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Research Insider



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18 months.

That's how far in advance the first email regarding PCC 2019 was sent. While science has always been (and will remain) the main focus of our organization, in 2019 we wanted to shift the dynamic just a bit and highlight scientific research not in isolation, but through the prism of the holistic anti-doping landscape. In those 18 months our two-person organization, with the help of too many people to mention here, managed to curate a three day platform for honest, authentic, and open anti-doping debate that 96% of attendees said they'd love to attend in the future. It was by far our largest event to date, and I believe, our most meaningful. The PCC came away with ideas for practical improvements to our programming (stay tuned!), a greater understanding of the challenges faced by our stakeholders, and newly forged or strengthened relationships that will help us, and the anti-doping movement, continue to grow. I could not be prouder.

We have included some key statistics, feedback, and takeaways from the event within this issue. If you joined us, thank you for showing up for fans and athletes the world over. This will be a hard one to top (but we're up to the challenge).

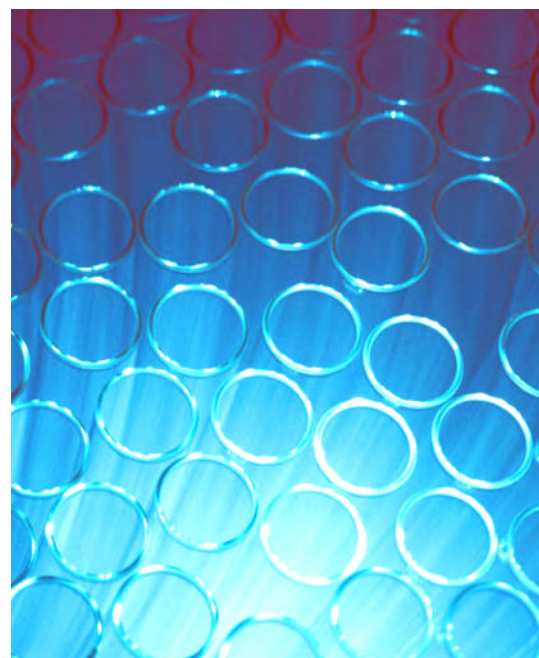
However, the conference was not the only thing the PCC was up to this year. Behind the scenes, the PCC was still funding and implementing research and facilitating critical discoveries. This issue also highlights some of the incredible things that happened in anti-doping science in the lead up to the conference, including the micro-grant that saved the blood testing abilities of the US professional leagues, newly available steroid reference materials, upcoming events in anti-doping, an update on the PCC Working Group tackling blood doping, and the unveiling of our newest PCC Member organization

Oh, and we also funded \$3.8M in research last year thanks to all of the amazing applications we received. Our goal is to fund even more in 2019, so if there is anyone in your network who may be eligible for our support, please send them to cleancompetition.org. We'd love to hear from them.

Respectfully,
Michael Pearlmutter



A PCC Micro-Grant Saves Pro League Blood Testing



New Steroid Reference Materials Available



Highlights and Takeaways from PCC 2019

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Presents the

**ANTI-
DOPING
POD-
CAST**

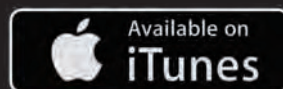


Streaming Every Other Tuesday

**IT'S HARD TO KEEP UP WITH DEVELOPMENTS IN THE ANTI-DOPING WORLD.
WE'VE MADE IT EASIER.**

Featuring the athletes, scientists, policy makers, sports leagues, attorneys, and other clean sport champions who are driving change, disrupting technology, and identifying how we as a community could be doing better.

Listen and Share:



Want to sponsor or be a guest of the Anti-Doping Podcast? Great Choice. Contact Jenna Celmer via Jcelmer@cleancompetition.org.

CLEAN SPORT

Crisis

HOW A PCC MICRO-GRANT MITIGATED AN IMMINENT DRUG TESTING DISASTER FOR US-BASED SPORTS.

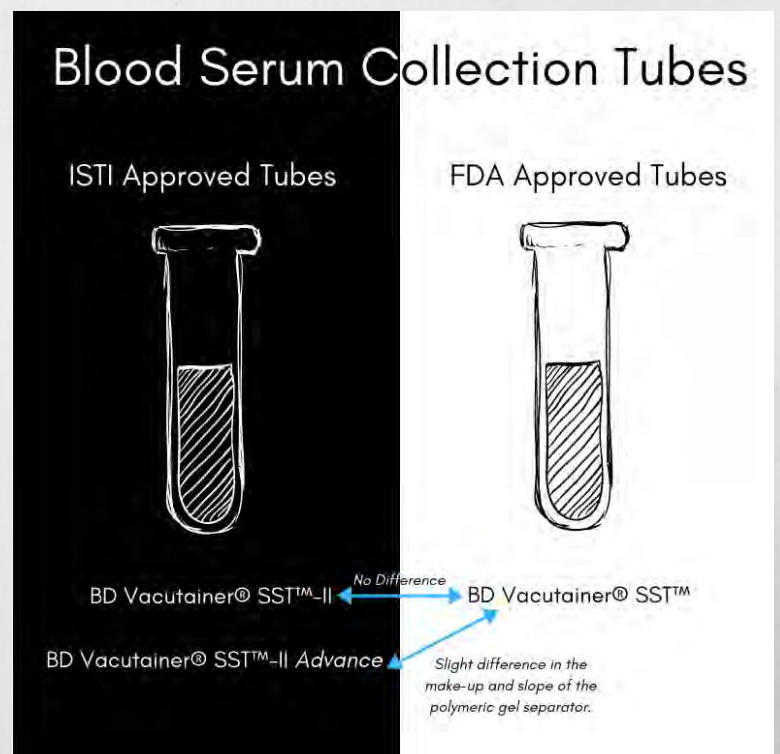
Blood testing is an integral part of any anti-doping program. However, the ability of US Professional Sporting Leagues to perform such tests was recently threatened by a lack of blood collection tubes. Using its quick-funding Micro-Grant mechanism, the PCC was able to facilitate the R&D required to protect the drug testing capabilities of its Members.

While urine is perhaps the most well-known and widely used sample collection medium for sports anti-doping analysis, many large proteins and biological markers (specifically those indicating anabolic agents) are not effectively or reliably measured in the urine matrix. Blood collection is therefore a vital aspect of any comprehensive drug program. In 2017 alone, nearly 55,000 anti-doping blood tests were carried out, half of these conducted on serum samples.

However, a recent update in FDA regulations meant that the tubes approved for serum collection according to International Standard for Testing and Investigations (ISTI) Collection Guidelines were no longer available for purchase in the USA.

Blood testing for US based WADA Code signatories, as well as professional and amateur sporting organizations, was halted indefinitely. Clean sport was at risk.

While the FDA had approved a similar blood tube available for US purchase, it was unclear how they compared with the existing versions. As anti-doping programs such as the Athlete Biological Passport rely upon uniform quantitative results from all laboratories worldwide, understanding any differences between the tubes in terms of sample collection, shipping, and/or laboratory analysis was critical before the ISTI could approve the new tubes.



CLEAN SPORT

Crisis

Alerted to the problem by its Members, the PCC snapped into action. **Within days, investigators from the Sports Medicine Research and Testing Laboratory (SMRTL) had the required funding** to verify whether comparable results from the common anti-doping analytes hGH, PIIINP, and IGF-1 are obtained from both the new SST, and existing SST-II Advance tubes.

“Based on these results, it is suggested that SST and SST-II Adv tubes can be used interchangeably for anti-doping blood collections and laboratory analyses.”

- Dr. Daniel Eichner, SMRTL

The study, which utilized identical serum samples across multiple methods, found high measurement correlation and minimal bias across each of the three analytes being studied, demonstrating comparability between the two collection tubes. Additionally, Bland-Altman analysis of the data did not suggest any increase in variability due to high or low concentrations, and showed LoAs around the expected intermediate precision of the assays.

The results validated the new tubes as a viable alternative to the existing models, and were the confirmation required for US laboratories to resume blood testing procedures, much to the relief of American-based sport leagues: “Blood testing is a vital aspect of any effective anti-doping program, and the ability to collect and test samples is dependent on access to validated equipment. When MLB and drug testing partners unexpectedly faced concerns with the availability of blood collection equipment last year, the PCC was able to quickly and efficiently facilitate and fund critical research at the Sports Medicine and Testing Laboratory (SMRTL) to address the issue through its micro-grant mechanism, to the benefit of MLB and all sport drug testing programs in the United States,” said Jon Coyles of Major League Baseball.

The PCC is proud of its ability to quickly and effectively address the concerns of its Members, and our stakeholders the world over through our Micro-Grant mechanism. So far in 2019, the PCC has leveraged the program to fund more than \$331K across five unique projects, supporting investigators in four countries.

Micro-Grants

Available for projects:

- Requiring up to \$75,000 USD
- Requiring up to six months to complete
- Generating preliminary data OR solving an imminent anti-doping challenge

“Having the agility and resources to address key anti-doping challenges immediately is a defining feature of the PCC, and a critical asset for maintaining the quality of anti-doping programs across sport”. – Dr. Daniel Eichner

Investigators world wide may apply via CleanCompetition.org

A SELECTION OF SCIENTIFIC UPDATES

HEMATOLOGY

Steve Elliott, Mike Sawka, and Larry Silverman (PCC SAB); Daniel Eichner and Geoff Miller (SMRTL); Jen-Tsan Chi (Duke University); James Cox (University of Utah); John Higgins (Massachusetts General Hospital); Merav Socolovsky (University of Massachusetts Medical Center); Nikolai Nordsborg and Jacob Bejder (University of Copenhagen); and Maziyar Baran Pouyan (Accenture Artificial Intelligence Laboratory)

The PCC Performance Hematology Working Group's (PHWG) goal is to develop strategies to identify athletes employing illicit blood doping (Autologous or Homologous Transfusion, Erythropoiesis Stimulating Agents). Plans were made in January at the Sports Medicine Research Laboratory (SMRTL) in Salt Lake City, UT, to develop strategies. Future human studies are planned and will be performed by SMRTL and the University of Copenhagen. They will examine novel biomarkers to identify blood doping and will also use machine learning algorithms to analyze the data. A series of teleconferences and a meeting at the PCC Conference in London were held, with a future meeting planned for December in Boston.

NANOMATERIALS

Nicolas Voelcker, David Rudd, Taryn Guinan, Hashim Alhmoud, and Rajpreet Minhas (Monash University & the Commonwealth Scientific & Industrial Research Organisation (CSIRO))

Novel doping agents and strategies continually enter the market, necessitating rapid, flexible, and non-selective methods that can detect novel substances and subtle changes in biological samples. New nanomaterials could help meet this need, allowing fast and sensitive detection of growth hormone peptides, anabolic-androgenic steroids, and banned stimulants within seconds. In particular, nanomaterial "chips" allow the profiling of prepared biological samples to obtain a snapshot of metabolites, steroids, peptides, drugs, and drug metabolites using a mass spectrometry technique called laser desorption ionization (LDI-MS), which allows analysis in less than 2 seconds from small sample volumes ($\leq 1 \mu\text{l}$). LDI-MS is also built for high-throughput analysis, where 96 samples can be analyzed in 3 minutes. The PCC funded nanomaterials could sensitively detect growth hormone releasing peptide-6, multiple androgenic-anabolic steroids, and stimulants including morphine and oxycodone in several body fluids. Further optimization with a wider range of doping agents, field tests, and validation could see nanomaterial-interfaced mass spectrometry transform athlete doping testing.

P-III-NP

Danielle Moncrieffe (Drug Control Centre, King's College London)

Procollagen III amino-terminal propeptide is an important biomarker for detecting growth hormone administration, and studies investigating its detection in blood have been ongoing since 2014. Dr. Moncrieffe confirms: "We have successfully measured P-III-NP in blood by liquid chromatography - mass spectrometry. Development of traceable peptide standards is the next step to delivering a quantitative method of measurement. We have synthesised peptide standards for P-III-NP that we currently verifying. Measurement of the GH biomarkers, IGF-I and P-III-NP, by LC-MS will enable more laboratories to carry out testing."

GRANT DEADLINE

Pre-Applications Due July 1, 2019

The PCC Scientific Advisory Board recommended more than **\$3.8M USD** in research funding during 2018 cycles. Researchers from **11** countries were funded.



Apply for a PCC
Grant or Fellowship:

Pre-Applications Due July 1, 2019

Full Applications Due August 1, 2019

CleanCompetition.org

**Future Cycles: November/December 2019 and
March/April 2020
Micro-Grants Accepted Year-Round.**

NEWLY AVAILABLE

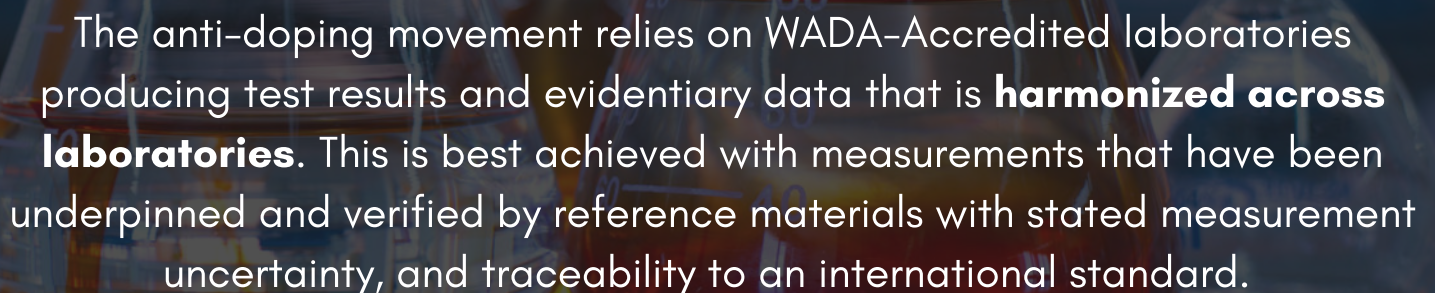
Reference Materials

A NEW STEROID CRM IS NOW AVAILABLE FROM THE NATIONAL MEASUREMENT INSTITUTE, AUSTRALIA

NMIA MX018, a new Certified Reference Material prepared under PCC funding is now available to assist WADA-Accredited laboratories in validating their accuracy and traceability for stable carbon isotope measurements in accordance to the WADA Technical Document TD2019IRMS.

WADA-Accredited lab staff may request materials by emailing chemref@measurement.gov.au

This CRM consists of thirteen pure steroids distributed into 3 ampoules (MX018-1, MX018-2 and MX018-3), each consisting of a mixture of target (TCs) and endogenous reference compounds (ERCs) certified for $\delta^{13}\text{C}$ values. Each ampoule mixture can be independently or collectively used for calibration of IRMS for $\delta^{13}\text{C}$ measurement of TCs and ERCs in urine samples.



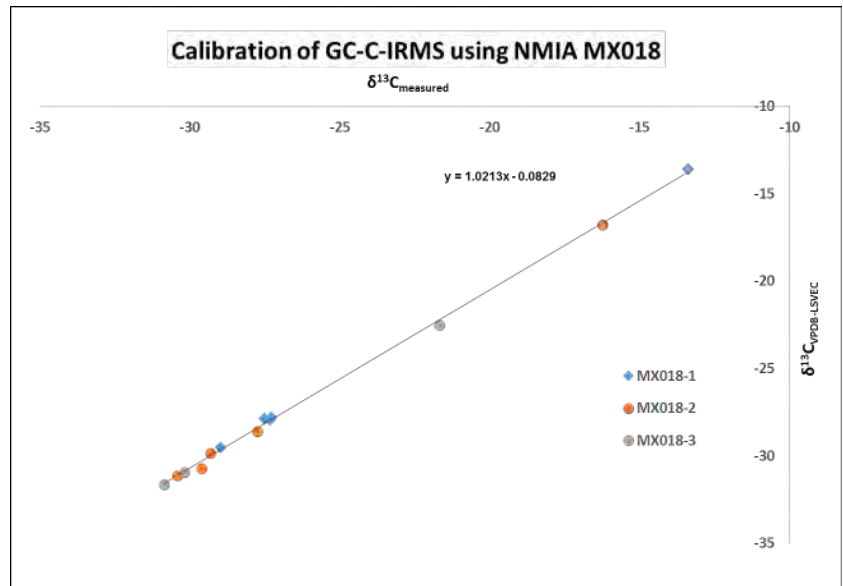
The anti-doping movement relies on WADA-Accredited laboratories producing test results and evidentiary data that is **harmonized across laboratories**. This is best achieved with measurements that have been underpinned and verified by reference materials with stated measurement uncertainty, and traceability to an international standard.

The Process

THE MAKING OF CRM MX018

HOW WERE THE MATERIALS DEVELOPED? READ ON.

The $\delta^{13}\text{C}$ values of the target steroids were certified using Elemental Analysis (EA-IRMS) and confirmed by Gas Chromatography Carbon Isotope Ratio Mass Spectrometry (GC-C-IRMS) using two GC columns (DB17ms and VF5ms). These are the first steroid mixtures



which have been certified with such low expanded uncertainties from 0.16 to 0.54 ‰ and have metrological traceability to the international VPDB-LSVEC scale. Analysis of the ampoule mixtures via the GC-C-IRMS technique has demonstrated a linear correlation of >0.999 is possible between the measured and certified $\delta^{13}\text{C}$ values (Figure 1). The use of these CRMs in calibration of the GC-C-IRMS will allow measurement of $\delta^{13}\text{C}$ in unknown samples to be normalised to the VPDB-LSVEC via the identical treatment principle and eliminate the need to accurately know the $\delta^{13}\text{C}$ of the reference CO_2 gas. When the CRM is applied for calibration on a regular basis, laboratories will obtain valuable information on the performance of their instrument through the quality of their calibration data across the range of delta values over time. The quality of the calibration data will serve as a great performance indicator to signal maintenance required for an underperforming reactor or potential active sites in the system.

WELCOME

TO OUR NEWEST
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Drug Free Sport INTERNATIONAL™

We are proud to announce Drug Free Sport International, who work exclusively with sports organizations and their athletes, has formalized their commitment to anti-doping innovation through PCC Membership. We thank DFSI for their unwavering commitment to clean sport.

PCC MEMBERS ARE THE LIFEBLOOD OF OUR ORGANIZATION



#PCC 2019

HIGHLIGHTS.
TAKEAWAYS.
IMPACT.

APRIL 16-18, 2019. KING'S COLLEGE LONDON.



THANK YOU

to our Conference Sponsors

THE FOLLOWING ORGANIZATIONS MADE THE PCC CONFERENCE NOT ONLY POSSIBLE, BUT EXCEPTIONAL.



#PCC2019 *at a glance*

275
DELEGATES

65
SPEAKERS

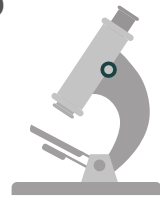
13
SPONSORS

DELEGATES REPRESENTING:

30+ Countries & 150+ Organizations



**INCLUDING 25
WADA LABS**



DEMOGRAPHIC BREAKDOWN

Anti-Doping Orgs
15.8%

Science
27%

Other
15.8%

Sport
12.4%

Media
9.3%

WADA Labs
9.7%

Legal
10%

MEDIA BREAKDOWN

24

MEDIA PERSONNEL

27

DISTINCT PIECES
OF COVERAGE

459K

COVERAGE VIEWS

DELEGATE *feedback*



4.4 Average Overall Rating

4.8 Staff/Event Organization

4.4 Lab Tour Experience

Favorite Sessions:

1. David Howman
2. Scientific Lectures
3. The Future of Anti-Doping

95% of respondents would recommend the PCC Conference to a friend and **96%** would attend another event themselves.

DELEGATE *feedback*



I thought it was an excellent event - rich with interdisciplinary conversation and I hope this will continue to be a feature of the PCC conference going forwards.

I rarely get to hear the athletes' voices at anti-doping meetings, despite the fact that they are the most impacted by these issues.

I really enjoyed hearing about the collectively bargained anti-doping codes of MLB and the NFL in the breakout session because I am interested in the value and pitfalls of collectively bargained rules.

It's hard to choose a favorite talk, as they were all unique, incredibly insightful and valuable.

A greater gender balance at this year's conference was also notable as it does bring a different perspective.

Set the standard for the conversations to be had, and challenging questions that need to be asked and discussed. Gave me chills at points!

The talk "Recent advances in sample collection methodology" was my favorite session, as it is time to think outside the box to improve sample collection and analysis.

Very important and underestimated themes.

In a difficult time in anti-doping, it is reassuring that other perspectives can be considered and that there is a rational and collaborative approach that can ultimately prevail.

#PCC2019 *Takeaways*

After hearing from 65+ experts, listening to delegates, and reviewing feedback, we determined three areas worthy of focus for anti-doping progress.

Anti-Doping Needs More:



INCLUSIVITY

Athletes and other historically disenfranchised voices need to be brought into discussions as a rule, not an exception.



CLARITY

Ensuring clear, mission-focused policies that can be easily communicated and understood by athletes and implementers.



TRANSPARENCY

Discussing advances and challenges candidly & increasing communications between WADA signatories & professional leagues to encourage idea-sharing.

We would love to hear how your organization is evolving thanks to PCC 2019.

ANTI-DOPING OPPORTUNITIES

MedEduCare

Anti-Doping – a Medico-Legal Update

“Who are you calling a cheat?”

28 June 2019 Chandos House, London

Aimed at senior SEMs, sports legal practitioners, and NGB staff with an anti-doping remit, the day will examine issues from the athlete perspective as well as doctors, other medical professionals and lawyers. A maximum of 60 senior practitioners will attend.

The program was developed by Dr Michele Verroken and features speakers such as Richard McLaren, John Amaechi, and Ali Jawad.

Email Barry Hill for a booking form to attend: barryghill@hotmail.com

Did you Publish or Present in 2018?

The PCC is in the process of creating our 2018 annual report and needs your help to ensure the full impact of your work is disseminated to our stakeholders.

Please send the PDF copy, link, abstract, or other relevant information from any publication or presentation resulting from PCC funded research in 2018 to

Jenna Celmer at

jcelmer@cleancompetition.org

UPCOMING Dates

MedEduCare

June 28, 2019

WHO ARE YOU CALLING A CHEAT?

PARTNERSHIP FOR
clean competition

July 1, 2019

**2019 ROUND TWO
PRE-APPLICATIONS DUE**

PARTNERSHIP FOR
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Aug. 1, 2019

**2019 ROUND TWO
FULL APPLICATIONS DUE**

PARTNERSHIP FOR
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Nov. 1, 2019

**2019 ROUND THREE
PRE-APPLICATIONS DUE**

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