Development of a vaccine against Squirrelpox virus (SQPV) – the current situation.

Background

Three years funding was provided by The Wildlife Ark Trust (WAT) to explore the feasibility of producing a vaccine against squirrelpox virus (SQPV) that could be used in the field to protect red squirrels against disease. All successful poxvirus vaccines to date are based on viruses from the same genus (the most closely related viruses) of the poxvirus family being able to "cross-protect" against the virus of interest. Alternatively, a weakened (attenuated) form of the virus of interest can be used. For this reason in the last few years we have been working with SQPV trying to understand how it is related to other poxviruses and how its virulence in red squirrels is controlled. Unfortunately it appears that SQPV is in a genus of its own and there are no viruses that could be used to "cross-protect" against squirrelpox disease. For that reason we have spent most of our time trying to produce a "weakened" form of SQPV. Two vaccine candidates were produced; both were attenuated live viruses.

Vaccination

Given that SQPV normally appears to be lethal to red squirrels in the wild and that all successful poxvirus vaccines to date have been live viruses our first challenge was to assess whether or not our vaccine candidates were sufficiently attenuated so as not to kill the inoculated animals (or at least require them to be euthanized on welfare grounds). Two groups of animals were assessed, one for each of the vaccine candidates. Both vaccine candidates caused lesions to develop at the site of inoculation and although these lesions took several weeks to resolve at no stage were animals removed from the experiment by euthanasia on health and welfare grounds resulting from vaccination.

Having survived the vaccination procedure all animals were challenged 5 weeks post-vaccination with the virulent "wild-type" virus. This resulted in lesions developing at the site of challenge, but at no stage were they severe enough to kill the animal, as would be expected in the wild. Indeed all vaccinated and challenged animals survived through to resolution of the lesions approximately 5 weeks post challenge. There appeared to be slight differences between the two candidate vaccines with one appearing to be more effective than the other. Full analyses of the samples taken from this vaccination experiment have yet to be completed, but preliminary evidence is that we have achieved our initial goal of proving "proof of concept" that it is possible to vaccinate red squirrels such that they are able to survive a normally lethal challenge of SQPV.

Next Steps

The next challenges in developing a vaccine are to determine how squirrels living in the wild respond to the vaccination. It is possible that they will respond differently to those already tested and therefore the safety of the vaccine in the wild has to be assessed. In addition the vaccine can only be as effective as the method used to deliver it. Therefore the means of effective delivery to a wild population has also to be explored.

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