

Background Brief No. 3 Dual-Use Research

The concept of “dual-use” or dual purpose refers to the “capacity or potential for biological agents, information, materials and supplies, or technologies to be used either for harmful or peaceful purposes”. In the current climate the concept of “harmful purposes” largely refers to the development of biological weapons for the purposes of biological warfare or bioterrorism. This is increasingly important, as Professor Matthew Meselson stated in 2000, “Every major technology ... has been intensively exploited, not only for peaceful purposes but also for hostile ones. Must this also happen with biotechnology, certain to be a dominant technology of the twenty-first century?”

The Biological and Toxin Weapons Convention (BTWC) prohibits states from developing, producing, stockpiling or otherwise acquiring or retaining: “(1) Microbial or other biological agents, or toxins ... of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes” but often distinguishing peaceful purposes from offense activities is difficult from the perspective of the BTWC. There are a range of scientific projects which can be considered dual-use. Some activities, such as those identified by the Fink Committee report which include, *inter alia*, research which “would demonstrate how to render a vaccine ineffective; Would confer resistance to therapeutically useful antibiotics or antiviral agents; would enhance the virulence of a pathogen or render a nonpathogen virulent” as well as other biodefence research are clearly dual-use.

However, it is not always clearly apparent how research could be used for malign purposes by determined actors and a range of spheres of life science can be seen as dual use including those dealing with drug delivery systems, mass production capabilities or fields such as high-throughput screening technologies, proteomics, systems biology, neurobiology and immunology. Moreover, even when research is considered to be dual-use, there is often no agreement on whether such research should have been conducted. Recent examples of research which illustrate these issues related to dual-use include:

- Mousepox IL-4 and subsequent Cowpox IL-4 research. In the process of developing contraceptive vaccines for sterilising mice and rabbits and curbing a burdening mice plague in Australia, researchers at Australia National University added a gene, IL-4, which was intended to “boost antibody production” what actually happened was the “overexpression of IL-4 led to total suppression of mouse cellmediated immune response to the mousepox virus” and the majority of the mice (60%) died, even though they were supposed to be resistant to the virus. More a similar experiment has been conducted on Cowpox in the US in response to concerns over bioterrorism.
- Resurrection of 1918 Spanish Flu In 2005, scientists reconstructed 1918 Spanish flu. This research was conducted with the objective of determining the pathogenicity and epidemiology of future strains of influenza and testing existing countermeasures against the devastating strain. However the strain, which is estimated to have killed more people than the First World War, generated considerable concern over how such research could be malignly applied to develop weapons.
- Aerosolisation and delivery research . Research on drug delivery systems is important in bettering the human condition and making drugs more effective, however the same

techniques and expertise required to facilitate drug delivery through aerosol, transdermal or oral route can also be used to enhance the delivery of biological weapons.

Dealing with dual-use activities requires a range of measures. At the most basic level, in many countries, biological agents that are considered dual-use are subject to laws and biosecurity/biosafety regulations. Often the movement of such agents is strictly controlled both national and international through export control lists or catch all clauses. Dual use knowledge is sometimes subject to secrecy; facilities in which dual use research is being conducted often require registration and assessment for suitability. Dual use research is more difficult to control and although some states have developed Scientific Advisory Boards and/or Oversight committees to assess the implications of research at different states, however because of the different perspectives on the value of scientific research, dealing with dual use is often quite complicated. Indeed, because dual-use research involves a conflict of principles between regulations on the one hand and freedom of scientific research on the other, dealing with dual-use involves a conflicting principles thus needs to include bioethics.