Postdoc Innovation seminar

ABSTRACT

"TALEs and TALENs for targeted genome engineering and expression control"

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The DNA-binding domain of TALEs (transcription activator-like effectors) from plant-pathogenic *Xanthomonas* bacteria has become an important tool for the programmable and specific targeting of DNA. Natural TALEs function as transcription factors in plant cells to support pathogen colonization of host plants. TALE proteins bind to DNA via near-identical tandem repeats of 34 amino acids. Each repeat recognizes one base in the target DNA sequence via repeat-variable diresidues (RVDs). The simple and modular repeat architecture allows rearrangement of TALE repeats to generate artificial TALEs with virtually any tailored DNA-binding specificity[1]. Highly specific genome-editing TALE nucleases (TALENs) can be engineered for targeted mutagenesis in plants and a wide variety of other eukaryotic organisms. We analyzed specificities and activities of TALEs experimentally in a transient reporter system using *Agrobacterium*-mediated expression *in planta*. Different RVDs exist in nature, but the DNA-specificity of only a few of them is known, so far. We will present novel results on RVD specificity and efficiency[2], as well as the design of programmable gene switches and programmable precision mutagenesis tools. TALEs and TALENs are versatile virulence factors for the pathogen and exceptional tools for biotechnology.

1. Boch, J. *et al*. Science **326**, 1509-1512 (2009).
2. Streubel *et al.* Nat. Biotechnol. **30**, 593-595 (2012).