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EuCheMS news

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EUCHEMS NEWS

European Analytical Column No. 48°

SLAVICA RAŽIĆ^{1*#} and MARCELA A. SEGUNDO^{2**}

¹Department of Analytical Chemistry, Faculty of Pharmacy, University of Belgrade, Vojvode Stepe 450, 11222 Belgrade, Serbia and ²Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, R Jorge Viterbo Ferreira, 228, 4050-313 Porto, Portugal

The European Analytical Column is the voice of the Division of Analytical Chemistry (DAC) as a Professional Network of chemical societies and their members working in all fields of analytical sciences within the European Chemical Society (EuCheMS). Promotion of Analytical Chemistry as an interdisciplinary field and support to members' activities are two of its main goals. This year we will focus on the role of Analytical Sciences on fighting COVID-19. We hope you feel inspired!

DAC–EuCheMS activities

One of the main activities of DAC–EuCheMS is the promotion of organization of Euroanalysis conference. Every two-years, one of the participating scientific chemical societies will host Euroanalysis, with active involvement of local scientists in the organization. Last year the Turkish Chemical Society organized Euroanalysis XX in Istanbul (<http://euroanalysis2019.com/>) from 1 to 5 September with two chairs, Prof. Dr. Sibel A. Özkan (Ankara University) and Prof. Dr. Mehmet Mahramanlioğlu (Istanbul University), and it was a successful event with more than 600 participants gathered in the campus of Istanbul University. Euroanalysis XXI is scheduled for August 2021 (<http://www.euroanalysis2021.nl/>), chaired by Prof. Dr. Lutgarde Buydens (Radboud University) and it will take place in the beautiful city of Nijmegen, Netherlands under the auspices of the Section Analytical Chemistry of the Royal Dutch Chemical Society and COAST, the Dutch Community of Innovation for Analytical Science and Technology.

* Correspondence E-mails: (*)slavica.razic@pharmacy.bg.ac.rs; (**)msegundo@ff.up.pt
Serbian Chemical Society member.



Other ongoing activities of DAC–EuChemS are performed within Study Groups. These include “Bioanalytics”, “Chemometrics”, “Education”, “Electro-analytical Chemistry”, “History”, “Nanoanalytics”, “Quality Assurance”, and also the recently upgraded Task Force “Sample Preparation”. Please check the DAC–EuChemS website for their reports (<https://www.euchems.eu/divisions/analytical-chemistry/>) and feel free to contact any of the Heads of the Study Groups in order to have more information or to participate in their activities.

Collaboration with other Professional networks within EuChemS is also sought. In particular, DAC–EuChemS and the Division of Chemistry and the Environment (DCE–EuChemS) have exchanged invited lectures and organized special thematic sessions in their last conferences. Finally, one of DAC–EuChemS objectives is to support its delegates on the organization of local events open to the international community through dissemination of the event within the Professional Network. The Steering Committee of DAC–EuChemS will be happy to receive input for additional activities. Feel free to contact one of the following persons: Slavica Ražić, University of Belgrade, Serbia (Chair), Marcela Segundo, University of Porto, Portugal (Secretary), Jiří Barek, Charles University, Czech Republic (Treasurer), Charlotta Turner, Lund University, Sweden, Sibel A. Özkan, Ankara University, Turkey, Lutgarde Buydens, Radboud University, the Netherlands, and Martin Vogel, University of Münster, Germany.

The role of Analytical Chemistry in the context of COVID-19 pandemia

It is undeniable that the emergence of Coronavirus disease 2019 (COVID-19) in the last months have changed the way our society behaves, affecting the daily life across all age groups and posing a life-threat to risk groups. The scientific community and its players became a focus of attention, with many people depositing the hope of a regression to our previous life-style based on immunization of population through vaccines. There is a flood of articles on the COVID-19 crisis with multi-angle and particular approaches. Having in mind an urgent need to get valuable information on yet unknowns, the peer/review process was skipped in a vast number of cases and the judgement on quality and trueness was left to the public. Analytical chemists, as a part of the scientific community, have been seeking for a solid ground of reliable methods, procedures and devices and their validation. The aim of this column is not to provide a list of references with details on analytical methods and devices, because this is a very dynamic field. In fact, more than 1000 papers and reports of different kind have been already published until the end of March.¹ The objective of this analytical column is rather to express the awareness of DAC–EuChemS* members regarding burning demands in connection with analytical issues related to the diag-

*DAC–EuChemS is composed by Delegates, Observers and Guests interested on analytical sciences in general, appointed by the respective Societies and Organizations.

nostics of COVID-19, highlighting the social and economic impact of analysis in this context. As an example, more than three million tests for COVID-19 have been performed daily worldwide (based on data reported on August 17th 2020, 7-day smoothed).² Considering an estimated cost of 100 dollars per test, this represents an estimated expense of 300 million dollars per day for governments/private institutions and/or individuals (and a market opportunity for companies producing these tests).

Essentially, commercially available methods are based on two approaches: *i*) detection of genetic material (or proteins) from SARS-CoV-2 in respiratory tract specimens or *ii*) detection of antibodies against the virus in blood samples. The detection of viral RNA is the only accepted diagnostics to confirm an active infection.³ The samples have to be representative respiratory specimens collected during the early and acute phases of infection. However, negative RT-PCR results from throat swabs may occur in the later infection phase when the virus has migrated into the lung. Antigen tests have some potential for the first approach and could give an information on the infection status, because several proteins on the surface of the coronavirus are able to cause an immunological reaction. However, according to the recent scientific literature antigen tests are still less reliable than RNA tests. Testing for antibodies in blood samples is mainly performed in studies concerning a previous contact with the virus (presence of immunoglobulin G).⁴ Analytical scientists are important here as they understand what is determined/detected in each type of assay and as they can assess and explain the limitations of each approach (limits of detection and quantification, existence of false positive or false negative results).

Another important aspect on implementing testing is the turnaround time. Obtaining a fast response after being tested is essential to implement an efficient outbreak management, with isolation of individuals who tested positive and with quarantine of their contacts, thus minimizing the spread of disease. Currently, this is the only way to break off the chains of transmission.

How can analytical scientists contribute?

Analytical scientists can give a major contribution here, by developing and evaluating innovative and cost-effective approaches to reduce analysis time. This is a highly dynamic area of the greatest importance and attractive for analytical chemists. It is now more widely understood and accepted that scientists are very important players and act on the frontline together with medical experts. The gap between them is narrower than ever before. As a matter of fact, clinical diagnostics, epidemiology and virology profiles are very important in the decision making process. On the other side, fundamental analytical science issues such as scientific data evaluation and the balanced presentation of results is of enormous importance. More than ever, the estimation and inclusion of uncertainties have

become an unavoidable part of all scientific approaches for decision making. In the present scenario, analytical chemists have to do their best to facilitate the communication with other disciplines/specialists/experts. In addition to the aforementioned, there is a grey zone between the roles of scientists and legislators. Nevertheless, the voice of the first party should be listened and taken into account in policy making processes since there is no black-or-white scenario in many cases.

In general, it is important to have sound scientific evidence on the reliability and comparability of most COVID-19 tests as soon as possible. Joint studies and sharing data will contribute to the pooling of efforts for developing the protocols for test validation and standardisation. In line with that, it is mandatory to have corresponding control samples and reference materials for both the manufacturers in carrying out product performance evaluations and for the laboratories validating that performance. Verified, well-characterised reference (control) materials mimicking real patient samples, and reference test methods will allow a giant step forward in COVID-19 testing and contribute by reliable test data to the successful fight against this pandemic crisis. For example, a positive control material for SARS-CoV-2 RNA testing by PCR has been developed in the European Commission's Joint Research Centre in April and it was already sent to reference laboratories in 42 countries around the world.⁵ EURM-019 is a quality control material, not a certified reference material. Still, more quality assurance measures are needed.

How DAC–EuCheMS will contribute?

In the present scenario, the creation of a Task Force on analytical aspects of COVID-19 is an idea, with three objectives in mind:

- to support the provision of information about COVID-19 testing and its analytical challenges for university lecturers on analytical chemistry,
- to disseminate knowledge and best practices for the performance characterisation of methods developed for COVID-19 detection and
- to promote the role of analytical sciences on COVID-19 pandemic.

We would like to invite all interested in this topic to contact us and contribute to this project!

Acknowledgment. Inputs and comments from Hendrik Emons were highly appreciated.

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