Point-of-Care Testing **Edited by: P.B. Luppa**

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Introduction

The point-of-care testing (POCT) working group POCT of the German Society for Clinical Chemistry and Laboratory Medicine (DGKL) organized the 4th Munich POCT Symposium on the subject of **"POCT at the Interface of Emerging Technologies and New Clinical Applications"**. The congress president Peter B. Luppa, TU Munich, organized a total of 10 sessions which were mostly chaired by the members of the POCT working group. The Scientific Committee was formed by Francesco Baldini (Florenz/IT), Roman Fried (Zürich/CH), Maria Luisa Hortas (Marbella/ES), Ralf Junker (Kiel/DE), James Nichols (Nashville, TN/USA), Dirk Peetz (Berlin/DE), Mario Plebani (Padua/IT), Thorsten Prinz (Frankfurt a. M./DE), Robbert Slingerland (Zwolle/NL), and Herbert Stekel (Linz/AT). The local Munich committee was composed of Andreas Bietenbeck, Georg Hoffmann, and Michael Schmolke.

The congress languages were English and German. A connected industrial exhibition with 37 *in vitro* diagnostics (IVD) companies showed the latest POCT devices (Figure 1). Again, an ePoster exhibition with 15 posters in a special session was organized. The posters were available electronically and the authors presented their posters to the attendees on a special monitor such as a picture presentation. As last time, four best posters were awarded again.

The 3-day conference was again a successful event with approximately 400 participants. Due to the wish of the majority of the participants, which was also expressed in an evaluation form, the symposium will be organized again in 2 years. Presentations and photos of the event and the industrial exhibition can be downloaded from the internet at www.poct-symposium.de.

The congress president **Peter B. Luppa** (Munich) (Figure 2) explained that the congress theme was meant as an emblematic kaleidoscope focusing on the emerging and fascinating analytical techniques as well as on evidence-based applications of POCT methods. The congress also offered the opportunity to formulate relevant questions regarding economics, medical care, and patient safety.

The oral presentations within the nine sessions

Session 1 "**Concepts for POCT and eHealth"**, chaired by Andreas Bietenbeck (Munich) and Thomas Streichert (Cologne), was devoted to a variety of information technology (IT) aspects when using stationary, but also ambulatory POCT services.

The first presentation ("*Medical data integration with POCT – new risks and opportunities*") was given by **Andreas Bietenbeck**. He highlighted the chances for POCT in different medical settings and with analyses of variable reliability. Only if data provenance is preserved, POCT measurements can be meaningfully integrated with other medical data.

Then, **Michael Marx** (Lübeck) gave interesting insights on "*eLearning platforms for the recertification of POCT users*" and how this is managed in the university hospital Schleswig-Holstein, Campus Lübeck. With the applied POCTOPUS/LabCollege software, a system was introduced which uses eLearning for the POCT user training. This approach simplifies organization and implementation, as well as automated control and documentation of usage authorizations and user trainings. **Thomas Streichert** (Cologne) reported in his presentation on

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Figure 1: Industrial exhibition at the symposium site.

Figure 2: Peter B. Luppa during his opening speech.

"*POCT IT-concepts – where we want to go from here?*". More details are given in a separate article in this issue of the *Journal of Laboratory Medicine*.

Also, the presentation "*A new approach for quality assurance in POCT by an intra- and inter-hospital QC*", given by **Alexander von Meyer** (Weiden i. Opf.), is the basis for a separate article in this issue.

The final two talks were given by Margherita Morandini (Pordenone/IT) and Stefan Rödiger (Senftenberg). **Margherita Morandini** explained the north Italian approach to POCT in her talk "*The POCT network in a hub and spokes organization of a regional hospital: the Pordenone experience*". She emphasized that since the first implementation in 2003, the use of a POCT system has been evolved to a complex intra- and inter-hospital network, according to the hub and spokes organization of the regional hospital of Pordenone. The author discussed the pros (remote control, supervision by central laboratory, implementation of clinical protocols and algorithms, middleware rules for result release) and cons (issues of information and communications technology [ICT] system, limited user-friendly device for nurses' needs) and described the future developments (new tests, new devices, new organization, new rules for auto-verification result release and test comments). Finally, **Stefan Rödiger** discussed in his presentation the "*Merging of laboratory and point-of-care test methods into an eHealth platform*". As biomarkers of cardiovascular diseases, C-reactive protein (CRP), brain natriuretic peptide (BNP), and cell-free mitochondrial DNA (cfmDNA) were integrated into a microfluidic microbead chip. As readout platform, the author used the real-time multispectral fluorescence microscopy technology. In addition, he developed the open source software digilogger using Shiny technology for data evaluation, visualization, classification, and machine learning.

Session 2 "Innovative POCT applications and companion diagnostics" was chaired by Ralf Junker (Kiel) and Christina Rode-Schubert (Mannheim) and gave three examples of new technologies and applications.

First, **Andreas Calatzis** (Munich) gave insights on "*Coagulation tests in whole blood – state-of-the-art and new developments*". He presented a novel viscoelastic measuring device (ProClot) with pipette-integrated coagulation-activating reagents, and showed comparisons to the established rotational thromboelastometry (ROTEM) and thromboelastography (TEG) systems. **Jörg M. Hollidt** (Henningsdorf) discussed "*POCT in personalized medicine: chances and challenges*". In an inspiring talk, he pointed out many pros and cons of companion diagnostics. **Dana Cialla-May** (Jena) gave the final presentation and explained to the audience the functioning of "*Surface-enhanced Raman spectroscopy for biological and biomedical applications*". The surface-enhanced Raman spectroscopy (SERS) technique is well suitable to detect infectious agents in biological matrices and powerful due to signal amplification of the Raman modes in the vicinity of metallic nanostructures by 6–8 orders of magnitude.

In parallel to sessions 2 and 3, the professional associations of the medical technicians in Germany (DVTA and DIW-MTA) organized a **"Seminar on organizational aspects of POCT management"** which was chaired in part 1 by Christiane Maschek (Berlin) and Anke Urban (Ludwigshafen) and in part 2 by Barbara Oschwald-Häg (Offenburg) and Marco Kachler (Klagenfurt/AT). This seminar was held in German in order to allow non-English speaking technicians the full understanding of the presented contents. Maschek and Kachler present their report in a separate article in this issue of the journal.

Session 3 "POCT for the identification of infectious agents" was conducted by Daniela Huzly (Freiburg) and Norbert Gässler (Hildesheim). The five speakers presented a wide range of relevant topics.

Frank Torsten Hufert's (Senftenberg) talk was entitled "*Development of mobile laboratory for viral hemorrhagic fever detection in Africa*". He described a mobile laboratory transportable on commercial flights to enable local response to viral hemorrhagic fever outbreaks using rapid diagnostic testing. The development progressed from use of mobile real-time reverse-transcription polymerase chain reaction (PCR) assays to mobile real-time recombinase polymerase amplification (RPA) tests. He described the various stages of the mobile laboratory development and gave an overview of mobile laboratory deployments, which culminated in the first on-site detection of Ebola virus disease (EVD) in 03/2014. He explained the successful use in a campaign to roll back EVD cases in Conakry in the West Africa Ebola virus outbreak. Then, **Daniela Huzly** (Freiburg) reviewed comprehensively available infectious disease (ID)-POCT methods in her presentation: "*ID-POCT – present and future*". There is a growing number of assays for the detection of viral or bacterial antigens and even molecular assays declared as POCT by the manufacturers. The complexity of ID-POCT is often not realized by users. Required quality management procedures are not performed for lack of knowledge. Therefore, POCT experts should point out ways to overcome these hurdles. It will be important to develop standards for ID-POCT and related diagnostic pathways. Then, **Heinz Zeichhardt** (Berlin), representative of INSTAND, one of the two German ring trial organizations, described "*Unit-use tests for virus detection – experiences from INSTAND EQA schemes*". He compared the results of virus antigen and genome detection tests, respectively, with the results of routine diagnostic test formats applied for analyzing a series of test samples. He focused on the diagnostics of infections with influenza viruses, respiratory syncytial viruses, norovirus, and dengue virus. **Leslie J. Donato** (Rochester, NY/USA) showed an example of the "*Implementation of POC molecular infectious disease testing in an express care setting*". The Mayo Clinic and affiliated smaller hospitals made first encouraging experiences with rapid nucleic acid testing (NAT) devices in emergency settings. Besides the beneficial effects by the use of the novel NAT POCT, also challenges remain for practices to convert their testing to a molecular platform performed at the point of care. The increased sensitivity of the methodology may result in an increased risk of contamination leading to inaccurate results. Rapid care clinics with busy staff that spend little time performing POCT could result in problems with staff competency. Her interesting results mirrored complementary with experiences of **Dorothee Riedlinger** (Berlin), who gave the last presentation in this interesting session entitled "*Screening tests for MSSA/MRSA colonization in the nasopharyngeal cavity by use of POCT in the emergency room*". On behalf of Markus Möckel, she presented first data from the Charité emergency setting and portrayed how this screening can be applied in a rational and cost-conscious way. In a screening study, nasopharyngeal swabs were taken from successive, unselected emergency room patients, and a prototype of the methicillin-sensitive *Staphylococcus aureus* (MSSA)/methicillin-resistant *S. aureus* (MRSA) assay of Roche's LIAT system was applied in 102 cases. In 26.4% of cases, colonization with MSSA was detected, and three samples were tested positive for MRSA. Only in one case, colonization with MRSA was described. This near-patient examination was able to be integrated without delay in the admission process of the internal emergency department.

Figure 3: ePoster session, frontal presentation by an author.

The first day was concluded by the **ePoster session** (Figure 3). Additional information is given at the end of the article.

The second day started with **Session 4 "POCT and emergency/intensive care medicine"**, which was dedicated to a quite similar and related topic, chaired by Dirk Peetz (Berlin) and Michael Spannagl (München).

Again, **Dorothee Riedlinger** (Berlin) gave a lecture and talked about "*POCT in intensive care and emergency medicine: what markers and tests?*". Laboratory parameters in emergency medicine can be divided into three categories. Urgent obligatory parameters are necessary for immediate therapeutic decisions and must be available within 60 min. For these, testing in the emergency department such as POCT should be considered. For the other two categories, results should be available within a 4-h period [1]. **James H. Nichols** (Nashville, TN/USA) devoted his presentation to the subject "*Achieving optimal turnaround time – a tale of troponin testing at two academic medical centers*". Rapid turnaround of troponin results is required to expedite the diagnosis of myocardial infarction and institute treatment for optimal patient outcome. Laboratories, however, have many choices for delivering troponin testing: POCT or traditional laboratory instrumentation performed either in the emergency department or via pneumatic transport of specimens to a central laboratory. Each option has advantages and challenges. The author deeply explored those options and discussed the experiences of two institutions with decentralized and centralized laboratory and point-of-care troponin testing. **Michael Spannagl** (Munich), on behalf of Patrick Möhnle, described "*The role of viscoelastometric POCT in intensive care medicine*". Viscoelastometric testing has increasingly gained value in bedside POCT diagnostics in critically ill patients. The use of these methods allows differential diagnosis of severe bleeding disorders especially in the postoperative situation. Specific drug therapy as well as coagulation factor substitution in acute bleeding situations can be guided by applying these functional tests. The use of viscoelastometric-guided therapy is already established in the current guidelines for treating patients with bleeding complications. Then, **Paul Collinson** (London/GB) gave a lively and inspiring lecture entitled "*Cardiac biomarkers in emergency and intensive care medicine: to POC or not to POC, that is the question*". His presentation is the basis for a separate article in this issue of the journal. Finally, **Sönke Bax** (Henstedt-Ulzburg) gave an answer to the question "*Is POCT economically applicable in clinical emergency and acute medicine?*" and presented a lively user report of a laboratory changeover in a basic care hospital.

Session 5 "Emerging POCT technologies" was conducted by Peter B. Luppa and Oliver Hayden (both TU Munich) and dedicated to new analytics.

Felix von Stetten (Freiburg) reported on "*Screening of antibiotic resistant pathogens at the point-of-care: two novel microfluidic platforms based on real-time PCR and digital RPA*". One of the systems is based on real-time PCR and is characterized by a high degree of multiplexity (25). The second one uses a digital isothermal DNA amplification protocol and gives the opportunity to perform a quantitative analysis of species- and resistance-relevant genes. His personal outlook was focused on the planned further development of the platforms to a possible commercial IVD product. **Alexander Gigler** (München) gave a lecture on "*midIR spectroscopy and multivariate data analysis for POCT"* and presented data showing that serum can be easily analyzed quantitatively and simultaneously for a series of metabolic markers by a very simple and rapid mid-infrared (midIR) spectrometric measurement. **Oliver Hayden** (Munich) called his talk "*Go with the flow*" and reported that flow cytometry is an iconic IVD tool which fundamentally changed the preclinical and clinical workflows. His working group recently developed a new method with minimum sample preparation to apply flow-based single cell analysis tools for bedside tests. He reviewed the current efforts on magnetic- and imaging-based flow cytometry. **Frank Apostel** (Darmstadt) presented in his lecture "*Vivalytic, all-in-one – the innovative, automated, and universal platform for nucleic acid testing*". With the Vivalytic device, an all-in-one platform for POCT applications is now available. It enables a wide range of different qualitative and quantitative NATs, even microarray-based multiplexed tests are possible to adopt. Additionally, the Vivalytic system combines the extraction of various sample matrices. The final contribution was given by **Sebastian Schlücker** (Essen) with his lecture "*Rapid, quantitative and highly sensitive POCT with a portable reader: SERS with molecularly functionalized gold nanoparticles*". Gold nanoparticles are routinely used in lateral flow assays (LFAs) in combination with visual inspection by the naked eye or by a camera for semi-quantitative detection. A central drawback is, however, the insufficient sensitivity for detecting low abundance biomarkers. A further disadvantage is that only a single target analyte can be detected at the capture zone. Molecularly functionalized gold nanoparticles in combination with SERS as an emerging technology overcome these limitations and pave the way toward integrating quantification and multiplexing into a new optical platform for POCT. The optical readout in SERS-based POCT is generated by inelastic scattering from Raman reporter molecules on the surface of a noble metal nanoparticle such as gold (SERS nanotag). The SERS technology is quantitative as the signal increases linearly with the number of SERS nanotags. Most importantly, it is very sensitive – down to the level of a single nanotag. As the vibrational Raman bands are 10–100 times narrow than the broad emission profiles of molecular fluorophores, 10–100 times more SERS markers/nanotags can be visualized simultaneously (spectral multiplexing). A major bottleneck for the application of the emerging SERS technology to POCT has been the acquisition time (many minutes to hours) using expensive confocal Raman microscopes. Thus, both aspects – time and costs – must be addressed before SERS can be utilized for routine POCT in real-world applications outside academic laboratories. The author presented the design of a portable SERS reader for rapid, quantitative, and ultrasensitive POCT using line focus illumination of the LFA with a custom-made optical fiber and a compact yet powerful near-infrared (NIR) laser. The acquisition time of only few seconds is 2–3 orders of magnitude faster and the detection limit of ca. 1.6 mIU/mL is 15 times lower compared to the current gold standard, a commercially available LFA with detection by the naked eye [2].

In **Session 6, "POCT management of chronic diseases and in primary care"** was the topic under the conduct of Ralf Junker (Kiel) and Hans Günther Wahl (Lüdenscheid). The first lecture was given by **Rogier Hopstaken** (CE Utrecht/NL) entitled "*POCT in primary care – labs on the move!*".

The urge for better management decisions in primary care, the technological POCT innovations, and the growing evidence of the added value for patients make POCT an important topic also for primary care. The presenter emphasized that physicians, practice nurses, and patients already have discovered the added value of POCT and ask for more. But this also implies that focus is needed on proper use, quality assurance, and patient safety. How can we get all stakeholders on board to set up POCT services in a sustainable way? He answered this question by describing detailed examples from the Netherlands. For example, he showed that the use of near-patient measured CRP significantly improved the discrimination and risk classification of patients with suspected pneumonia [3]. **Bogdan Solnica** (Krakow/PL) dedicated his contribution to "*Not only emergency tests – POCT in chronic diabetes complications*" and described in detail the applications of POCT methods for diabetes patients in Poland. POCT methods, available in outpatient clinics

and doctors' offices including hemoglobin A_{1c} (HbA_{1c}), lipid profile, plasma creatinine with estimated glomerular filtration rate (eGFR) calculation, and urine albumin creatinine ratio, are needed for monitoring the metabolic status of diabetic patients. The next speaker, **Maurice O'Kane** (Belfast/IE), deepened this topic in his presentation "*Patient self-testing in chronic disease management*". More details are given in a separate article in this issue. An exciting new experience for the audience was the online transmitted lecture from **Jeffrey Dubois** (Waltham, MA/USA). Due to unforeseeable circumstances, he was unable to come to Munich, but gave his lecture "*POCT beyond the hospital today – chronic disease management in the primary care setting*" from his living room in Massachusetts. His presentation reviewed the extent of the global chronic disease burden, shortage of primary care physicians, and nurse practitioners to provide care. He emphasized that the demand for more complete services at the time of a visit to a primary care setting is the major driver to the development of POCT in this large market segment. A series of clinical cases were shown by the author and depicted how technology applications can improve care for chronically ill patients.

The second congress day concluded with the **parallel Session 7 "POCT concepts of the IVD industry"**, chaired in part 1 by Peter B. Luppa and Oliver Hayden (both Munich) (part 1) as well as in part 2 by Ralf Junker (Kiel) and Guido Freckmann (Ulm).

Authors and titles of the presentations of part 1 were as follows: **Andreas Hüfner** (Regensburg), "Cepheid GmbH – PCR diagnostics in the emergency room"; **Stephanie Neemann** (Köln), "LumiraDx GmbH – the LumiraDx smart diagnostic POCT platform"; **Christian Braun** (Mannheim), "Roche Diagnostic Deutschland GmbH – data security at the point-of-care"; **Christian Sommer** (Eschborn), "Siemens Healthcare Diagnostics GmbH – on the way to the big picture"; and **Heiko Müller** (Essen), "OSM group – POCT and DSGVO – how fits this together?".

Authors and titles of part 2 were as follows: **Christian Fischer-Rasokat** (Stockach), "QIAGEN Lake Constance GmbH: reader for rapid testing. Demands, solutions and trends"; **Holger Gundelach** (Hürth), "Quidel Germany GmbH – TriageTrue – how an innovative cartridge design brings a high-sensitive troponin test to the point-of-care"; **Astrid Petersmann** (Greifswald), "Radiometer GmbH – process and result quality for POCT. The central role of sophisticated IT solutions"; **Frank Apostel** (Darmstadt), "R-Biopharm AG – Bosch Vivalytic – the universal and innovative molecular platform for POCT"; **Johannes Jansen** (Schwäbisch Hall), "OTIMA life science GmbH – IVD kit production automation – to OEE, or not to OEE that is the question"; and last but not least **Job Harenberg** (Heidelberg), "DOASENSE GmbH – description of the study design for evaluating an *in vitro* diagnostic test for direct oral anticoagulants" [4].

The last day of the conference presented two additional sessions. **Session 8 "Continuous monitoring of biomarkers and drug-monitoring by use of POCT"** was chaired by Guido Freckmann (Ulm) and Hans Günther Wahl (Lüdenscheid). **Guido Freckmann** (Ulm) gave insights on "*Basic principles and application of continuous glucose monitoring for diabetes treatment*". His presentation is also the basis for a separate article in this issue. Therapeutic drug monitoring (TDM) was the topic of the lecture of **Sven Schimanski** (Bayreuth) "*TDM of antibiotics – really at the point-of-care?*". TDM of antibiotics and other anti-infectives beyond the standard application for vancomycin and aminoglycosides has great potential to improve the treatment of patients with IDs through an individualized therapy. In particular, in antibiotics with a narrow therapeutic window, in antibiotic-resistant pathogens, and in situations with altered pharmacokinetics (e.g. renal dysfunction and sepsis), the determination of the concentration in the blood, possibly also in the tissue, could play an important role. At present, however, the preanalytical, analytical, and postanalytical requirements have not yet been comprehensively defined. TDM was also discussed by **Ambra Giannetti** (Sesto Fiorentino/IT) in her talk "*A novel POCT optical device for TDM*". TDM plays an important role in transplanted patient treatment by enabling the assessment of the correct dosage of immunosuppressant drugs, characterized by a narrow therapeutic window. As only protein-unbound (free) drugs can cross membranes and bind to receptors to produce the required pharmacological effect, free drug concentrations are more closely related to efficacy and also to toxicity. With this aim, a novel POCT optical device was designed and tested by the working group in Florence. In order to reach the low limit of detection required, a heterogeneous binding inhibition immunoassay based on fluorescence measurements has been developed in a microfluidic chip.

The final **Session 9 "POCT quality assessment and legal certainty in Europe"** was conducted by Oswald Sonntag (Munich) and Claus Langer (Essen). In the first presentation, given by **Franziska Amiet** (Bern/CH), the "*Integration of new POCT devices and technologies in the*

hospital setting – plug and play?" was discussed. In the hospital, all POCT devices have to be evaluated and connected to the laboratory and hospital information system. All POCT measurements are to be controlled by the central laboratory. Thanks to innovation and emerging technologies, the POCT portfolio is growing. Also, the data from the new POCT methods (e.g. continuous glucose monitoring [CGM]) are to be integrated into the existing hospital network. Many questions remain: device quality, correlation with the results generated in the laboratory, and responsibility and traceability when importing external data from patient devices, plug and play? **Michel Vaubourdolle** (Paris/FR) focused his presentation on "*POCT quality concepts and legal certainty in Europe*" and explained the governing concepts for POCT. The term "POCT" covers three situations: (1) tests under laboratory responsibility, used by clinicians with immediate therapeutic decision, (2) guidance tests, done by health professionals with a necessary confirmation of results by laboratory, and (3) self-tests used by patient for their own care management. In Europe, two surveys (European Federation of Clinical Chemistry and Laboratory Medicine-European Cooperation for Accreditation [EFLM-EA]) showed that, for case 1, the tests are mainly under the laboratory responsibility and that quality management is often based on 22870 accreditation. However, the author observed a great heterogeneity in the world for the management of these three situations, in terms of definition, regulation, and quality management. Then, **Thorsten Prinz** (Frankfurt a. M.) gave a lecture on the title "*How to achieve MDR compliance for medical apps*". Starting from 26 May 2020, the new European Union (EU) Medical Device Regulation (MDR) will significantly tighten the regulatory requirements for medical devices in Europe. In particular, this also applies to software as an independent medical device (stand-alone software) such as a medical app. In his presentation, he described how the new road to CE certification for medical apps is to be described and where IVD manufacturers will find concrete support for their products. Special legal insights were given by **Ulrich Gassner** (Augsburg) in his interesting presentation "*QMS of POCT under the IVDR*". Operating a comprehensive quality management system (QMS) for devices for near-patient testing is not a new requirement. However, the *In Vitro* Diagnostic Regulation (IVDR) now specifies what the QMS must include and how the manufacturer must operate it. The presentation discussed some important new features to be considered in the QMS practice under the IVDR [5]. Impacts of this new EU legislation on POCT methods were also described by **Bernhard Gerstenecker** (Konstanz) in his lecture "*The new IVD directive 2017/746/EU and its influence on POCT market placements*". With the transition from the positive-list-based classification of the former IVD directive to the rules-based classification system of the IVDR and the subsequent integration of notified bodies, the situation is completely new for the IVDs. His contributions were especially interesting for the IVD industry and complemented by the last speaker, **Jens Hain** (Habach), who talked about "*Clinical trials according to the new IVDR to get POCT devices on the market – some carrots and many sticks*". It is the aim of the new EU regulations to guarantee higher standards for new and existing medical devices and IVDs. However, there is still a great deal of uncertainty of what that the new regulation actually means. For many, the regulation seems to have much more sticks than carrots. The cataloging of products into a new risk-based classification system (risk classes A–D) will most probably lead to an additional need for clinical trials and clinical evidence in the coming years. At the same time, the requirements for good clinical practice and study management have increased as well. Therefore, companies that could do their licensing formerly independent will need new partners to address these challenges. The short transitional period, the increased list of requirements, and, in most cases, the inclusion of notified bodies will thus fundamentally change the market launch of new products in the coming years.

Poster awards

Final action, conducted by the congress president, was the award ceremony. Four poster awards were given to:

Thomas Hug (Berlin) for his presentation "*Establishing of a new POCT training concept for care-givers*"; **Dario Mager** (Karlsruhe) for his contribution "*eLoad – centrifugal microfluidics with modular embedded systems for a simplified usability and maintenance at the PoC*"; **Rolf Bikker** (Hannover) for his poster entitled "*Development and integration of operator optimized POCT eLearning modules*"; and **Franziska Beck** (Regensburg) for her presentation "*Development of high performance electrochemical biosensors for clinical analysis*".

Final remarks

The conference offered an attractive social program during the first 2 days with guided tours to the Brandhorst

Museum and the Lenbachhaus, followed by an elegant dinner at the Künstlerhaus.

At the end of the conference, which offered the attendees many new impressions and information, Peter B. Luppa and the local organizing team thanked all speakers, discussion speakers, and participants for their commitment and perseverance. Special thanks were also due to the patrons DGKL, RfB, and INSTAND e.V., the sponsors for their generous support and the company Conventus, Jena, for the excellent organizational realization of the event. The DGKL working group POCT hopes to invite to the 5th Munich POCT Symposium in 2 years' time.

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