An Assessment of the Use of Chimpanzees in Hepatitis C Research Past, Present and Future: 1. Validity of the Chimpanzee Model

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Summary — The USA is the only significant user of chimpanzees in biomedical research in the world, since many countries have banned or limited the practice due to substantial ethical, economic and scientific concerns. Advocates of chimpanzee use cite hepatitis C research as a major reason for its necessity and continuation, in spite of supporting evidence that is scant and often anecdotal. This paper examines the scientific and ethical issues surrounding chimpanzee hepatitis C research, and concludes that claims of the necessity of chimpanzees in historical and future hepatitis C research are exaggerated and unjustifiable, respectively. The chimpanzee model has several major scientific, ethical, economic and practical caveats. It has made a relatively negligible contribution to knowledge of, and tangible progress against, the hepatitis C virus compared to non-chimpanzee research, and must be considered scientifically redundant, given the array of alternative methods of inquiry now available. The continuation of chimpanzee use in hepatitis C research adversely affects scientific progress, as well as chimpanzees and humans in need of treatment. Unfounded claims of its necessity should not discourage changes in public policy regarding the use of chimpanzees in US laboratories.

Key words: chimpanzee, hepatitis C, hepatitis C virus, hepatocellular carcinoma, Pan troglodytes.

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Introduction

The use of chimpanzees in biomedical research remains at the centre of debate, both within the scientific community and among the general public. The suffering experienced by the chimpanzees involved (1–5), combined with growing evidence of the lack of human relevance of the data produced (6–10), provide compelling ethical and scientific arguments that have contributed to worldwide legislative decisions to ban, or at least significantly restrict, experimentation on chimpanzees and other great apes (1). These concerns are reflected in the United States, both in public opinion (11), and in legislative actions, such as the CHIMP (Chimpanzee Health Improvement, Maintenance and Protection) Act in 2000, the Burr Amendment of 2007 (12), and the 2009 reintroduction of the Great Ape Protection Act (GAPA; 13) — legislation that seeks to prohibit the conducting of invasive research on all great apes. In spite of the above considerations, invasive experimentation on chimpanzees continues to be performed in the USA. As the only significant user of these animals in such research, approximately 1,000 individuals were held in US laboratories as of late 2009 (14). It has been claimed, by some advocates of their use, that chimpanzees are a crucial tool in the fight against serious human diseases such as AIDS, cancer and hepatitis (15), constituting a scientific necessity that ‘trumps’ ethical and practical concerns. While robust scientific evidence has been published to rebut these claims with respect to AIDS (6) and cancer (16), as well as the general utility of chimpanzee research with regard to human medical benefit (7, 8), little attention has been devoted specifically to the question of chimpanzee research into hepatitis C.

Science and medicine are naturally compelled to address hepatitis C, a disease that currently affects up to 200 million people and leads to billions of dollars in healthcare costs. Annually, there are around four million new infections and tens of thousands of deaths, as the disease often progresses to liver cancer, treatable only in approximately half of the cases. There is currently no vaccine available against the disease. As a result, hepatitis C research has been an area of intense investigation for many years. In common with other viral infections, a huge effort has been made to further understand the virus, the immune responses to it, the ensuing disease and pathology, and the roles of host and viral factors therein. Extensive work has also been undertaken toward the development of vaccines and antiviral therapies. This effort has comprised clinical, epidemiological, in vivo, ex vivo, in vitro and in silico approaches, but has also extensively utilised chim-