Virulence determination of Cowpox virus isolates - do we still need animal experiments?

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Zoonotic Cowpox viruses (CPXV) are endemic in Western Eurasia and the incidence of human CPXV infections is increasing. Accidental hosts (e.g. rats) mediate the transmission to humans. Currently, several novel CPXV-isolates from potential reservoir or accidental hosts were obtained and their entire genomes were characterized. The virulence of CPXV-isolates is usually evaluated by animal experiments, using e.g. Wistar rats (Rattus norvegicus) as model, or common voles (Microtus arvalis) as reservoir species.

To reduce animal experiments, the objective of our study was to characterize CPXV-isolates using different in vitro techniques, including comparative replication kinetics and phenotypic evaluation with chorioallantoic membrane (CAM) cultures.

Therefore, different CPXV-isolates - already tested in vivo - were analyzed for their replicative capacity on different cell lines originating from potential reservoir hosts as well as established cell lines (Vero76). Independent from the used cell culture, the growth kinetics yielded no marked differences between the isolates.

Phenotypic characterization on CAM cultures discriminated pox lesions induced by ectromelia virus from lesions caused by CPXV. However, all tested CPXV-isolates showed no significant phenotypic differences.

In conclusion, virulence characterization of CPXV-isolates still needs in vivo experiments, presumably due to the multifactorial nature of virus-host interactions that cannot be evaluated in vitro.

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