Live attenuated vaccine trials in medically informed volunteers: a special case?

Anthony J Pinching St Bartholomew's and The Royal London School of Medicine and Dentistry, London

Abstract

A group of activist clinicians have offered to volunteer for clinical trials of live attenuated HIV vaccines. This has provided an important conceptual challenge to medical ethics, and to work on the development of HIV vaccines. In exploring these issues, this article highlights how the HIV field has altered the content as well as the tone of ethical discourse. The balance of expertise and authority between research subjects and trialists is profoundly changed, raising questions about the limits of voluntarism and differing perspectives on risk-benefit analysis. Care is needed to ensure that the novelty of the situation does not confuse the central ethical and scientific issues.

Keywords: HIV vaccines; research ethics; risk-benefit analysis; voluntarism; consent

HIV vaccine research has proved as frustrating as its necessity is vital. The technical and conceptual problems of vaccine development are at least as challenging as the ethical debates regarding their trials and potential application, as seen in the article by Guenter et al. In recent years, a group of activist clinicians, some of whom are self-declared members of at-risk communities and/or are involved in clinical care of people with HIV infection, have offered themselves as volunteers for trials of live attenuated vaccines. This has raised some intriguing new slants on some key ethical issues.

The technical background is simply enough stated. Some of the most effective vaccines in the past have been live, but attenuated, strains of the virulent organisms against which they are able to confer protection. They provide better protection because, by replicating in the host, they can stimulate a more substantial and broadly based immune response. Such vaccines are based on strains of organisms that have been passaged in culture or through other species and have been shown not to revert to the “wild-type”, disease-producing strain. There are some, albeit provisionally, data to suggest that some strains of HIV may be less pathogenic. The proposal is that these well-informed volunteers would be willing to act as guinea pigs in the evaluation of such vaccines.

This generous, but also provocative, offer raises complex issues about process in research ethics, risk-benefit analysis, consent, disclosure, voluntarism, expertise and the duty of care, as well as concerns about timeliness, evaluability and the hazards to research processes and opportunities in the event of failure.

Firstly, we need to look at the very special kind of volunteers who are putting themselves forward. Arguably, they are among the best-informed people in the field: they have substantial clinical experience of the disease against which protection is being sought, and they are, in a number of instances, members of communities that have been substantially affected by HIV, giving them a keen personal sense of its community impact. However, does this very proximity undermine or influence adversely the principle of voluntarism? Are they in effect being implicitly or unconsciously coerced by their professional and/or community awareness of the issues? Idealism and solidarity are evident, but is there a sense of duty arising from their awareness of the limitations of medicine, from the burden of grief for patients or their peer-groups, or even an element of guilt at having escaped the fate of their patients and friends? Can we regard doctors in this field as somehow distinct from others who may volunteer and if so how? Do they need more or less protection from the influence of their prior perceptions?

In pressing for these studies to be done and to be done on them, how do they affect the issue of equipoise that should inform study acceptability and design?

The offer to be trial subjects from individuals who are so highly informed seems to turn upside down much of the ethical literature about disclosure and consent to clinical trials. The presumption in most of it is that the doctor conducting the trial is substantially more informed than the trial participant. If the situation is reversed, then how does this affect the relative roles of the researcher conducting the trial - the trialist, and the volunteer? If the informed volunteer urges the
Precipitateness is another issue in this unusual setting. The volunteers have put themselves forward in a way that could be construed as putting pressure on vaccine trialists to undertake such a study. That may indeed have been, in part, their intent. The urgency is real enough. Yet that urgency has been present for well over a decade. Pressure to take some bold steps, even short cuts, is certainly fuelled by the lack of progress with viral protein vaccines. Is there also a sense of global solidarity because of the increasing disparity between what can be offered as treatment to those in the industrialised, and to those in the developing, world? These arguments would appear to justify proceeding apace on the grounds of the ethics of emergency.

The balance in favour of attempting the live attenuated approach may have been tipped by the impressive effectiveness of combination antiretroviral therapy. This could have been seen as providing something of a safety net for the vaccinees, if the vaccine strains proved to be, or reverted to, pathogenic strains. Is the urgency to proceed based on the need and on a perception of the available data, rather than its realistic appraisal? Can we genuinely identify non-pathogenic strains? Is there a sufficiency of data now to justify the view that immune protection can indeed be provided, or are we still too unclear about the nature, correlates and induction of such protection? Is a false sense of security being provided by the partial data that we have to date?

Yet one could argue that there will always be uncertainties, always more data to be gathered, but that ultimately the only way forward is to try something that we know from other settings to be the most likely way of achieving an effective vaccine. While some data can be obtained from animal experiments including those on primates, the reality is that HIV is a uniquely human pathogen. Therefore it is only in the setting of clinical trials that we are going to find out the vital answers. So why not just try it, if there are willing guinea pigs? The argument is an appealing offer to break the gridlock of incomplete and unsatisfactory knowledge derived from only partially relevant extrapolations. After all, Jenner didn’t wait for the laboratory data to stack up before applying the original vaccine against smallpox. (However, Jenner did have a raft of human experience, almost literally “in the field”, to draw upon!)

If we do look at the available and relevant data, can we draw any conclusions? The Sidney cohort of transfusion recipients is a key group that can offer insights. In this group of transfusion recipients, and the relevant donor, the strain infecting them has a deletion in the nef gene. Their clinical course seemed to be non-progressive over a long period of observation. Primate studies had also indicated that deletions in the nef gene could render the virus less pathogenic in a model system. These two strands of evidence seemed to provide encouragement.

Timely reminder
However, the clinical data from Sidney are necessarily time-limited, and more recent studies on the cohort have indeed started to suggest that there is evidence of disease progression, or immune decline, after longer periods of observation. This is a timely reminder of the importance of a sufficiently long follow-up period before judgments are made about a disease that may, in the “wild”, take 10 years to cause disease in 50% of subjects. The possibility remains that the strain has reduced pathogenicity and hence a longer...
time to progression, and that this can lead to the
discovery of an even less pathogenic strain for
vaccine use. However, data from primate models
suggest that the pathogenicity of nef deletion
strains varies. Other data show that the capacity
for recombination, as well as mutation, in HIV
and related viruses is very real. Thus it seems
dangerous, on theoretical grounds, to rely on an
assumption the the vaccine strain will remain
non-pathogenic.

As more data emerge therefore, the validity of
the concept of an identifiable stable attenuated
strain of HIV, rendering it suitable for vaccine use,
is seen as premature. The data also underpin the
need for very long term follow-up to validate any
observational experience of wild-type variants
before conclusions are drawn. This also highlights
just how long the follow-up period of any trial
would need to be before it could be judged safe. A
vaccine safety trial (phase I) of the necessary ten
to fifteen years’ duration seems neither realistic,
nor likely to be an acceptable pathway for those
who would wish to stress the urgency. Yet how
could one justify extrapolating from initial pre-
liminary results of an apparently safe initial phase
in order to proceed to large-scale phase II and III
trials of efficacy, let alone safety? The Sidney
cohort offers a brutal reminder of the dangers of
reading the results too soon.

The balance of these various strands of
argument is difficult to resolve and different views
can be readily justified. There is no question that
the gauntlet thrown down to the scientific
community by the volunteers for live attenuated
vaccines has sharpened the debate on vaccine
development. Indeed, it has lent other approaches
some added urgency. The volunteers have also
challenged ethicists to re-examine some of their
basic concepts in a very different setting, and have
enhanced our insights into the conduct of clinical
trials.

Perhaps an almost overwhelming argument
against attempting such trials with the present
state of knowledge, is that there is a real risk that a
truly pathogenic strain could turn out to have
been used, or could emerge over time, in the vac-
cinees. If that were to happen, even in one recipi-
ent, it would almost certainly mean that the live
attenuated approach could never be tried again.
So to proceed with this adventurous approach,
even with willing volunteers, would probably
jeopardise the possible validity of the concept and
a potentially valuable approach to HIV vaccine
development for all time. That heavy burden of
responsibility suggests that the challenge should
not be taken up at this time. Rather, the validity of
the concept should be recognised and developed
further in preclinical settings. The critical risk of
the premature application of this approach, even
in willing and altruistic volunteers, is not just the
risk to the individuals, which they knowingly
accept, but the significant threat to a whole strand
of future investigation and application. The chal-
lenge has, however, facilitated an acceptance of
the legitimacy of the concept of a live attenuated
vaccine approach, which in itself is an achieve-
ment.

Author’s note
This paper is based on a talk given at a conference
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Anthony J Pinching is Louis Freedman Professor of
Immunology and Fellow, Department of Human Sci-
ence and Medical Ethics, St Bartholomew’s and The
Royal London School of Medicine and Dentistry,
Queen Mary & Westfield College, West Smithfield,
London EC1A 7BE.

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