Virofight

Fighting viral infections with engulfing nano-shells

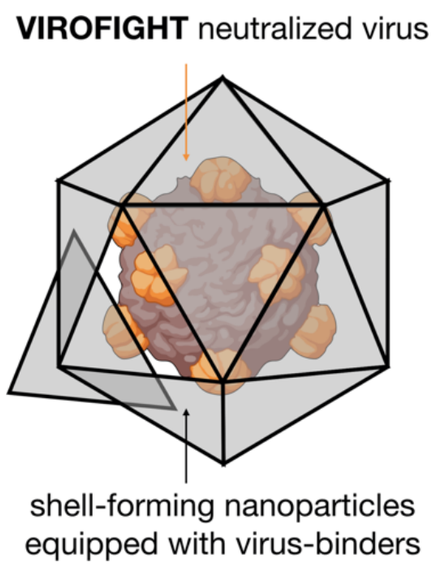
Viral infections affect millions of people every year and cause tremendous human suffering and costs to society. For approximately 70% of all WHO listed viruses, no treatment is available and the antiviral drugs that do exist must be applied very early after infection to be effective.

The VIROFIGHT consortium proposes a new approach to fight viral infections, to address the lack of broadly applicable antiviral treatments, and to create means for combating emerging pathogens.

THE VIROFIGHT APPROACH

Instead of targeting virus-specific proteins or enzymes by small molecules as done by current antivirals, researchers of the EU-funded VIROFIGHT project will develop nano-shells that are supposed to engulf and neutralize entire viruses. This novel approach has the potential to help fight multiple diseases such as COVID19, HIV infection, influenza and hepatitis B with one and the same approach. Further, the nano-shell technique may also help to prevent negative effects that may be elicited by antibodies used for virus neutralization (antibody dependent enhancement).

The biocompatible nano-shells developed by the researchers combine DNA origami, protein design and in-vitro evolution. Their interior will be coated with a layer of virus-specific molecules to exploit avidity effects for strong and specific virus binding. These binding effects will be tested at laboratory scale on a variety of viruses. To achieve this technological target, the interdisciplinary project integrates experts on supramolecular chemistry, molecular nanoengineering, and virology.



FACTS & FIGURES

Start	1 June 2020
End	31 May 2024
Duration	48 months
Funding	European Commission – “Horizon 2020”
Budget	3.88 M€
Partners	6 from 4 countries
Coordinator	Technical University Munich, Germany

THE VIROFIGHT CONSORTIUM

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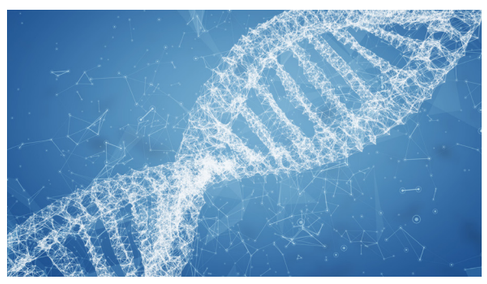
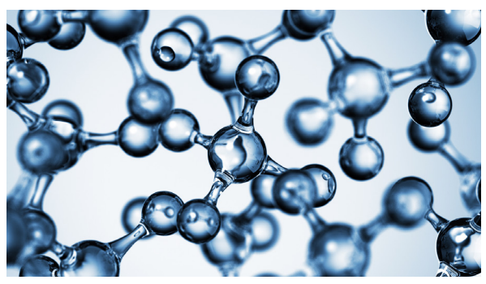
KEY TECHNOLOGIES



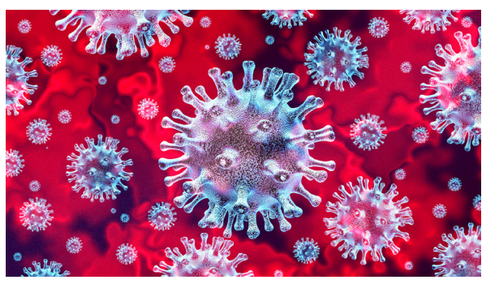
DNA / protein nanotech

Fabrication of fully addressable synthetic virus-sized nano-shells and attaching the virus-binders to them



Aptamers, peptides

Identification of molecular binders against user-defined targets through in vitro selection processes to obtain specificity to any given target virus



Real viruses and virus-like particles

Real viruses will be used as test targets including influenza viruses (enveloped) and adeno viruses (non-enveloped)

OUR IMPACT

- The aim of VIROFIGHT is the development of a radical new line of antiviral technology for eradicating multiple viruses and therefore has an enormous potential for decreasing the burden for patients and saving costs to society.
- VIROFIGHT may be the foundation for a new ecosystem of antiviral drugs, with potential to enable routine treatment of many types of viral infection with a drastic impact for European citizens and healthcare systems.
- VIROFIGHT scientific advancements and their future use will greatly impact the European technology sector by boosting the use of nanotechnology and molecular medicine. Our technology has a high translational potential for the treatment of major disease threats.
- Furthermore, VIROFIGHT can impact seemingly distant fields, such as the purification of food or drinking water from viral pathogens by trapping the pathogens in filters equipped with our virus-binding systems.

“Our mission is to develop and test prototypes of nano-shells that have the principal capacity to neutralize any given virus by engulfing them. We think this may lead to neutralization of the pathogen by occlusion.”

Prof. Hendrik Dietz, Coordinator
Technical University of Munich

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