

Poster presentation

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Evolution of viruses and antiviral defense

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Contemporary viruses can be organized in an evolutionary tree ranging from the RNA world to the DNA world, from ribozymes, via viroids, DNA-ribozymes, Influenza, retro- and para-retroviruses to DNA viruses - supporting a „virus-first“ hypothesis. Retroviruses have shaped or may have even built the human genome, where up to 50% are retrovirus-related sequences to which increasing and decreasing complexities contributed. Rudimentary reverse transcription from RNA to DNA is still ongoing today in telomeres during embryogenesis and cancer [1]. Sequence analysis of the human genome witnesses our past, indicating how long HIV-like viruses, reverse transcriptase and RNases H have been around. Endogenization of retroviruses is actively ongoing in animal models and may allow a prediction on the future of HIV in people. Evolution of HIV takes place during antiretroviral therapies. An HIV suicide approach circumvents mutagenesis and escape mutants [2,3]. Co-evolution or crossing arms, also known from phage and bacteria, can be deduced from structural and functional similarities of retroviral replication and the siRNA-mediated antiviral defense machineries [4]. An evolutionary relationship between siRNA and interferon can be constructed by comparing their pathways. siRNA involving dicer as well as interferon are active antiviral defense mechanisms in mammalian cells, tested by dicer and interferon knockdown analyses [5,6]. The systems differ in strength and sequence specificities.

References

1. Noreen F, Heinrich J, Moelling K: **Antitumor activity of small double-stranded oligodeoxynucleotides targeting telomerase RNA in malignant melanoma cells.** *Oligonucleotides* 2009, **19**:169-178.
2. Heinrich J, Mathur S, Matskevich AA, Moelling K: **Oligonucleotide-mediated retroviral RNase H activation leads to reduced HIV-1 titer in patient-derived plasma.** *AIDS* 2009, **23**:213-221.
3. Matzen K, Elzaouk L, Matskevich A, Nitzsche A, Heinrich J, Moelling K: **RNase H-induced suicide of a retrovirus by oligodeoxynucleotides in a mouse model.** *Nat Biotechnol* 2007, **25**:669-674.

4. Moelling K, Matskevich A, Jung JS: **Relationship between Retroviral Replication and RNA Interference Machineries.** *Cold Spring Harb Symp Quant Biol* 2006, **71**:365-368.
5. Matskevich AA, Moelling K: **Dicer is involved in protection against influenza A virus infection.** *J Gen Virol* 2007, **88**:2627-2635.
6. Matskevich AA, Moelling K: **Stimuli-dependent cleavage of Dicer during apoptosis.** *Biochem J* 2008, **412**:527-534.