Repurposing viral replication for prophylaxis, diagnosis and treatment: Hoisting the engineer with his own petard

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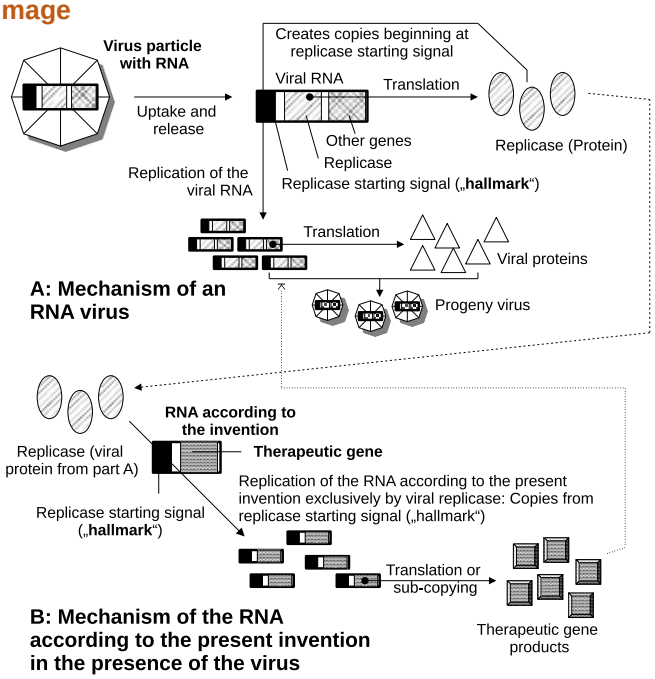
Abstract (300 word limit)

There are basically two antiviral approaches: Immunization; and pharmaceutical-biochemical inhibition of viral functions. Both are costly in terms of time and money, hence insufficient for emergent and/or mutation-prone viruses: Evolution can outrun the development of therapeutics. The pharmaceutical-biochemical approach also suffers from the low number of molecular targets in viruses, while the immunological approach is encumbered by the practical problems of quickly supplying billions of people with side-effect-free vaccines.

Our curative approach is based on linking a molecular mechanism with a drug delivery system, opening the perspective of developing effective and tolerable therapeutics for specific treatment of viral infections – sufficiently quickly and cheaply for combating even emergent, engineered and/or rapidly mutating viruses. The idea is to use essential functions of the virus quasi-parasitically in order to trigger antiviral processes only in virus-infected cells.

Each virus necessarily comprises a replication and packaging system for its nucleic acid, as well as nucleic acid hallmarked by certain signal sequences for its particular replication and packaging system, ensuring that only the viral and not the more abundant cellular nucleic acid is replicated and packaged. Hence, our concept is centered on combining a therapeutic nucleic acid with a specific "hallmark" sequence and introducing it by means of a drug delivery system into the host cells, where five antiviral effects can be used: Competition; antisense activity; overriding of viral effects; hijacking of nascent virions; and tagging of viral elements to uncloak the virus. Such exploitation of the "hallmark" system gives rise to a wide range of further applications, from activity-based screening kits to disease-resistant GM crops; most intriguing, however, is use of a coronaviral hallmark sequence linked to an anti-virion-maturation and/or anti-immune-escape siRNA in a liposome formulation for treatment of coronaviral airway diseases.

Image



References

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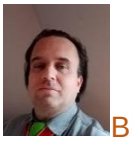
Photograph



Biography (150 word limit)

The Chevalier Dr. Dr. Rűdiger Marcus Flaig is a scientist and scholar whose main pursuit is the combination of apparently disparate strands of knowledge. Being financially independent, he focused on the molecular biology and innovative treatments of infectious diseases, including trypanosomiasis, at a time when these received less interest than cardiovascular and neoplastic conditions did. His patent-pending approach to viral diseases builds on his research experience from a variety of fields.

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Notes/Comments: