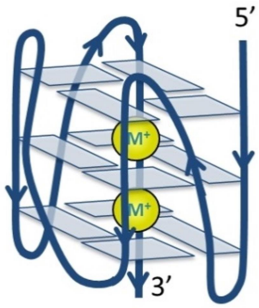
Entschuldigung, dass der Text nur in English existiert, aber wenn Sie Forschungsarbeit machen möchten, müssen Sie die Englische Fachliteratur lesen können. Konsultation mit dem Supervisor ist natürlich auf Deutsch auch möglich.

TDK

Research topics for undergraduate students

Exotic (noncanonical) DNA structures.
Investigation of stability of G-quadruplexes using fluorescence spectroscopy



Everybody knows the double helical structure of DNA, but the nucleic acids can accommodate other less known structures, like the G-quadruplex (GQ). Four guanine bases can form a so called G-quartet. Two or three G-quartets form the GQ. Such structures can be formed in the guanine rich sequences of DNA (or RNA). These sequences can be found at critical positions of the genome, where they can control the cell proliferation. GQs at the telomere region (at the end of the nucleic acid) inhibit the telomerase enzyme. This enzyme makes the cancer cells immortable by elongating the telomeres. The complementary stand of the GQ sequence is the so called i-motif (iM), the existence of which was proven only recently.

The research focuses on the stability of different GQs and iMs. Also the factors influencing the stability will be explored. The conformational changes of GQs and iMs will be detected mainly by fluorescence spectroscopy. The nucleic acid oligos will be labeled by two chromophores at each end and the Förster Resonance Energy Transfer (FRET) will be measured, which is very sensitive to the distance between the chromophores. The presence of FRET corresponds to the folded GQ (or iM) structure, while the ends of the unfolded nucleic acid are too far to get any FRET signal.

Several ligand molecules are known, which bind to GQs. These were developed for the human GQs, but we have recently observed some stabilizing effect in case of viral nucleic acids as well. The student will be involved in such experiments too. This area is quite a hot topic, since the viral infections caused serious infections. The work will be performed using small nucleic acid strands, which form GQs, there are no viruses in the laboratory, so the work is quite safe.

If you are interested to study such noncanonical nucleic acid (DNA and also RNA) structures, contact:

Dr. László Smeller

Dept. Biophysics and Radiation Biology Semmelweis University

laszlo.smeller@eok.sote.hu

+36-1-4591500/60225