



PARTNERSHIP FOR
clean competition

Research Insider

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How Scientific
Collaboration is
Fighting Growth
Hormone Abuse
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Conference:
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From the Desk of the ED

Our 2015 Conference will be a tough act to follow. Luckily, the investigators we fund never cease to amaze us with incredible technological advancements that we can't wait to share with you.

After hearing that 100% of 2015 conference attendees would recommend our event to friends and colleagues, we knew two things:

- First, PCC funded investigators are leading the charge to scientifically deter doping in sport through their brilliant approaches to pervasive challenges, and it's amazing to watch.
- Second, in 2017 we'd need to step up our game even further to match the excitement catalyzed by our 2015 event.

After confirming this year's speakers, I've no doubt we've done just that.

This year, we're unveiling some fascinating novel technologies and, equally important, the factors surrounding their implementation in real world anti-doping settings. I'm also thrilled that nearly 10 years since the release of the MLB Mitchell Report - the document that catalyzed the robust anti-doping programs we see in Major League Baseball today - Commissioner Rob Manfred will be discussing MLB's inspiring journey to rid the league of PEDs. We are also honored to hear from Mr. Richard McLaren regarding his take on the recent doping scandals, and are delighted to present the PCC Contribution to Anti-Doping Award to Yulia Stepanova for her courageous and important contributions to clean sport. While the PCC Conference is now sold out, I urge you to take a look at the full agenda starting on page 5 to see if you'd like to get on the waiting list.

This month, we are also excited to present a behind-the-scenes look at one of our most unique and successful approaches to solving a global anti-doping challenge: the IGF-1 Working Group. Starting on page 2, this month's featured research highlights the vital importance of a collaborative approach to scientific inquiry.

Looking forward to all that 2017 has to offer,
Michael Pearlmutter

The Conference Issue!

A First Look at Speakers, Topics, and Highlights.

Research Spotlight: Growth Hormone Biomarkers Test

Dr. Andy Hoofnagle, MD, PhD talks to the PCC about the IGF-1 Working Group, which designed a biomarkers test for growth hormone detection implemented in WADA labs late 2016.



Photo Credit: msacl.org

In 2012, the PCC assembled a team of researchers representing five distinct laboratories around the world: Dr. David Cowan of King's College London Drug Control Center, Dr. Andrew Hoofnagle of the University of Washington, Dr. Mario Thevis of the Sport University Cologne, Dr. Daniel Eichner of the Sports Medicine Research and Testing Lab, and Dr. Anthony Butch of the UCLA Olympic Analytical Laboratory. In 2013, Dr. Richard Holt from the University of Southampton was added to the team.

Their goal? To develop a test to precisely and reliably detect growth hormone (GH) abuse in samples analyzed by WADA-Accredited and clinical laboratories worldwide. More specifically, the group set out to develop a mass spectrometry method to improve upon a serum-based GH-biomarkers assay previously approved for the London 2012 Games, as well as improve upon and offer an alternative to the GH-isoforms assay already in place at WADA-Accredited laboratories for a number of years.

If the history of GH detection attempts were any indication, the task would be challenging.

A Brief History

The PCC Working Group was not the first attempt to rid the sporting world of GH abuse. According to Dr. Larry Bowers, USADA's Chief Science Officer from 2000-2016, a renaissance in GH detection was led by his team via the USADA grant program in 2001, which resulted in a GH-isoforms method used at the 2004 Olympic Games in Athens. Knowing yet more work was needed, a USADA-WADA GH Working Group was formed in 2005, with USADA supporting development of a 'biomarkers' approach to GH detection, and WADA supporting the isoforms test. Yet, many issues existed with the available immunoassays for GH detection. Finally, in 2011, mass spectrometry techniques became advanced enough to apply the technology to the GH problem, and with Dr. Bowers leading the charge, five laboratories were invited to join the newly formed PCC IGF-1 Working Group.

A Renewed Approach

While anti-doping scientists were aware a hormone called 'Insulin-like growth factor 1' (IGF-1) was a well characterized biomarker (or measurable indicator) of growth hormone abuse, researchers had yet to develop a test that could produce standardized results across laboratories. (continued on page 3)

Research Spotlight: Growth Hormone (Contd.)

Inter-laboratory agreement is integral within the context of the anti-doping movement, as the reliability of initiatives such as the Athlete Biological Passport (ABP) rest upon the ability to collect and compare longitudinal data from individual athletes in multiple laboratories.

To be successful, the newly formed PCC IGF-1 Working Group would need to both enhance scientific methods of quantification of IGF-1 serum and assure inter-laboratory agreement across tests. They proved equal to the assignment.

Led by the significant expertise of Dr. Larry Bowers, who helped with idea generation, ensuring equal dissemination of PCC funding, and data summation throughout the project, the group pooled the knowledge of their multi-disciplinary backgrounds to address the complex research questions posed by the project.

The Working Group focused their efforts on using Liquid Chromatography - tandem Mass Spectrometry (LC-MS/MS) to detect IGF-1 serum with the knowledge this method was proven to achieve useful limits of quantification in small molecules. After months of combined effort, the team was successful in creating and validating a new IGF-1 MS method which made quantification of IGF-1 much easier to achieve, while proving instrumental in calculating new decision limits for the GH-biomarkers assay.

“This was one of the most collaborative projects I have ever worked on. We were truly “developing” and “implementing” a standard operating procedure that could be launched in any laboratory in the world.”

- Dr. Andy Hoofnagle

The Power of Partnership

While the creation of the new IGF-1 MS method was impressive, it was the Working Group’s ability to collect and compare accurate results across labs that was truly unique. Each laboratory used different LC-MS/MS equipment during the study, mirroring the reality of fluctuating instrumentation across WADA-Accredited labs. Led by Dr. Hoofnagle and Dr. Holly Cox of SMRTL, inter-laboratory comparison began.

The team’s ability to work collectively, yet remotely, proved invaluable. Says Dr. Hoofnagle, “This was one of the most collaborative projects I have ever worked on. We were truly ‘developing’ and ‘implementing’ a standard operating procedure that could be launched in any laboratory in the world. It was only one of many projects ongoing in all of our laboratories. We communicated via teleconference (and then by email). There were some experiments that were only done in one or a few labs, but part of what we needed to do was prove that we could do the assay in any lab.”

To showcase the level of collaboration, different labs were responsible for performing different pieces of the project. Dr. Hoofnagle explains, “While they haven’t been published, the group at King’s College (led by Dr. David Cowan) did a lot of important validation studies...while [Dr. Cox] and I led the efforts to perform the inter-laboratory comparison study along with performing many of the experiments to identify what the most useful calibrators would be.” In particular, after determining that variation due to instrumentation was minimal, Dr. Hoofnagle and co. assessed variation due to the external calibration of instruments, finding single point calibration to produce the most consistent inter-laboratory results. “Our focus on calibration was paramount in getting similar results across laboratories,” he confirms. (continued on page 4)

Research Spotlight: Growth Hormone (Contd.)

According to Dr. Hoofnagle, it was the Working Group's diligence in discerning the cause of imprecision, not the methodology alone, that contributed so greatly to advancing growth hormone detection: "Truly, the quantification method could have applied to any protein. LC-MS/MS [...] is an important, novel technology that will help clinical and anti-doping labs in general, but it has been around for a while. The collaborative validation of the assay [across labs] was the most important contributor to success."

Through consolidating their scientific acumen and diverse resources, the IGF-1 Working Group successfully decreased inter-laboratory variability for Growth Hormone Detection from 33.5% (as measured by the College of American Pathologists from 2011-2013) to 11.1%, which is below the goal of 15% total allowable error suggested by the Royal College of Pathologists of Australasia.

The test developed by the IGF-1 Working Group was instituted in WADA-Accredited labs in late 2016. We congratulate the PCC IGF-1 Working Group on providing this advance to the deterrence efforts of all stakeholders of the Clean Sport Movement.

For more information, please email jcelmer@cleancompetition.org, or access the published works of the IGF-1 working group, including their most recent article in Clinical Chemistry via <http://www.cleancompetition.org/funded-projects/>.

PCC Working Groups

Speeding the pace of discovery in priority areas



The PCC provides funding for teams of anti-doping research experts to work together on some of the most important challenges facing clean sport. Called PCC Working Groups, such teams consist of both WADA-Accredited Lab Directors and leading scientists who pool their acumen and resources to address anti-doping challenges faced by professional sporting leagues and the Olympic Movement. The program offers the opportunity to foster and promote international collaboration between distinguished scientists across the globe, ensuring an interdisciplinary approach to complex research questions. This challenge-led funding mechanism, fueled by the identification of priority challenges by PCC Sponsors and the Scientific Advisory Board, complements individual research projects and strengthens the PCC's capacity for research and innovation. To date, PCC Working Groups have resulted in enhanced testing methodologies, increased substance knowledge, and increased analytic reliability across laboratories.

The 2017 PCC Conference

April 11 & 12, 2017
Major League Baseball HQ, NYC
- Sold Out -

The 2017 PCC Conference will bring together anti-doping stakeholders from around the world for a collective discussion surrounding the year's biggest advances in anti-doping science, and the best ways to implement new technologies into the labs, sports, and agencies fighting for clean sport.

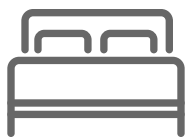
Registration Includes:

Conference fees include access to all symposiums and demonstrations held in Major League Baseball Headquarters April 11 and 12 (including breakfast both days and lunch Tuesday, April 11), as well as entrance to the Welcome Reception the evening of Tuesday, April 11, and CME credit through the UCLA David Geffen School of Medicine.



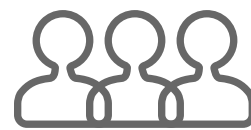
Sponsorship

Limited sponsorship opportunities for the 2017 PCC Conference are available. Please contact Jenna Celmer via jcelmer@cleancompetition.org for details.



Accommodations

The PCC has reserved a limited number of rooms at the New York Marriott East Side for attendees wishing to stay near MLB HQ. To book a room, visit cleancompetition.org/conference/accommodations/



Wait List

Due to overwhelming response, we have created a wait list for those wishing to attend #PCC2017. Please contact Jenna Celmer via jcelmer@cleancompetition.org to get placed on the list.

PCC Conference Agenda

Tuesday, April 11:

Registration and Breakfast

7:00 AM – 8:30 AM

Welcome Announcements & PCC Update

8:30 AM – 8:50 AM



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Mr. Michael Pearlmutter, PCC

2016 in Review: A Look at Anti-Doping

8:55 AM – 9:25 AM



USADA

Dr. Larry Bowers, USADA (Ret.)

Logistics, Benefits, and Challenges of Alternative Matrices

9:30 AM – 10:10 AM



UNIVERSITY OF MARYLAND
SCHOOL OF MEDICINE

Dr. Marilyn Huestis, University of Maryland School of Medicine



antidoping.ch

Mr. Matthias Kamber, Anti-Doping Switzerland



Tuesday, April 11 (Cont.):

Alternative Matrices: Dried Plasma Spots

10:15 AM – 10:55 AM



 **Q² Solutions**
Quantum Quality Control Solutions

Dr. Jack Henion, Q² Solutions

Break

10:55 AM – 11:10 AM

Alternative Matrices: Breath Technology

11:10 AM – 11:55 AM



 **Deutsche
Sporthochschule Köln**
German Sport University Cologne

Dr. Mario Thevis, German Sport University Cologne

Policy Considerations Panel: Alternative Matrices

12:00 PM – 12:45 PM



Mr. Andy Levinson, PGA TOUR



UFC
Ultimate Fighting Championship

Mr. Jeff Novitzky, UFC



Mr. Dan Halem, MLB

Tuesday, April 11 (Cont.):

Lunch

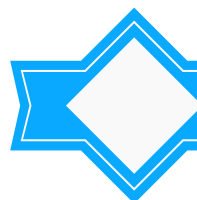
12:45 PM – 1:45 PM

PCC Awards

1:45 PM – 2:30 PM



Yulia Stepanova, Athlete and Whistleblower



TBD

The Five Most Important Things that Came Out of Research in 2016 for Labs

2:35 PM – 3:10 PM



Dr. Daniel Eichner, SMRTL



Dr. Peter Van Eenoo, DoCoLab Ghent

Next Generation Technologies

3:15 PM – 4:00 PM



Dr. Chris Harrison, SDSU



Tuesday, April 11 (Cont.):

Anti-Doping's Next Generation: PCC Fellows

4:05 PM – 4:35 PM



Dr. Geoff Miller, SMRTL



Dr. Liying Jiang, King's College London

Break

4:35 PM – 4:50 PM

Olympic Athlete Perspective on Doping

4:50 PM – 5:20 PM



Alysia Montano, US Olympian

Networking Reception

5:30 PM – 7:00 PM

Location to be determined

Wednesday, April 12:

Breakfast

7:30 AM – 8:30 AM

PCC Translational Research Fund

8:30 AM – 8:55 AM



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Mr. Michael Pearlmuter, PCC

Translational Research Talk

9:00 AM – 9:30 AM



Dr. Tom Brenna, Cornell

Doping Scandals: Implications for Research

9:35 AM – 10:20 AM



Mr. Richard McLaren, University of Western Ontario



Dr. Bryan Finkle, NFL



Dr. Gary Green, MLB



Wednesday, April 12 (Cont.):

Panel of Scientific Advisory Board members

10:25 AM – 11:05 AM



Dr. Mike Sawka, PhD

Georgia Institute of Technology



Dr. Ai Matsumoto, MD

University of Washington
School of Medicine



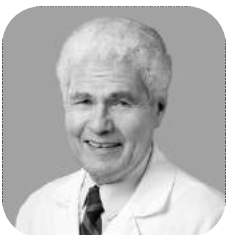
Dr. Steve Elliott, PhD

Amgen (ret).



Dr. Gary Green, MD

Major League Baseball



Dr. Larry Silverman, MD

University of Virginia



Dr. John Yates, PhD

The Scripps Research Institute



Dr. Larry Bowers, PhD

USADA (ret).



Dr. Bryan Finkle, PhD

National Football League
(consultant)



Closing Speaker

11:15 AM – 12:00 PM



Commissioner Rob Manfred, MLB

PCC Conference Patronage

A selection of the organizations that will be represented at the PCC Conference



anti**doping**.ch



Western
Law

INRS
Université d'avant-garde

Sheffield
Hallam
University



Deutsche
Sporthochschule Köln
German Sport University Cologne



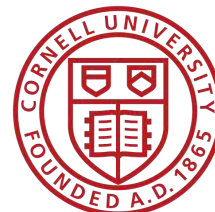
Karolinska
Institutet



ThermoFisher
SCIENTIFIC



SAN DIEGO STATE
UNIVERSITY



AMGEN



iNADO



TEAM
USA



Drug Free Sport™



Congratulations Corner

Travel Grants Awarded

We are excited to announce the recipients of the 2017 PCC Travel Awards. Awardees were chosen from a pool of candidates showcasing great interest in anti-doping and potential in the field. We thank all of our applicants for their interest in the conference and contribution to the clean sport movement.



Dr. Tom Bassindale is a Forensics and Analytical Science Lecturer at UK's Sheffield Hallam University. Tom completed his PhD at the UK's World Anti-Doping Agency accredited laboratory at King's College London, under the supervision of Dr. David Cowan and Dr. Andrew Kicman.



Dr. Laura Garvican Lewis is a Research Fellow at the Australian Institute of Sport and Australian Catholic University and was awarded a PCC grant in 2015 to study the combined effects of altitude and iron supplementation on the Athlete Biological Passport.



Dr. Jacob Bejder is a Danish PhD Scholar at the University of Copenhagen, Department of Nutrition, Exercise, and Sports. He began his work within the field of anti-doping during completion of his bachelor degree in Sports and Health at the University of Southern Denmark in 2012.



ACS Program in a Box



Dr. Liying Jiang, PCC Fellow at King's College London will present for the American Chemical Society's February Program in a Box! The program is an interactive event designed for young chemists to learn about the diverse applications of chemistry. Dr. Jiang, alongside mentor Dr. David Cowan, will highlight the important role of chemistry in the world of anti-doping and show how analytical chemistry is advancing to detect performance enhancing substances.

For more information visit acs.org/content/acs/en/acs-webinars/program-in-a-box.html

SAB Keynote Address



SAB member Dr. Bryan Finkle has been chosen to give the keynote address at the 50th Anniversary of the California Association of Toxicologists.



Currently Chief Consulting Toxicologist to the National Football League, and consultant to the World and U.S. Anti-Doping Agencies, Dr. Finkle is a founding member of the California Association of Toxicologists. His address will speak to the history and advancements in toxicology in California during the 1960s-90s, as well as the creation of important new fields for toxicologists, such as sports anti-doping science, and the research endeavors of the PCC.

For more information visit cal-tox.org

Experimental Biology 2017



PCC SAB members Dr. Larry Bowers and Dr. Steve Elliott, and anti-doping researchers Dr. Daniel Eichner, Dr. John Higgins, and Dr. Yorck Olaf Schumacher will participate in the symposium "Blood Doping: Physiology, Pharmacology, and Detection Challenges" at the American Physiological Society's 2017 Annual Meeting. The group aims to review the current status of blood doping in sports, promote discussion regarding improved detection and deterrence approaches against blood doping, and encourage scientists to apply for available funding to conduct novel anti-doping research from the Partnership for Clean Competition.

For more information visit experimentalbiology.org

Grant Deadline Reminder

In 2016, 43% of grant applications submitted during regular cycles were recommended for funding by the PCC Scientific Advisory Board.



**Apply for a PCC
Grant or Fellowship:**

Pre-Applications Due March 1, 2017

Full Applications Due April 1, 2017

CleanCompetition.org

Future Cycles: July/August 2017 and November/December 2017

CleanCompetition.org

#beyondresearch



The PCC Congratulates the PGA TOUR



The PGA TOUR has renewed its commitment as a PCC Contributor. The four-year investment will fund research integral to the protection of authentic competition and player health and safety.

Upcoming Dates

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**2017 Round One
Pre-Applications Due**

March 1, 2017



**Athlete Biological
Passport Conference**

March 11-12, 2017

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**2017 Round One
Full Applications Due**

April 1, 2017



ENDO Annual Meeting

April 1-4, 2017

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2017 Conference in NYC

April 11-12, 2017



APS Annual Meeting

April 22-26, 2017



ACSM Annual Meeting

May 30-June 3, 2017



AARHUS UNIVERSITY

**International Network of
Doping Research (INDR)
2017 Conference**

August 24-25, 2017

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