FAKULTÄT FÜR CHEMIE

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Einladung zum Vortrag von

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„Quadruplexes are everywhere"

"*DNA comes in many forms*" (*A. Rich*): a number of non-classical pairing patterns are possible between or within DNA strands. These interactions result in the formation of unusual structures, among them the **G-quadruplex** and the **i-motif**. G-quadruplexes (G4) result from the stacking of several *G-quartets* (formed by hydrogen bonding of four coplanar guanines), and are stabilized by monocations such as sodium and potassium. These structures are very stable under physiological conditions but were first thought to be an *in vitro* anomaly. Critical evidence for the biological relevance of G4 has come from use of G4-specific antibodies and results obtained in a variety of organisms.

We are now using novel strategies, including new analytical tools and a unique model organism, to confirm the importance of G-quadruplexes and study their properties. We first developed a new algorithm for prediction of G4 propensity (1). We developed new assays to identify and analyze selective G4 ligands (2) and the resolution of G4 structures by helicases (3-5). We provide evidence for G4 existence in living cells using *in vivo* NMR (6). Having established that quadruplex-prone regions are conserved in the genome of viruses, we are currently investigating whether quadruplexes may become the Achilles' Heel of the viral life cycle (7-8). In addition, besides their importance in Biology, unusual nucleic acid structures may find applications in Biotechnologies and Nanotechnologies. These structures have clear advantages over conventional duplex DNA, such as enhanced thermal stability, conductivity, and sensitivity to chemical stimuli (9). A major drawback of G4 and i-DNA designs is the lack of control over the assembly process. We recently provided solutions to this problem (10-11).

(1) Bedrat *et al.,* ***Nucleic Acids Res.*** 2016, 44: 1746 (2) De Rache *et al*., ***Biochimie*** 2015, 115: 194 (3) Mendoza *et al*., ***Nucleic Acids Res.*** 2015, 43: e71 (4) Mendoza *et al*., ***Nucleic Acids Res.*** 2016, 44: 1989 (5) Gueddouda *et al*., *submitted* (6) Salgado *et al.,* ***Chem. Sci.*** 2015, 6: 3273 (7) Amrane *et al*., ***J. Am. Chem. Soc*** 2014, 136: 5249 (8) Métifiot *et al*., ***Biochimie*** 2015, 118: 173 (9) Yatsunyk, Mendoza & Mergny., ***Acc. Chem. Res.*** 2014, 47: 1836 (10) Mendoza *et al*., ***Chem. Eur. J.*** 2015, 21: 6732 (11) Fu *et al*., 2016, *in preparation*

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