



MEETING REVIEW

Aptamers 2019 – a conference update

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Received: 11 June 2019 | **Accepted:** 19 June 2019 | **Published:** 14 July 2019

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INTRODUCTION

The International Society on Aptamers held Aptamers 2019, the sixth successful annual symposium at Oxford in April. The meeting was chaired by Professor Dr Günter Mayer. The participants, representing over 25 countries, included some familiar faces as well as several new ones (~40% PIs/postdocs, 25% students, and 35% from the industry)! A wide range of topics were covered in in 25+ oral presentations, 15+ flash-talks and 45+ posters. Below, we have briefly discussed some of the highlights of the symposium.

THERAPEUTICS AND DIAGNOSTICS

Due to the importance of aptamers in therapeutics and diagnostics, it is not surprising that we had a two-part session on this topic, chaired by Dr Julien Tanner and Professor Beatrix Süss. The conference opened with the chair, Professor Günter Mayer (University of Bonn, Germany) who discussed an aptamer that binds to a surface splicesomal complex and causes cell necrosis (Tonapi et al, 2019). Next, Dr Kazumasa Akita (Ribomic Inc, Japan) updated us on aptamers for affinity purification of antibodies (Inomata et al, 2018). Dr Christine Reinemann (Aptamer Group, UK) presented their newest successes in selecting aptamers to small molecules. After the break, INSOAP president, Dr Sarah Shigdar (Deakin University, Australia) updated us on using aptamers to cross the blood brain barrier to selectively deliver therapeutics (Macdonald et al, 2017). Next, Dr Marcus Menger (Fraunhofer Institute for Cell Therapy and Immunology, Germany) discussed measuring library enrichment and diversity for the selection of aptamers to superantigens. Kevin Cheung (University of California, Los Angeles) then

talked about the work using aptamers for point-of-care (Nakatsuka et al, 2018) and Dr Styliana Philippou (Cyprus Institute of Neurology & Genetics, Cyprus) shared their work identifying RNA aptamers for delivering therapeutic oligonucleotides (Philippou et al, 2018). Our final talk was Professor Fernando Pastor (University of Navarra, Spain) who discussed an agonist aptamer to enhance CTLA-4 blockade therapy in tumours (Soldevilla et al, 2018).

BIOSENSORS AND PROBES

The third session focused on aptamers as biosensing probes. The session opened with Professor Kevin Plaxco (University of California, Santa Barbara, USA) introducing aptamers for real-time measurement of small molecules in live animals (Arroyo-Currás et al, 2017). Professor Jennifer Heemstra (Emory University, USA) showed her work about enantioselective sensing of racemic molecules (Tan and Heemstra, 2018), achieved using D-DNA and L-DNA aptamers. The third talk of this session was given by Dr Laura Cerchia (Istituto per l'Endocrinologia e l'Oncologia Sperimentale, Germany) about an aptamer targeting triple negative breast cancer and its efficacy in a mouse xenograft model (Camorani et al, 2018). Dr Victoria Calzada (Univ de la Republica, Uruguay) talked about theranostics; the combination of therapy and diagnosis (Sicco et al, 2018). The session ended with Dr Nako Nakatsuka (ETH Zürich, Switzerland) who further explained aptamers used as probes in field effect transistors (Nakatsuka et al, 2018).

FLASH TALKS

The flash talks were a great hit at the conference and we had fantastic 3-minute presentations from PhD students

and early-career-researchers. Our flash talk winners were Nico Dreymann (Germany), Benat Olave (Spain), and Sladjana Slavkovic (Canada). Nico Dreymann presented work on using aptamers for diagnosis of bladder cancer in urine samples, and the hopes to develop a multiplex tool with high sensitivity and specificity for early detection of bladder cancer. Benat Olave investigated the performance of DNA aptamers in non-conventional solvents, such as ionic liquids and deep eutectic solvents. Results suggested that DNA forms unique interactions in these non-conventional solvents that are quite distinct from those found in physiological conditions. Sladjana Slavkovic investigated the selectivity of the cocaine binding aptamer for antimalarial compounds.

RIBOSWITCHES

The first session on day-2 focused on riboswitches and was chaired by Professor Jennifer Heemstra. Talks began with Professor Jörg Hartig (University of Konstanz, Germany), who showed us that RNA switches can control gene expression in *C. elegans* (Wurmthaler et al, 2019)! Finally, Professor Beatrix Suess (Technical University Darmstadt, Germany) discussed many projects, including their successes in using Capture-SELEX to identify new functional new synthetic riboswitches (Boussebayle et al, 2019).

CHEMISTRY, SELECTION, TECHNOLOGIES AND INNOVATION

The final portion of the conference focused on new innovations, and thus was divided into two parts, chaired by Professor Maureen McKeague and Professor Philip Johnson. First, Professor Philip Johnson (York University, Canada) discussed his lab's thorough biophysical work on the cocaine aptamer (Shoara et al, 2018). Then, Dr Julian Tanner (University of Hong Kong, China) discussed some exciting results in collaboration with the Hollenstein group (Institut Pasteur, France) which show how unique chemical modification in aptamer chemistry can drastically improve aptamers relevant to malaria. Next, Dr Philipp Holliger (MRC Laboratory of Molecular Biology, UK) discussed work developing aptamers with diverse backbone chemistry, including an uncharged backbone (Arangundy-Franklin et al, 2019). We also had the opportunity to hear from Dr Philip Webber (Dehns Oxford, UK) on how we can patent specific aptamer sequences. After the break, we resumed with a talk by Dr Nebojsa Janjic (SomaLogic, USA) who shared their progress on determining crystal structures of SOMAmer-protein complexes as well as results of SOMAscan assays (Strauss et al, 2018). Lauren Ferreira (Rhodes University, South Africa) presented her recent studies on developing an aptamer for human chorionic gonadotropin (hCG). Next, Thomas Schäfer (University of the Basque Country, Spain) presented his work using an ATP aptamer as part of developing a stimuli-responsive artificial membrane. Simon Chi-Chin Shiu (University of Hong Kong, China) talked about incorporating split aptamers into DNA nanostructures, namely a DNA origami box (Shiu et al, 2018). Maud Savonnet (Université Grenoble Alpes, France) spoke about developing a sandwich assay using an antibody and an aptamer for cardiac troponin I to detect myocardial infarctions. Rhushabh Maugi (Loughborough

University, UK) presented his work on nanopore detection of nanoparticles using a method that relies on an aptamer changing its structure to regulate passes through the pore. Tanu Bhardwaj (Indian Institute of Technology Delhi, India) detailed research on aptamers for Lucentis for monitoring purposes. Finally, Tarek Mohamed Abd El Aziz (Minia University, Egypt) reported on developing aptamers as anti-venom agents for snakebites.

CONCLUSION

The conference concluded with flash talk awards and the poster awards going to Kevin M Cheung (UCLA), Robert Hale (GlaxoSmithKline) and Wiebke Sabrowski (Fraunhofer Institute for Cell Therapy and Immunology). See everyone next year at Aptamers 2020: <http://libpubmedia.co.uk/aptamers-2020/>

ACKNOWLEDGEMENTS

Thanks to the chairs, presenters, participants and sponsors. Aptamers 2019 was sponsored by Ribomic Inc, the Aptamer Group, TagCyx, atdbio, Library Publishing Media, and INSOAP.

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