HONG KONG RNA CLUB

Seminar

香港城市大學
City University of Hong Kong

30 Apr 2019 (Tue) / 10:30-11:30am
B5-210, Yeung Kin Man Acad. Building (AC1)
City University of Hong Kong

Guest Speaker:

Prof. Thomas Carell
Center for Integrative Protein Science
at the Department of Chemistry,
Ludwig Maximilians University, Munich

DNA Bases beyond Watson and Crick

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DNA Bases beyond Watson and Crick

Professor Thomas Carell

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Abstract

Epigenetic information is for example stored in the form of modified bases in the genome. The positions and the kind of the base modifications determines the identity of the corresponding cell. Setting and erasing of epigenetic imprints controls the complete development process starting from an omnipotent stem cells and ending with an adult specialized cell. I am going to discuss results related to the function and distribution of the new epigenetic bases 5-hydroxymethylcytosine (hmC), 5-formylcytosine (fC), 5-carboxycytosine (caC), and 5-hydroxymethyluracil (Scheme 1).[1] These nucleobases seem to control epigenetic programming of cells and establish genetic programmability. Synthetic routes to these new bases will be discussed that enable the preparation of oligonucleotides. The second part of the lecture will cover mass spectroscopic approaches to decipher the biological functions of the new bases.[2] In particular, results from quantitative mass spectrometry, new covalent-capture proteomics mass spectrometry and isotope tracing techniques will be reported.[3] Finally I am dicussing potential präbiotic origins of modified bases [4].

[1] M. Wagner, J. Steinbacher, T. F. Kraus, S. Michalakis, B. Hackner, T. Pfaffeneder, A. Perera, M. Müller, A. Giese, H. A. Kretzschmar, T. Carell *Angew. Chem. Int. Ed.* **2015**, *54 (42)*, 12511-12514. Age-Dependent Levels of 5-Methyl-, 5-Hydroxymethyl-, and 5-Formylcytosine in Human and Mouse Brain Tissues.

[2] Perera, D. Eisen, M. Wagner, S. K. Laube, A. F. Künzel, S. Koch, J. Steinbacher, E. Schulze, V. Splith, N. Mittermeier, M. Müller, M. Biel, T. Carell, S. Michalakis *Cell Rep.* **2015**, *11*, 1-12. TET3 Is Recruited by REST for Context-Specific Hydroxymethylation and Induction of Gene Expression

[3] C.G. Spruijt, F. Gnerlich, A.H. Smits, T. Pfaffeneder, P.W.T.C. Jansen, C. Bauer, M. Münzel, M. Wagner, M. Müller, F. Khan, H.C. Eberl, A. Mensinga, A.B. Brinkman, K. Lephikov, U. Müller, J. Walter, R. Boelens, H. van Ingen, H. Leonhardt, T. Carell*, M. Vermeulen* *Cell* **2013**, *152*, 1146-59. Dynamic readers for 5-(hydroxy)methylcytosine and its oxidized derivatives

[4] S. Becker, I. Thoma, A. Deutsch, T. Gehrke, P. Mayer, H. Zipse, T. Carell, *Science* **2016**, *352 (6287)*, 833-836.