Leading Scientist Seminar

Prof. Mark Isalan

Professor of Synthetic Biology,
Life Sciences, Imperial College London

Feb 13th (Wed) 2019, 17:00~18:00

@ Kyoto University KUIAS/iCeMS Main Building
2F Seminar Room

Synthetic biology: from gene circuits to gene therapy

Abstract

Recent advances in synthetic biology, directed evolution and genetic circuit engineering could lead to new practical applications. We are developing methods to engineer new proteins and transcription factors for bottom-up engineering of small genetic circuits. Furthermore, we are exploring ways to "rewire" large cellular networks, to access phenotype space conveniently. Finally, we have developed artificial zinc finger (ZF) transcription factor repressors to switch off the mutant huntingtin gene in Huntington's disease (HD). By injecting AAV viruses expressing ZF, we were able to switch off mutant huntingtin by 80% in whole mouse brains, with effects lasting 6 months after a single injection. Thus, synthetic biology holds great promise for both biotechnology and medicine.

References

Network rewiring: *Nature* 452:840-5, 2008
Directed evolution of transcription factors (TFs): *Nat Comms* 7, 13858, 2016
Huntington's disease TF therapy: *Mol. Neurodegeneration* 2016;11(1):64)

Brief Introduction. Mark Isalan originally trained in engineering zinc fingers to bind new DNA sequences. He now runs a research group in systems and synthetic biology, focusing on protein and gene network engineering in bacteria, as well as more applied work towards human gene therapy.

Spoken language: English

Contact: Jun Suzuki, Kyoto University, iCeMS
Mail: jsuzuki@icems.kyoto-u.ac.jp Phone: 075-753-9771

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