UNIVERSITEIT GENT

FACULTEIT WETENSCHAPPEN

Free One-Day Seminar

Biophysical Studies and Chemical Modifications of Nucleic acid structures

Aptamers are short, single-stranded DNA or RNA molecules that can bind to specific targets, such as proteins, small molecules, or even cells. They are often compared to antibodies because they can recognize and bind with high specificity to target molecules of varying sizes, but unlike antibodies, aptamers are synthesized chemically and can be easily modified. Their potential applications range from therapeutic agents and biosensors to diagnostic tools, making them versatile agents in biotechnology, biomedical research and environmental science.

In 2019, the NMR and Structure Analysis research group at Ghent University started to develop an interest in **the structural characterisation of aptamers using NMR spectroscopy**. This was inspired by our work and that of others demonstrating that a number of aptamers designed to target small molecules with the aim to develop sensing applications, were in fact not at all interacting with their supposed target. More generally, it appears only limited effort is being made within the aptamer research community towards generating relevant three-dimensional structures to provide a more solid basis for understanding aptamer-target interactions at a molecular level.

At the same time, **chemical modifications of nucleic acids** for bioconjugation approaches or to influence their physicochemical properties towards specific biomedical applications increasingly appear within the scientific literature. These often lack sufficient characterisation and validation of the proposed modifications and impact, potentially undermining the proposed outcomes of the research.

Against this background, Sofie Schellinck will defend her PhD entitled ***'Unravelling the secrets of aptamer–small molecule complexes with NMR spectroscopy - the TESS.1 aptamer case'***, on September 27th, 2024. It represents the successful forage of the NMRStr group into the investigation of small molecule aptamer structures and is co-promoted by José Martins (NMR and Structure Analysis group) and Annemieke Madder (Organic and Biomimetic Research group).

To celebrate this outcome we are pleased to organize a ***free one day seminar*** where various experts in the field of nucleic acid structure and their biophysical characterisation will present their take on biophysical investigations of nucleic acid structures. Several PhD and postdoctoral researchers from the NMRStr and OBCR groups will also present their ongoing work on nucleic acid structure, in particular with regard to the impact of chemical modifications and the elements defining the structural behavior. Together, this should stimulate the further introduction of methods such as NMR spectroscopy in the design and structural investigation of nucleic acids as performed in other research groups within Ghent University.

Contact address for more information: Jose.Martins@UGent.be

Practical details

Attendance is free but participants are required to register for this event to ensure a suitably sized lecture room and organise the reception. Registration is possible by following this link. The details and final programme and venue will be mailed to registered participants on Monday September 23rd

https://event.ugent.be/registration/biophysnucacids

Please note that we cannot guarantee your attendance without registration.

Biophysical Studies and Modification of Nucleic Acid Structures

September 26th 2024

NEW VENUE LOCATION
Venue: Lecture room 1.1, Building S4, Entrance 3, Faculty of Sciences
Campus Sterre, Krijgslaan 281, S4, 9000 Gent

9:50 AM – Prof. José Martins (NMR and Structure analysis (NMRStr), UGent)

Introduction

10:00 AM – **Prof. Philip Johnson** (York University, Canada)
Biophysical Studies of Aptamer Small Molecule Interactions to Aid in Sensor Development

11:00 AM – **Dr. Elise Daems** (Antwerp University)

The Role of Native Mass Spectrometry in Investigating Aptamer-Target Interactions

11:25 AM – Jack Barr (OBCR, **UGent**)

Light-triggered stapling of biologically relevant DNA tetraplexes results in increased topological, thermodynamic, and metabolic stability

11:50 AM – Lunch Break*

1:45 PM – **Prof. Cameron Mackereth** (Bordeaux University, France)

Using Tricks from Biomolecular NMR to Study Aptamer Complexes

2:45 PM – Dr. Yoanes Lie Vianney (NMRStr, **UGent**)
Structural and thermodynamic studies of G-quadruplexes with unique structural motifs and their recognition by small molecules

3:15 PM – Dr. Enrico Cadoni (OBCR, UGent)

Proximity-induced Light-triggered Reactions Using Quadruplex Nucleic Acids as Template

3:45 PM – Coffee Break

4:15 PM – Lessandro De Paepe (OBCR, UGent)
Templated and Sequence-Selective Pre-miRNA G-Quadruplex Targeting

4:40 PM – Raffa Graziano (OBCR, UGent/visiting from University of Napels)
Towards the selective and simultaneous targeting of G-quadruplex structures in c-KIT promoter region

5:05 PM – **Prof. Frederic Lynen** (Separation Science Group, UGent)

Evolutions in the chromatographic and electrophoretic separation strategies for oligonucleotide analyses

6:00 PM – Prof. Annemieke Madder (Organic and Biomimetic Research group (OBCR), UGent)

Conclusion

Small Reception

*participants should take care of their lunch, for instance at the Resto Campus Sterre (S5)

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