



## GSK Vaccines

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# Vaccines partnering to give your science and technology a global impact

GSK forms multidisciplinary teams to accelerate R&D and address major public health challenges

Advances in immunology, genetics and microelectronics are creating opportunities to improve human health. More work is needed to realize the potential of novel technologies. As a science-driven leader in vaccine research, development and production, GSK is well placed to collaborate with companies and universities to translate technologies into products that make a global impact.

GSK has a broad portfolio of vaccines to help protect people of all ages from infectious diseases. The portfolio is robust, with one quarter of sales coming from innovations introduced in the past 5 years. GSK is working to bring more advances to market, investing £718 million in core vaccines R&D in 2019.

A team of 2,500 GSK vaccine scientists at three R&D centres is focused on advancing 15 innovative assets in clinical development and moving new candidate vaccines into human testing. While GSK's scientists apply leading technologies, collaborating with external experts is an essential part of its strategy. GSK Vaccines has over 110 scientific collaborations and works with partners on all its pipeline prospects.

### What GSK looks for in alliances

GSK is looking for scientific partnerships with large and small drug and vaccine developers, consortia, charities, academia—including graduate and post-doctoral research programs—and companies in industries beyond biopharma that can help adapt innovative solutions to vaccine challenges.

The relationships sought by GSK cover discovery to late-phase development projects that advance disease prevention and therapy, vaccine production and supply, and help transition from 'anchor' systems that define operations today to future digital technologies. Through such pacts, GSK is using, for example, reverse vaccinology and systems biology to accelerate vaccine discovery and development.

For all scientific partnerships, GSK applies the same open, collaborative and science-led ethos. Its R&D experts evaluate scientific and technological opportunities, focusing on scientific evidence, potential outcomes and impact, while trying to understand the needs of the possible partner.

GSK aims to establish creative collaborations that harness the strengths of each contributor to achieve shared goals. At GSK, scientists are entrusted with managing the relationship, ensuring close communication and ready access to resources. GSK is also building the next generation of vaccinologists by providing courses and opportunities for PhD students and postdoctoral researchers.

### Areas of interest for potential partnerships with GSK Vaccines R&D

<p><b>Immunology and vaccinology</b></p> <ul style="list-style-type: none"> <li>Are you developing new technologies to characterize and monitor host–pathogen interactions or immune responses?</li> <li>Are you researching epigenetic modification of innate immune cells (trained immunity)?</li> </ul>	<p><b>New production process technologies</b></p> <ul style="list-style-type: none"> <li>Are you developing new technologies to characterize biological products or improve their manufacture (biosensors, microfluidics)?</li> </ul>	<p>Infants Children Adolescents</p>
<p><b>New vaccine targets and antigen design</b></p> <ul style="list-style-type: none"> <li>Are you researching novel associations between viral or bacterial agents and chronic diseases?</li> <li>Are you developing new tools to refine or accelerate future vaccine target identification?</li> <li>Are you developing nanoparticles or virus-like particles or other antigen delivery platforms?</li> <li>Are you researching monoclonal antibodies?</li> </ul>	<p><b>New technologies and tools to accelerate R&amp;D</b></p> <ul style="list-style-type: none"> <li>Are you developing miniaturized clinical assays to make them faster and more robust or developing quality control and assurance assays?</li> <li>Are you developing novel clinical trial designs?</li> <li>Are you researching biomarkers and the application of systems biology to new readouts?</li> </ul>	<p>Adults Pregnant women</p>
<p><b>New technology platforms</b></p> <ul style="list-style-type: none"> <li>Are you investigating antigen stability?</li> <li>Are you working on microbiome functions?</li> <li>Are you working on technologies to induce more efficient and rapid immune responses?</li> <li>Are you researching structural vaccinology?</li> </ul>	<ul style="list-style-type: none"> <li>Are you developing organoids or organ-on-chip systems?</li> <li>Are you developing assays on a chip?</li> </ul>	<p>Older adults</p>
<p><b>Vaccine delivery</b></p> <ul style="list-style-type: none"> <li>Are you developing mucosal, oral, sublingual, nasal or intradermal delivery methods or devices?</li> </ul>	<p><b>Artificial intelligence and digital data analytics</b></p> <ul style="list-style-type: none"> <li>Are you investigating novel applications of systems biology, data modelling and analysis and artificial intelligence that could inform and accelerate the discovery and development of future vaccines?</li> </ul>	

### How GSK is having a global impact

GSK has a broad vaccines portfolio with global reach and delivers around 2 million doses of vaccine every day to people living in more than 160 countries. It includes, for instance, vaccines against shingles (older adult), meningitis (pediatric and adult) and hepatitis (pediatric and adult). GSK also has a strong R&D pipeline of vaccine candidates including respiratory syncytial virus (RSV), therapeutic chronic obstructive pulmonary disease (COPD), therapeutic chronic hepatitis B, *Clostridium difficile* and *Shigella*.

The global impact of GSK's scientific partnership model is illustrated by its collaborations. As a recent example, multiple approaches will be necessary to stop the COVID-19 pandemic. GSK is making its vaccine adjuvant technology available to scientists and organizations working on promising COVID-19 vaccine candidates and technology platforms.

As part of the Innovative Medicines Initiative, GSK supports healthy aging by creating vaccines and vaccination strategies to overcome the age-related weakening of the immune system. GSK also joined the Respiratory Syncytial Virus Consortium in Europe (RESCEU) with teams from academia, patient groups, other pharma companies, regulatory agencies and others to share knowledge of RSV.

GSK is working with postdoctoral researchers and PhD students from Italian and UK universities to try to understand the role of the pathogenic bacteria most prevalent during acute exacerbations of COPD (AECOPD)—non-typeable *Haemophilus influenzae* and *Moraxella catarrhalis*—and elucidate the mechanism of action of a new vaccine candidate in development that aims to prevent AECOPD,

by using next-generation in vitro models.

GSK established a partnership with Viome, a company with expertise in understanding the gut microflora and its role in chronic diseases, to facilitate vaccine development to prevent or treat such conditions.

Working with the Bill & Melinda Gates Foundation and the Wellcome Trust, GSK is developing a vaccine against *Shigella*, a genus of bacteria that causes the loss of 12.8 million disability-adjusted life years and 237,800 deaths a year. The rise of drug-resistant bacteria is reducing treatment options, intensifying the need for a vaccine.

A collaboration with the Université Libre de Bruxelles, Belgium, to characterize in-depth fermentation processes uses time-resolved state of the art omic methods coupled with data analytics and mathematical modelling. This characterization represents a step toward the digitalization of vaccine process development and aims to improve the overall vaccine quality and to hasten the development process.

Going forward, GSK continues to seek out such collaborations to gain access to technologies and knowledge that enable and accelerate the development of life-changing vaccines.

1. GHDx. <http://ghdx.healthdata.org/gbd-results-tool> (2017).

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