An Assessment of the Use of Chimpanzees in Hepatitis C Research Past, Present and Future: 2. Alternative Replacement Methods

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Summary — The use of chimpanzees in hepatitis C virus (HCV) research was examined in the report associated with this paper (1: Validity of the Chimpanzee Model), in which it was concluded that claims of past necessity of chimpanzee use were exaggerated, and that claims of current and future indispensability were unjustifiable. Furthermore, given the serious scientific and ethical issues surrounding chimpanzee experimentation, it was proposed that it must now be considered redundant — particularly in light of the demonstrable contribution of alternative methods to past and current scientific progress, and the future promise that these methods hold. This paper builds on this evidence, by examining the development of alternative approaches to the investigation of HCV, and by reviewing examples of how these methods have contributed, and are continuing to contribute substantially, to progress in this field. It augments the argument against chimpanzee use by demonstrating the comprehensive nature of these methods and the valuable data they deliver. The entire life-cycle of HCV can now be investigated in a human (and much more relevant) context, without recourse to chimpanzee use. This also includes the testing of new therapies and vaccines. Consequently, there is no sound argument against the changes in public policy that propose a move away from chimpanzee use in US laboratories.

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

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Introduction

Hepatitis C affects hundreds of millions of people worldwide, including an estimated four million in the USA and five million in Europe (1–3). Serious consequences include liver cirrhosis and hepatocellular carcinoma (HCC), and around 5% of infected people eventually die as a result (4–6). It is therefore a significant healthcare burden, which is set to increase dramatically as the number of infected people rises (2). Research to understand the virus and the disease has been a priority since its discovery in 1989 (7), and this research has involved extensive use of chimpanzees.

However, invasive research involving the use of captive chimpanzees has been banned, or at least severely restricted, across much of the world (8). The continued use of chimpanzees in invasive research in the USA is therefore highly controversial, and there exist compelling arguments against it — for example, the extent of suffering of those chimpanzees involved, and concern over the lack of human relevance of the data produced (8–17). The latter — i.e. the scientific validity of chimpanzee experimentation with respect to human medicine — has been extensively investigated with respect to hepatitis C in the associated paper, 1: Validity of the Chimpanzee Model (18). This previous paper, which examined, in detail, claims concerning the past contributions of chimpanzee experiments to hepatitis C research, as well as the need for chimpanzee use in current and future investigations, concluded that these claims were exaggerated and unjustifiable, respectively. Major scientific, ethical, economic and practical caveats of the chimpanzee model in hepatitis C virus (HCV) research were highlighted, and the contributions of other, non-chimpanzee methods of research were evaluated. On balance, it was concluded that extensive chimpanzee use in the study of the virus and the disease has made relatively negligible contributions to the body of knowledge and to tangible progress, as compared to non-chimpanzee methods, and that the chimpanzee model must be considered to be scientifically redundant, given the array of alternative methods of inquiry now available.

While Paper 1 makes this argument in its own right by evaluating the degree to which chimpanzee data are predictive of and relevant to human HCV infection, and by illustrating the extent of the contribution of other methods, this complementary paper makes an important further contribution, by reviewing the breadth and com-