British Society for Immunology (BSI) – Written evidence (COV0037)

The British Society for Immunology (BSI) represents over 4,200 immunologists working in academia, clinical medicine and industry. Our objective is to promote and support excellence in research, scholarship and clinical practice in immunology for the benefit of human and animal health. The BSI leads a taskforce, chaired by our President, Professor Arne Akbar, that aims to provide an expert voice on the immunology of COVID-19 to assist the response to the pandemic. The group's first report is available here.

COVID-19

- Disease presentation is complex with many unusual pathologies that have not seen before.
- Understanding the immunopathology of COVID-19 and identifying biomarkers predictive of severe disease is crucial to allow optimisation of treatment for individual patients and to manage the burden on the health system.
- Longer term immunological responses are emerging that have consequences for the health of people who have contracted COVID-19. More research is needed to understand these and the ramifications they will have on our nation's health.

Immunity

- Immunity to coronaviruses often wanes over time, but due to the novel nature of SARS-CoV-2, we are unable to currently comment accurately on the durability or effectiveness of any immunity.
- The correlates of protection of SARS-CoV-2 are currently unknown. It is likely, however, to involve many components of the immune system including, but not limited to, the production of antibodies and T cell responses. It should not be assumed that all antibodies are protective against repeat infection.
- SARS-CoV-2 is able to modulate the host immune response in a way that one might not expect from a novel virus. It is currently unknown why this is.

Vaccine development

- Vaccine development must consider which of the several levels of protection, e.g. nasal, lung and systemic, that we are looking for, and how these can be best achieved.
- A vulnerability of SARS-CoV-2 could be blocking the entry into cells through the interaction of the viral spike protein with the ACE2 receptor.
- Vaccines are generally not as effective in older people and vaccine efficacy decreases as the immune system ages.
- Careful thought needs to be given to who is prioritised in receiving any vaccine developed. Sometimes, a vaccination programme can protect a subpopulation at particular risk, by immunising another subpopulation, e.g. with flu vaccine, children are immunised to stop them spreading the disease to older adults.
- A coherent overall vaccination programme may include different vaccines providing direct protection to different vulnerable groups, and then secondary protection being provided through a community-based approach that targets groups that amplify infection.

Pandemic preparedness

- We must better track diseases in species that are a known risk as reservoirs of viruses with the ability to mutate and cross the species barrier to infect humans, e.g. bats and rats, as well as zoonoses into intermediate species.
- We need a more joined up approach to global infectious disease surveillance; with the level of globalisation today, local isolation of a disease with a moderate to high transmission rate is unlikely. Previously UK disease surveillance platforms have focused too narrowly on influenza despite evidence of a pandemic from another virus like this being on the horizon[1].

Questions for further inquiry

The committee should investigate the B cell response to COVID-19, such as in the production of mediators that co-ordinate immune responses. It should also further investigate why people have different susceptibilities to the disease and what effect different variable factors have, e.g. ageing, BAME, obesity, children, and also what effect that these factors have on our immune systems' responses to treatments and vaccines.

30 June 2020

[1] Cui *et al.* 2019. Origin and evolution of pathogenic coronaviruses. *Nature Reviews Microbiology* **17** 181–192