this place is actually a very nice resort particularly during the colorful months of autumn. Having lived for a short while near Palisades, I must admit that this area is at least as beautiful if not more. The hotel the organizers chose for the meeting was a big surprise: after 15 years or so I had to use the funicular to go to the actual meeting site. From the cocktail to the gala dinner, from the keynote speakers to the elected posters to be presented as lectures, the program offered something new and exciting for each of the members in the audience to learn from. The organizing team was amazing and I had the pleasure to personally know Sancy Leachmann and the two Michelles (as I call them 😊) (Lee White and Judd) with whom I worked a bit on some materials to be included in the newsletters (that I graciously edit along with Prashiela Manga) and into the PCMR Journal. The organizing team worked hard to be able to accommodate the participants in a very nice place and to raise funds used to cover the cost of the social events. Sancy and her team did great in inviting to the meeting what I would like to call (citing Greg Barsh’s presentation on genomes) the perfect “admixed” audience that could ever be. Personally, it was a fulfilling experience to get to see all my old friends and collaborators at the meeting, and also to get to know younger investigators who presented incredible work. After all, this Society is how Andrzej’s wife, Elizabeth, described it: a big family. I may add: with all that means: gatherings, strong opinions, nice collaborations, friendships and future plans (always).

The lectures presented by Drs. Roger Hanlon (on octopus), Robert Reed (butterflies), and Mike Shapiro (pigeons) were equally interesting and instructive. Watching the screen and listening to Dr. Hanlon presenting on how the octopus embeds itself in the surroundings through pigment production and reflection of color, I often wondered if I was at the PASPCR meeting or watching Discovery or Science Channel. I learned a lot about pigmentation in other species and been amazed of how miraculous nature is! And felt guilty that I don’t dedicate more time to admire it…
I attended other meetings where invited speakers from other fields would come, present their exciting work and soon leave. Well, many of the new attendees who presented at this meeting stayed for the whole (or almost) meeting which proves that they liked the program, the Society (that’s all of us!) and wanted to learn new things. Sancy, if only through this and you reached your goal with this meeting.

Several lectures drew my attention with interesting topics. Dr. Zalfa Abdel-Malek (University of Cincinnati) presented her group’s recent findings on vitamin D3 participation in the DNA damage response of human melanocytes following UV exposure. The data showed that vitamin D3, a classic compound otherwise used for the treatment of some skin conditions, activates key intracellular pathways such NER (nucleotide excision repair) and is expected to reduce the UV-induced mutagenesis in melanocytes, with possible role in melanoma prevention. Furthermore, Dr. Ana Luisa Kadekar (University of Cincinnati) presented on catalase transfer from melanocytes to keratinocytes. The data showed that α-MSH and UV induce the translocation of peroxisomes toward melanocytes dendrites in a similar manner to melanosomes. Based on the preliminary data, the authors hypothesized that melanocytes provide protection against oxidative stress induced by UV irradiation by transferring catalase to keratinocytes based on a mechanisms similar to melanin transfer.

Dr. Melissa Harris (National Human Genome Research Institute) presented on the differential regulation of Sox10 during the maintenance of the melanocyte lineage and establishment of the melanocyte stem cell. The data presented supported the hypothesis that, through differential regulation of Sox10, postnatal melanocytes can maintain their lineage specification while also allowing some of them to acquire the role of melanocyte stem cells. Following Melissa’s presentation, I extended her an invitation to author the “Laboratory Updates” column included in this newsletter. I hope you will find it inspiring and interesting. Overall, the chairs of each session did a great job keeping everyone in time. As exciting all presentations were, the questions were many and all very useful, however there was enough time in the breaks to further discuss on the topics of interest.

I very much enjoyed the posters sessions. I discussed with several presenters and learnt about many new topics for me and exchanged great ideas. I also spent the time presenting with Dr. Stanca Birlea (University of Colorado, USA) our poster on all-trans-retinoic acid influence on human melanocytes, a collaboration initiated by Dr. Ioana Baldea (University of Medicine and Pharmacy “Iuliu Hatieganu”, ROMANIA). It was rewarding to see so many attendees visiting our poster, asking questions, making suggestions, comments, etc. Thank you all, the interaction has been great and very useful to us!

Another rewarding activity for me was to approach, together with Prashiela, many of the attendees and ask them to contribute with articles to the upcoming PASPCR newsletters. And it was SO much easier in person than through emails! Those of you who agreed to contribute will definitely hear from us with invitations for upcoming numbers. Needless to say, thank you in advance!

Last but not least, I attended my first Council Meeting which was quite an experience. But that is another story. All in all, I am really happy to have attended and seen all of you and to learn about new directions in pigmentation and related areas. Well, I end right here, my airplane just arrived and we’ll be boarding soon. See you again in Wisconsin with new and exciting lectures and posters!

By Dr. Prashiela Manga

To say that this year’s annual meeting was a great success is putting it mildly. The location was fabulous and the accommodation beyond all expectations. My hotel room (and probably the bathroom alone) was bigger than my New York apartment! As always, it was wonderful to catch-up with so many friends and colleagues and even our fantastic environment did not detract from the exciting and interesting science on offer at the meeting. The organizers made a great decision to invite a diverse group of speakers who truly covered the color spectrum across the evolutionary tree.
Several presentations were of particular interest to me:

- On the first day Dr. Michael Shapiro changed my mind about pigeons. Although I will continue to avoid the New York varieties as much as possible, I will pay more attention to their coloration especially upon hearing that the tyrosinase-related protein 1 is a determinant of coat color in some variants.
- Dr. Brian Brooks’ presentation addressed a key issue, the need to develop therapies for the treatment of albinism. Nitisinone, a drug used to treat type I hereditary tyrosinemia, can increase the levels of serum tyrosine. This increase is sufficient to promote pigmentation of the hair and eyes in OCA1B mice homozygous for tyrosinase mutations. An exciting prospect, that some forms of albinism can be treated using a drug that has a well-documented safety profile.
- Dr. Hopi Hoekstra gave a fascinating talk about her research on reconstruction of the evolutionary history of mouse populations based on coat color genes such as Mc1r.
- Dr. Robert Cornell discussed transcription factor Activator Protein 2 alpha (TFAP2A), a novel regulator that works in concert with MITF to facilitate melanoblast proliferation and differentiation of melanocytes.

The posters sessions were also of great interest. To mention a couple:

- Dr. Gisela Erf’s group continued to demonstrate the utility of the Smyth line of chickens in the study of vitiligo. In the poster they showed evidence that 4-tertiary butyl phenol (4TBP) can be used to induce melanocyte loss in the feathers of their model and that melanocytes in susceptible animals have a different response to 4TBP as compared to melanocytes from control animals.
- Dr. Sancy Leachman’s group presented posters addressing UV exposure, ranging from the significantly positive effect of education of fourth grade students through a sun protection program on their willingness to take protective steps such as use of sunhats to evaluating the dangers of UV lamps being used in nails salons.

Sancy and her team put together a fantastic conference. By choosing “the power of genetics and pigmentation” as the theme, they also highlighted the extensive reach of pigment biology and I hope we are able to continue expanding the boundaries of our Society. As an added bonus, we will get to hear about tropical fieldtrips to study butterflies (Dr. Robert Reed) and diving expeditions to make extraordinary octopus videos (Dr. Roger Hanlon) while continuing to hear about the wonderful work going on in our current community.

By Dr. Michael Shapiro, University of Utah

I was a first-time attendee at the 2012 PASPCR meeting in Deer Valley. In fact, I was something of an outsider on several fronts. In addition to knowing very little about the Society, I was also a newcomer to pigmentation research. My laboratory studies the genetic and developmental basis of morphological evolution, primarily in the vertebrate skeleton. Very recently, however, we began a project to understand the genetic changes underlying feather pigmentation diversity among breeds of domestic pigeons. The project was so new, in fact, that I’m still not quite sure how the organizers knew about it when they invited me to give a talk at the meeting! Most of the conferences I attend focus on evolutionary biology, genetics, and evolutionary developmental biology (“evo-devo”), and I was expecting every different content at PASPCR. In particular, I was concerned that the focus would be
largely biomedical and translational, and that my research might be wildly out of place. Instead, what I experienced at the conference was a wonderful mix of presentations on basic and biomedically oriented research. I was particularly impressed with the mindfulness of all of the presenters in communicating to a broad audience and avoiding jargon. To my delight, some of the talks with the most unabashedly clinical goals also featured some of the most intriguing – and beautifully communicated – basic science.

While I was fascinated by the talks on human disease, the highlight sessions of the meeting for me occurred on the first two days. The meeting organizers assembled a world-class group of speakers on the topics of pigmentation evolution and genetics, drawing on research in vertebrates, butterflies, and cephalopods (the latter in an outstanding keynote address by Roger Hanlon). In addition to being in my area of direct interest, these talks also beautifully illustrated how seemingly disparate subfields of pigment research are converging on similar genetic mechanisms that underlie normal and abnormal variation among humans and other organisms.

I would urge someone with broadly similar research interests to mine in pigmentation cell biology – that is, not explicitly biomedical or translational – to strongly consider attending a PASPCR meeting. Looking back at my experience at the Deer Valley meeting, I am left with the following three major impressions:

1. PASPCR Annual Conference is not “just” a medical or disease-focused meeting. This year’s meeting also featured great talks on pigmentation genetics in wild and domesticated animals. Even the keynote talk had a basic biology focus. The biological diversity components of the meeting were integral parts of the first two days, not just a sideshow or curiosity. I was impressed to see that the Society embraces this diversity.

2. The PASPCR community is welcoming, engaged, and supportive. I caught up with a couple of old friends, made some new ones, and had the chance to talk with people whose work I had admired from afar. Everyone was approachable, and I left the meeting armed with insightful advice that has changed the course of my lab’s experiments.

3. The social events were outstanding. The meeting schedule allowed ample time for interaction, and the setting – early fall in Park City – afforded spectacular views and hiking opportunities. The faculty dinner at a downtown Park City whiskey distillery was one of the most memorable events of this or any other meeting I’ve attended.

Realistically, I probably won’t attend every future PASPCR meeting because pigmentation biology is not the main focus of my lab. However, for anyone considering attending a future meeting, I can attest that this is a worthwhile event for researchers with a basic or translational focus. The interactivity among attendees and the crosstalk among subdisciplines were outstanding.
PIGMENTATION COMMUNITY CONNECTIONS

In this issue, we continue the “Laboratory Updates” with a column by Dr. Melissa Harris, the “Industry Perspectives” with a column by Dr. Carol Bosko, and the “Clinical Insights” with a column by Dr. Anand Ganesan. We hope that you will be inspired to take the opportunity to fill us in on what is happening in your lab or company. Volunteers would be greatly appreciated, just email us at paspcr.newsletters@gmail.com.

This initiative is part of our effort to keep the pigmentation community connected and to emphasize the importance of collaboration and communication between groups. We will keep adding stars on our world map below each time you contribute a column about your newest research projects. So, let’s go on a global research adventure!
Scientific training in the field of pigmentation; a comparative approach.

I was first introduced to the science of pigmentation as an undergraduate intern under the guidance of the late Dr. Ann T. Bowling. In 1999, she was working as the Executive Director of the Veterinary Genetics Lab at the University of California, Davis (VGL). In a double-wide trailer off the back end of the campus, I learned the basics of genetics and linkage analysis by way of studying horse coat color inheritance. Terms like agouti, quarterhorse, PCR, ABI 377, and microsatellite were part of everyday conversations. It was at VGL where a bittersweet combination of events sealed my future into this field; in December 2000, Ann passed away suddenly and exactly a year later we published my first scientific study, a linkage report on the cream allele which is responsible for the dilution of hair color seen in palomino, buckskin, cremello, and perlino horses (Locke et al., 2001). With Ann's enthusiasm for the utility of horse genetics a constant reminder, I, with geneticist Dr. Cecilia Penedo, went on to successfully use 101 microsatellites (!) to perform a genome-wide scan that identified the chromosomal location of the grey coat color locus in horses (Locke et al., 2002). A lot has changed since then, as now we have seen the completion of the horse genome sequence and the development of a high density equine SNP array (McCue et al., 2012; Wade et al., 2009).

Through these linkage analysis studies I realized that using a candidate approach to identify the genes that contribute to coat color requires some knowledge of melanocytes. Thus for my graduate degree, I sought out Dr. Carol Erickson - an expert in early neural crest cell biology, performing research in chick embryos, also at UC, Davis. Here I became interested in the mechanism of cellular pathfinding during embryonic patterning.

Carol had discovered previously that melanoblasts within the chick are prespecified and that this governs their ability to migrate from the neural tube to the space between the ectoderm and somite (dorsolateral pathway) (Erickson & Goins, 1995). Neuronal neural crest cells, on the other hand, are kept from entering the dorsolateral pathway by the presence of numerous inhibitory molecules. I guessed that in order for melanoblasts to overcome these repulsive cues they must express subpopulation-specific receptors that could guide their invasion of the dorsolateral path. Using morpholinos and in-ovo electroporation, we discovered that two receptors, Endothelin receptor B2 (EDNRB2) and EphB2, are critical for this process. Their loss results in an inability of melanoblasts to migrate dorsolaterally. Vice versa, overexpression of EDNRB2 or EphB2 is sufficient to drive neuronal precursors into the dorsolateral path inappropriately. At the time, it was also known that at axial levels other than the trunk, like at the level of the heart, neural crest cells other than melanoblasts can migrate dorsolaterally. Using a combination of techniques including heterotopic quail-chick chimeras, we found that they do this without using EDNRB2 or EphB2, but only when the dorsolateral path is correspondingly free of inhibitory molecules. These data provided new insights into when and why instructive interactions are critical in the pathfinding of specific neural crest cell populations (Harris, Hall, & Erickson, 2008).

I now find myself working as a postdoctoral fellow in Dr. Bill Pavan's lab at the National Human Genome Research Institute of the National Institutes of Health. I first met Bill at the 2006 PASPCR meeting in Cincinnati, OH where I was invited to give a talk on the role of EDNRB2 and EphB2 in dorsolateral pathfinding by melanoblasts. It was around this time that the idea of the melanocyte stem cell (McSC) was becoming increasingly popular, and I'd become interested in questions about where and how the McSC arises. Bill, on the other hand, was busy constructing a body of work revolving around the transcription factor Sox10, spurred by initial discoveries that this was the gene involved in
Hirschprung’s disease (Southard-Smith, Kos, & Pavan, 1998). This included the construction of a transgenic mouse line, \textit{Tg(DctSox10)}, by then postdoc, Ramin Hakami (Hakami et al., 2006). What brought us together was the observation that \textit{Tg(DctSox10)} homozygotes exhibit premature hair graying, a classic McSC phenotype.

Within the embryo, SOX10 is expressed by neural crest cells and upregulates transcription factors that participate in specifying different neural crest sublineages. For melanocytes, SOX10 initiates the expression of the transcription factor, \textit{Mitf}. Together, SOX10 and MITF support the survival and differentiation of the melanoblast lineage. Postnatally, the melanoblasts that are incorporated into the hair follicle bulge, or stem cell compartment, give rise to the McSCs. It is known that these McSCs regenerate the differentiated melanocytes of the hair follicle during adult hair cycling, however it is unknown how this population is established. One possibility is that the McSC arises through the downregulation of \textit{Sox10}.

Using the \textit{Tg(DctSox10)} line to explore this idea, we expected that if McSCs maintain low levels of \textit{Sox10} we might be able to affect their fate by overexpressing \textit{Sox10}. Accordingly, \textit{Tg(DctSox10)} results in the premature differentiation and pigmentation of McSCs, their eventual loss, and early hair graying. Perhaps then, we thought, McSCs do not require \textit{Sox10} for their maintenance. Instead, we find by immunohistochemistry that McSCs express both SOX10 and MITF but somehow remain undifferentiated. And, by knocking out \textit{Sox10} in the postnatal melanoblasts (\textit{Sox10}^{fl}; \textit{Tg(Tyr::CreER)}), we also show that McSCs require \textit{Sox10} for their survival. We further questioned whether SOX10’s role in McSCs is solely to regulate \textit{Mitf} by investigating whether haploinsufficiency for \textit{Mitf} (\textit{Mitf}^{vg9}) can rescue hair graying in \textit{Tg(DctSox10)} animals. To our surprise, the combination of \textit{Mitf}^{vg9} and \textit{Tg(DctSox10)} worsens both the onset and amount of hair graying and we interpret this to suggest that MITF negatively regulates \textit{Sox10} in McSCs. Together these data suggest a mechanism where SOX10 can be present to support the melanocyte lineage while also be inhibited from driving the differentiation of the McSC population (Harris and Pavan, unpublished data).

These data illustrate how tissue-specific stem cells can arise from lineage-specified precursors, and how this can occur through the regulation of the very transcription factors important in making that lineage. What are the instructive cues that exist within the hair bulge that might influence the establishment of the McSC? Recent studies highlight Wnt/\beta-catenin, Notch and TGF-\beta signaling pathways, although how they might affect \textit{Sox10} expression remains to be understood. Variability of hair graying within the human population also suggests there is an additional genetic component to this phenotype that has yet to be uncovered. We anticipate that further studies using this and other hair graying mouse models may elucidate new pathways in McSC establishment and maintenance.

In our ever-expanding, multidisciplinary world it is easy to see how the science of pigmentation can provide so many avenues for exploration. As a trainee, the melanocyte has taken me from genetics to cell and developmental biology and back again and from horse, to chick to mouse. Ann, my first scientific mentor, wrote a book titled, ‘Horse Genetics’, and in the preface she advises, “Readers of this book will find answers to many of their questions about the genetics of horses, but I hope that other questions will replace them. Learning is a continuous process that does not end with finding answers…” (Bowling, 1996). I believe the same sentiment is true of the melanocyte and its biology.

References:


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**INDUSTRY PERSPECTIVES**

*by Dr. Carol Bosko*

**In Pursuit of Flawless Skin**

When I joined Unilever’s Dental Research program in Edgewater, N.J. fresh from my graduate studies, ink not yet dry on my degree, I never dreamed that I would soon switch the emphasis of my studies from prokaryotes to eukaryotes. I had earned a Doctorate in Oral Biology & Pathology from Stony Brook University in 1990, had considered myself a microbiologist, and was studying the development of oral biofilms when it was announced that the Dental Program would be relocated to one of Unilever’s UK labs. When my manager informed me that I would be joining a fledging Skin Research Program I was a bit unsettled. But, if there is anything that arms one against the uncertainties of the world it is the ability to be flexible. So I embraced the opportunity, knowing that the snippets of epidermal biology I had learned in graduate school from Dr. Lorne Taichman would have to serve as the basis for a new career. I have been studying various aspects of skin biology ever since. The change is one that I have never regretted.

Over these many years I have learned that skin is an amazing organ. It protects us from pathogens and dehydration, it regulates temperature and sensation, and is a site of vitamin production. Through it, we communicate so many emotions; a tender touch communicates love, empathy, sympathy and, quite amazingly, human touch is requisite for normal infant growth & development. Infants learn about their world through touch and learn to feel loved through their mother’s touch. Through the exquisite sense of touch, we feel and react to itch, pain, heat, cold, pressure. It is the primary organ that protects us from the environment, from dessication, harmful radiation, infection, and toxins, while simultaneously allowing us to interact with that same environment. The skin is a
highly accessible tissue, and yet it still holds so
many mysteries.

I have also learned that skin is complex. Not
only is it a highly complex tissue
morphologically, with distinct layers and
numerous appendages, but it is complex
biochemically. The revelation that nearly every
biological process and biochemical reaction that I
can ever recall studying as an undergraduate, also
occurred in skin, blew me away. Skin is a
primary site of vitamin D synthesis, lipid
synthesis, a major site for iron excretion, and is a
significant immunological, hormonal, and
neurological organ. The skin-brain connection
extends far beyond the mere embryological
migration of melanocytes from the neural crest,
far beyond the nerve fibers that connect
epidermis to the central nervous system. The skin
is replete with opioid receptors, cannabinoid
receptors, serotonin, norepinephrine and
dopamine transporters; the hypothalamic-
pituitary-adrenal axis is alive and well in skin. So
many of the processes that I had considered in the
realm of neuroscience, are also the topic of study
for dermatology. Before I began studying skin I
had seen my own skin only as the stratum
corneum, a layer some consider “dead”, now I
realize that this layer is derived from an
epidermal layer, supported by a dermal layer, that
are rich with over 17 different cell types
responsible for barrier formation,
immunosurveillance, sensation and, of course,
pigmentation.

Pigmentation is so important to all of us for
so many reasons. Through the millennia,
pigmentation has protected humans from the
ravages of the sun. Strong evolutionary selective
pressure has driven a wide variation in skin color
that directly correlates with the intensity of UV
light at the point of anthropological origin.
Perhaps equally important, skin color has
historically been a strong indicator of
socioeconomic status. While this particular aspect
of human history has often been scarred by
misguided prejudice, like it or not, skin color
remains an important part of today’s culture.
Witness the huge expenditures, totaling in the
billions of dollars annually, on tanning beds and
fairness creams. Unilever developed and markets
one of the most popular fairness creams sold
across Asia and has, at times, come under fire for
exploiting that aspect of the human conscious.
While my intent is neither to defend nor promote
that particular aspect of our business, it is an
undeniable truth that both females and males find
the color and condition of their skin to be a
primary determinant of beauty and self-esteem.
Just as numerous scholarly articles have been
written on the impact of acne on self-esteem, it is
true that the residual hyperpigmented spots, that
remain months and years after resolution of the
acne lesion, can be the source of tremendous
psychological pain. Melasma, lentigines, and
other hyperpigmented lesions can have
significant negative psychological consequences.

In our consumer studies, evenness of skin
color, irrespective of race and ethnicity is always
ranked as a highly desired attribute. Even skin
tone is viewed as a hallmark of “healthy skin”
just as uneven skin tone is a hallmark of aging.
Moreover, even skin tone is a consumer need that
is inadequately met by current treatments be they
prescription, over-the-counter or cosmetic. This is
precisely why so many research dollars are spent
each year by consumer products companies, like
Unilever, on understanding and controlling
melanogenesis. Indeed I see pigmentation
research as one of the very bright spots in
cosmetic research. Whether it is our own research
on the semaphorin:plexin system (1), SLC 24A5
(2,3), and d-Dopachrome tautomerase (4) or our
competitors research on endothelin 1 (5) and
protease-activated receptor 2 (6), many important
discoveries related to the pigmentary system have
been made by industrial scientists in pursuit of a
flawless complexion.

When I began my career in Skin, I had the
honor of meeting many of the giants of
Dermatology research; Albert Kligman, James
Leyden, Jouni Uitto. Twenty years later, as
Director of Biosciences for Unilever, I have the
honor of leading a talented team of scientists with
diverse backgrounds in cell & molecular biology,
organic & medicinal chemistry, pharmacology
and physics. The close coordination of diverse
skills to achieve a common purpose has been a
highly successful strategy for developing new technologies for skin as evidenced by our numerous innovations, patents and filings. We have presented our findings on the role of the semaphorin signaling pathways in melanosomal transfer at the PASPCR meeting. Using RNA interference we demonstrated that semaphorins, and SEMA 6D in particular, mediate melanosomal transfer to keratinocytes (1). Similarly, at the 2012 PASPCR meeting we presented data suggesting for the first time, to our knowledge, a role for d-Dopachrome Tautomerase (a relative of Macrophage Migration Inhibitory Factor and structurally unrelated to L-dopachrome tautomerase) in melanosomal transfer (4). My colleagues in the UK have published on the role of SLC24A5, the so called golden gene, as a determinant of human skin color. Through genome-wide association studies it was determined that polymorphisms in three genes, SLC24A5, TYR and SLC45A2 account for a large fraction of the natural variation in skin color in a South Asian population (2,3).

Important studies by industrial scientists have furthered our understanding of the regulation of melanosomal transfer (1,4,5,6), the histopathology of solar lentigines (7,8), and genetic regulation of pigmentation (2,3,9), to name a few. Many of those studies have been in collaboration with scientists from academic institutions. There is more incentive than ever for Industry to partner with Academia and small biotechnology firms. Increasingly, industry is coming under pressure to reduce fixed-labor costs and moving to a more flexible research model that accesses capabilities on an “as needed” basis or facilitates the translation of academic discoveries into marketplace launches, is highly desirable.

Unilever has a long history of such collaborations. For example, we have long collaborated with Dr. Marcia Simon of Stony Brook University and as part of that collaboration, have recently established an arm of the Pond’s Institute within Stony Brook University. On the other hand, when we decided to develop a capability in the emerging field of Systems Biology, we chose to partner with a small technology firm to develop an in silico model of epidermis (10). Unlike some pharmaceutical houses, which have an entire department dedicated to this relatively new field, we chose to work with an external partner and build a very small skill base internally. Industrial-Academic collaborations are far from new, but these types of partnerships are likely to change with industry increasingly requiring assignment of Intellectual Property rights, strict timelines, and tangible return-on-investments. And while the United States continues to be the location of most-referenced science authors, we will see relationships with institutions outside of the US, particularly those in Asia, grow due both to the expansion of the consumer base and the investment in scientific institutions in that region.

Several trends that are affecting the types of external collaborations that consumer products companies, like Unilever, enter are related to the changing world demographics. The growth of the middle class in Asia is driving the need for research on Asian skin and hair and is driving the need for effective products tailored for Asian skin types. Here again we see the need for research into pigmentation as paramount. Finally, the world is ageing. Many “maturiing” consumers have the desire to maintain a high quality of life, to maintain a youthful appearance, and the disposable income to spend on such pursuits. This will increasingly drive the market for products that improve skin ageing, which includes the discontinuities in pigmentation that come with increasing age. Here we see the trickle-down of professional aesthetic procedures into at-home devices as an important trend. In 2011, there were 12.2 million minimally-invasive cosmetic procedures performed in the US alone. And while increasing numbers of consumers, both male and female, are opting for professional aesthetic procedures there remains a strong preference for at-home treatments. Everything from microdermabrasion devices to home-use lasers may be purchased in stores, on the internet, and via “home shopping networks”. This trend is certain to expand with many more energy-based devices becoming available for at-home use.

Pigmentation research will continue to grow in importance for companies like Unilever and
this research will provide insights, mechanistic understanding, and solutions to skin problems that are considered “cosmetic” in nature and, as such, are not typically supported by government grants. Collaborative research programs between industrial and academic scientists will continue to be an important link in that search for flawless skin. As our research continues to unlock the mysteries of skin, it is my hope that it might also contribute, in some small way, to the more significant problems of pigment cell research, such as melanoma.

In closing, I would like to thank the editors of the PASPCR Newsletter for the opportunity to provide you with my views and hope you have found this Industry Perspective of interest.

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CLINICAL INSIGHTS

by Anand Ganesan, M.D., Ph.D.

While I was extremely honored that Emilia and Prashiela asked me to contribute to the Clinical Insights column for the PASPCR newsletter, the invitation was clearly somewhat premature - compared to other physician-scientists who are also pigment cell biologists my scientific career is clearly still in its infancy. Despite my possible naïveté, I do feel that there is one central question in pigment cell biology and clinical dermatology that is not frequently discussed and that is worth bringing up in this forum - is the answer to treating vitiligo determining what makes dark skin darker as opposed to finding out what makes vitiligo skin white?

I clearly did not start out intending to ask/answer this question. My career as a pigment cell biologist began as an undergraduate at
University of California, Berkeley in the laboratory of Hiroshi Nikaido, MD, who is best known for his pioneering work in the field of bacterial antibiotic resistance. I then entered the MD/PhD program at the Medical College of Wisconsin. For my doctoral dissertation, I worked in the laboratory of Joseph T. Barbieri, PhD, and my graduate work focused on characterizing how bacterial exotoxins can modulate host cell signal transduction pathways. I decided that I wanted to study signal transduction and how these pathways are dysregulated in the context of cancer. During my time in the MD/PhD program, I had the opportunity to hear some lectures from Janet Fairley, MD, who was then the chairperson of the Department of Dermatology. It became clear to me from her lectures that dermatology was a field in which it was quite easy to translate basic science findings from the laboratory to the clinic. For example, an investigator could easily obtain biopsies from diseased skin, generate cell strains from actual patients with skin diseases, and study the biology of disease in the relevant system. Somehow, I was able to navigate the difficult residency application process and was selected to join the Dermatology residency program at UT Southwestern Medical Center, where I entered a combined residency/postdoctoral fellowship program. My intention at the time was to focus on understanding cellular signal transduction in the context of skin cancer.

The residency program at UT Southwestern is unique in its diversity. Dermatology residents rotate through a busy county clinical practice at Parkland, which sees a large proportion of ethnic minority patients. They also have the opportunity to rotate through the VA hospital, which sees a largely Caucasian patient population from rural Texas. Finally, the residents also participate in faculty specialty clinics, which focus on topics such as connective tissue disorders, pigmentary disorders, and cutaneous T-cell lymphoma. One thing that immediately struck me from this experience was how skin disease appeared different in lightly-pigmented skin as compared to darkly-pigmented skin. For example, the Caucasian patient with acne or eczema would often present with redness, while African American patients with similar conditions would present with hyperpigmentation. In light skinned individuals, cutaneous T-cell lymphoma would present as red patches on sun spared areas, while in dark skinned individuals it would present as hypopigmented patches. While I found this topic interesting, I wasn’t sure at the time whether I would pursue this question further. After seeing several patients die from melanoma during my residency, I decided instead that I wanted to focus my area of research on signal transduction pathways that control melanocyte transformation.

After my first two years of dermatology residency, I applied for and received physician-scientist training program fellowship to support my research work. This unique postdoctoral fellowship program gave me the opportunity to join any laboratory at UT Southwestern. At the time, I was very interested in RNAi technology, so I entered the laboratory of Michael A. White, a scientist who utilizes RNAi technology to study cellular signal transduction pathways. Initially, my project focused on understanding the role of BRAF kinases in melanocyte transformation, but it quickly became clear to me that there were too many groups working in this area that had too much of a head start. Louis Pasteur famously said “chance favors the prepared mind”. My “chance” came when my mentor wandered through the lab early one morning and asked me “Hey Anand, I just worked out a deal where we will be the first or second lab nationwide to get a genome-wide RNAi library. Do you have any ideas in terms of an interesting screen you might want to do?” My answer was immediate - we should do an RNAi screen to identify novel regulators of melanogenesis to find out what genes regulated melanogenesis in human cells. I immediately began completing proof of concept experiments for my RNAi screen. I completed a genome-wide RNAi screen to identify novel regulators of melanogenesis before I left UT Southwestern in 2006. When I joined the faculty at UC Irvine in July 2006, I came only with a list of novel putative regulators of melanogenesis. Fortunately, I was able to rapidly set up my lab

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and then validate the results of our RNAi screen, which was published in PLoS Genetics in 2008 (3). This paper identified 92 novel regulators of melanogenesis, a novel drug that can inhibit melanin production, and also identified a novel role for genes that regulate autophagy in melanosome biogenesis. A central focus of our lab has been to characterize how Aldh inhibitors block melanogenesis and also to determine how regulators of autophagy control melanosome biogenesis (4). As my laboratory was (and continues to be) very small, we did not have enough funding/manpower to address two other important questions raised in our screen. Namely, our screen suggested that depletion of some genes stimulated melanogenesis while depletion of other genes differentially regulated melanogenesis in lightly pigmented or darkly pigmented melanocytes (3). These observations raised a fundamental question: are there genes/pathways that specifically stimulate melanogenesis in darkly pigmented melanocytes or specifically inhibit melanogenesis in lightly pigmented melanocytes?

When I arrived at UC Irvine, I not only established my research laboratory but also established my clinical niche in pigmentary disorders and vitiligo. While at UT Southwestern, I had worked with Amit Pandya, a vitiligo expert, and had gained expertise in treating vitiligo patients. At UC Irvine, I was on my own, trying to develop new treatment approaches for patients with vitiligo and other pigmentary disorders. While much of the scientific community has focused on vitiligo etiology, it became abundantly clear that my patients cared little whether their vitiligo was caused by oxidative/cellular stress or was autoimmune in etiology (5). They said to me “doc, make the pigment come back”, and the only way to do that was to stimulate the melanocytes to produce more pigment. I found early on that immune-directed therapies were not very effective in treating vitiligo patients (6). I feel that the primary reason light therapies work to treat vitiligo is because they are capable at inducing melanocyte stem cells within hair follicles to differentiate and produce pigment (7, 8). Conceptually, I felt that the excimer laser could be a more effective method to stimulate melanogenesis, and convinced the chairman of the department to let an excimer company loan us a laser. Unfortunately, the department couldn’t afford to hire staff to operate the laser, so I had to perform the treatments myself. What became clear after many light treatment sessions was that light skinned patients often seemed to have some improvement with the laser, but the improvement was limited because they were unable to tolerate significant dose escalation. Darkly pigmented patients, on the other hand, improved significantly with the laser treatment for two reasons: their response to the light was more rapid and also they could tolerate higher doses than light skinned patients. This phenomenon has not been well documented in the literature (9). Nonetheless, these observations started me thinking - does lightly-pigmented skin not tan as effectively because they express genes that inhibit pigment production?

After these initial observations, I began to examine more closely the appearance of skin diseases in dark skinned patients. An increasing number of darkly-pigmented patients in my practice complain of hyperpigmentation around the eyes that is not secondary to hemosiderin deposition (10). In addition, I noted that males with darkly pigmented skin often exhibit melasma, a disorder that had been thought to be limited primarily to women (11). Interestingly, I also started to accumulate a large proportion of patients in my practice with pigmented lichen planus (12). This disorder, which is not seen in light-skinned individuals, exhibit similar patterns of inflammation as typical lichen planus but presents with pigmentary alterations as opposed to erythema. Other studies have demonstrated that disorders such as acne and atopic dermatitis often present with pigmentary changes in darkly pigmented individuals, which is not as frequently observed in lightly-pigmented individuals (2). When coupled with my observations in vitiligo patients, I came to the conclusion that there was an intrinsic difference in the melanogenesis regulatory mechanisms in darkly pigmented and lightly pigmented melanocytes - namely
inflammation/ skin disease can easily stimulate melanogenesis in dark skin where it is unable to do so in light skin.

Extensive biochemical and genetic studies have identified over 150 novel genes that regulate melanogenesis (13). Many of these studies have focused on characterizing human and mouse genetic mutations that result in loss of pigment. My recent clinical observations suggest that there may be an intrinsic difference in the response of light-skinned and dark-skinned melanocytes to stimuli. These observations raised an interesting question - is the answer to treating vitiligo discovering what makes dark skin darker as opposed to determining what makes vitiligo white? Our laboratory is now starting to try to answer these questions. We are currently characterizing new cellular pathways that stimulate melanogenesis, and also trying to identify genes that suppress melanogenesis in lightly-pigmented skin. Additional studies are focusing on which of the genes identified in our screen regulate pigment differences. We hope that in the future this unique approach will lead to the design of improved agents to treat vitiligo and other pigmentary disorders.

References:


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POSITIONS WANTED/AVAILABLE

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A **postdoctoral fellowship** position is **immediately available** in the laboratory of

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