The Singapore Bioimaging Consortium (SBIC)
presents a seminar on

"Protein-DNA Recognition and Target location studied by NMR Spectroscopy"

Speaker: **Professor Robert Kaptein**
Utrecht University, The Netherlands
Host : **Professor Patrick Cozzone**
Date : **Monday, 15 April 2019**
Time : **1.00pm – 2.00pm**
Venue : **SBIC Seminar Room**
11 Biopolis Way
Level 2, Helios Building, Singapore 138667
(Please enter via Level 1)

Abstract

How do gene regulatory proteins bind to specific DNA-regions and how do they find their target sequences? We have investigated this process in more detail using the *E. coli* lac repressor as a model. First, we have solved the structures of complexes of lac repressor headpiece (the DNA-binding domain) both with lac operator and with non-operator DNA by NMR. As it had been suggested that non-specific binding combined with sliding along the DNA could play an important role in target location, we measured the rate of sliding for the non-specific complex from NMR line-broadening. The surprising result was that the 1D diffusion constant for sliding is orders of magnitude smaller than expected and indeed measured by laser spectroscopy. Thus, the simple sliding model cannot explain the high target location rate for lac repressor. A more likely mechanism is a combination of 1D sliding and 3D hopping. The implications for the general problem of target location of DNA-binding proteins will be discussed.

About the Speaker

Dr Robert Kaptein received his PhD in 1971 from Leiden University where he discovered the mechanism of Chemically Induced Dynamic Nuclear Polarization (CIDNP). After a post-doctoral training in the US and a short stay at Shell laboratory in Amsterdam, he went to the University of Groningen, where he became Professor in 1980. In 1987, he moved to Utrecht University. Honours include the Golden Medal of the Royal Dutch Chemical Society (1971) and the Holleman award of the Royal Dutch Academy of Arts and Sciences (KNAW) in 1985. From 2002 to 2008, he was Secretary General of the KNAW. He is now Emeritus Professor at Utrecht University. His research has mainly dealt with NMR spectroscopy applied to problems in structural biology. High-lights include the 3D structure of lac repressor headpiece in 1985, and its complex with DNA in 1988. Lac repressor served as a model for in-depth studies of structural and dynamic aspects of protein-DNA recognition and allosteric interactions. Other major research areas include structural aspects of DNA repair and photobiology.

--- Admission is free and all are welcome ---