Stichting Human Vaccine Project Europe:
Strategic Plan 2019

The Global Effort

The way in which we fight disease is broken. We spend billions of Euros and decades testing and developing new and improved vaccines, drugs and diagnostics and repeatedly fail:

- 8% of vaccines successfully make it to market;
- 5% response to immunotherapies for cancer patients
- 0% treatments shown to be effective for Alzheimer

Globally, we are losing our fight against diseases. One in 3 people will be diagnosed with cancer sometime in their life. One in 3 people will have Alzheimer's by the age they reach age 85. One in 5 people will develop an autoimmune disease sometime in their life. During the forthcoming years, aging will cause large increases in non-communicable diseases such as cancer, Alzheimer's disease and autoimmune disorders. In the infectious diseases arena, human immunodeficiency virus (HIV), tuberculosis (TB) and malaria will continue to threaten vulnerable populations, while outbreaks, pandemics, antimicrobial resistance (AMR) and the spreading of vector-borne diseases will constitute global challenges for health systems.

The immune system is the key to human health.

The lack of progress in traditional development of vaccines, diagnostics and drugs for major diseases is largely due to a fundamental gap in our understanding of how our immune system prevents and controls disease. Rather than primarily funding individual efforts on single diseases, we need significant resources focused on decoding the human immune system which will provide the basis for the development of powerful new vaccines, diagnostics and treatments for a wide range of infectious as well as non-communicable diseases.

Unprecedented recent technological advances in biomedicine, engineering, and, most importantly, artificial intelligence (AI) and machine learning have given us the tools we need to embark on this ambitious endeavor. Such tools are necessary because of the vast size and complexity of the human immune system. It is billions of times larger than the human genome, and processing such a huge amount of information requires significant data-science capabilities and frontier supercomputing. Advances in frontier supercomputing can then be applied to that database to create the first AI-based models of the immune system. These

models will fill in the current gaps in our knowledge to create more effective cancer immunotherapy, as well as diagnostics, vaccines, and therapies for a host of other diseases.

Over the next decade, we aim to:

- Complete the genetic sequencing of the human immune system
- Determine how the immune system fights disease
- Develop the first machine learning model of the human immune system

The European contribution:

Europe has an impressive history and track record in the biomedical sciences. The knowledge and expertise in the areas of virology, immunology, vaccinology, genomics, epidemiology etcetera are essential assets for the Human Vaccine Project to mobilize and involve.

The purpose of the European Program is to contribute to the overall objective of the Human Vaccines Project to decode the human immune system and to accelerate the development of vaccines, immunotherapies and diagnostics to prevent, treat and cure important diseases.

The Stichting will focus on outreach, advocacy, fundraising, creating partnerships and consortia to shape and strengthen the European contribution to the global research program by:

- Establishing a network of leading European centers for human immunology and vaccination centers and connect them to the mission and activities of the Human Vaccines Project.
- Mobilizing financial support from the public, private and philanthropic sector
- Advocating for scientific prioritization of the decoding of the immunome
- Working together with government institutions, academia, industry and non-state actors – building champions and powerful alliances