



Hepatitis C research: summary of chimpanzee use

Although the majority of chimpanzees in laboratories are simply being warehoused following a major decline in their use over the past decade, they do continue to be used for Hepatitis C virus (HCV) research despite the availability of promising alternatives. A review of published HCV research using chimpanzees over the past ten years has revealed that substantial financial (tens of millions of public dollars alone) and scientific resources have been expended and yet these efforts have not produced effective candidates for a preventive or therapeutic human HCV vaccine.

Questionable science

Overall, HCV studies using chimpanzees have a poor scientific record and their relevance to the human condition is unconvincing. While chimpanzees have been used largely because they were alleged to be the only animal that could be infected with HCV, chimpanzees (unlike humans) tend to clear HCV infection and do not develop chronic active hepatitis, cirrhosis or liver cancer. These are the main points in the argument that the chimpanzee is not a good model for HCV. Similar problems occurred with the use of chimpanzees for HIV research and chimpanzees were ultimately deemed a poor model by the scientific community. That tipping point has not yet occurred in the case of HCV research.

Another major problem in terms of scientific validity is that researchers attempt to draw significant conclusions from results based on a small number of chimpanzees (likely due to the fact that they are very expensive to use), in some cases 1-3 chimpanzees. The use of 1-3 humans to test whether a vaccine is effective prior to its use in the general population, for example, would raise significant concern, never mind the use of an entirely different species that doesn't even acquire and exhibit HCV in the same way.

Invasive procedures

The procedures that chimpanzees are subjected to when used in HCV research provoke welfare concerns; this concern is only enhanced when the research is largely ineffective. Chimpanzees used for HCV research are subjected to various invasive procedures, such as infection with HCV and multiple liver biopsies (including surgical biopsies) and blood draws.

When collecting blood samples from chimpanzees, various labs subject the animals to darting, a procedure that involves shooting the chimpanzee with a dart full of anesthetic. This process induces major fear in the chimpanzees. The processes of both becoming sedated and waking up from the anesthetic can involve falling onto concrete and metal bars and subsequent injury.

There are two types of biopsies done: punch biopsies and surgical biopsies. Punch biopsies involve injecting a sharp, cylindrical instrument into the liver and "punching" the liver to get a tissue sample. Surgical biopsies involve surgical excision of a wedge of liver tissue, in order to obtain a larger sample. At any one biopsy, samples might be drawn from 3-5 different sites in the chimpanzee's liver. Biopsies are known to cause discomfort in humans, even when a local anesthetic is used. Former research chimpanzees who were subjected to multiple liver biopsies have been documented following autopsy as having various adhesions.

Because most HCV studies of our review extended over months or years, and many chimpanzees were used in multiple studies, the number of procedures on an individual chimpanzee could be counted in dozens, or in some cases, triple-digit figures. Repeated use of chimpanzees in a variety of research protocols has been a common practice, given their long lifespan.

Alternatives do exist

While some researchers continue down the path of chimpanzee use, research on human HCV patients as well as *in vitro* and *in silico* studies have made significant strides and should be aggressively implemented. As only one example, researchers recently developed the first tissue culture of normal, human liver cells that can model infection with HCV. This system will allow the testing of possible HCV treatments and vaccines, which is something that chimpanzees have been historically used for with a lack of promising results.

Furthermore, no amount of chimpanzee studies can inform us of the immune response and HCV pathology in humans as well as human HCV patients can. Persistent efforts and institutional teamwork in the past two decades have proven, without a doubt, that it is possible to run successful longitudinal human studies of HCV. In the coming years, these existing alternatives to chimpanzee research should be practically implemented and take precedence in obtaining scarce research dollars.

Conclusion

The bottom line is that HCV studies using chimpanzees have not produced significant breakthroughs or successes, yet chimpanzees continue to be repeatedly subjected to invasive procedures. There still is no effective human vaccine despite years of research and tens of millions of taxpayer dollars. Going forward, carefully designed human studies, coordination among researchers, and implementation of existing *in vitro* studies provide ample opportunities for testing treatments and vaccines and provide more relevant information on the characteristics of HCV in humans than any chimpanzee studies ever will.

The use of chimpanzees for HCV research should come to an end and the chimpanzees in laboratories should be retired.