Characterising the immune responses of *Mustela furo* to experimental infection with *M. bovis*

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Bovine tuberculosis (bTB), or zoonotic tuberculosis, caused by *Mycobacterium bovis* (*M. bovis*) creates biosafety and economical threats to the farming industry and the public. The UK has the highest European bTB prevalence, followed by the Republic of Ireland and Spain. In France, the Officially TB Free (OTB) status is also challenged by a rise of bTB in several regions. BTB eradication is an OIE (World Health Organisation for Animal Health) requirement, but despite comprehensive test and slaughter policies conducted at a high cost for decades, long-term management of transmission from infected wildlife, typically European badgers (*Meles meles*), is required. Oral vaccination of badgers with the Bacille of Calmette and Guerin (BCG) is an attractive option but developing cost-effective and efficacious BCG-containing baits deployable in the field is an ambitious challenge, human vaccine against TB. Experimental and field studies in captive and wild badgers have already shown that oral BCG is protective but trapping and housing large numbers of wild badgers is not viable for the complete R&D and regulatory programme. We have therefore reverted to ferrets as “clean”, and laboratory-adapted mustelid surrogates for badgers to understand the host/responses interactions and develop quantitative markers of infection suitable for vaccine efficacy studies. The long-term goal of this work is to accelerate the screening of oral BCG formulations and doses. In the present experimental studies, we investigated the pathogenicity and immunogenicity of *M. bovis* in inoculated ferrets by the intratracheal route (IT) or exposure by direct contact for 40 weeks. The peripheral cellular and serological responses of IT infected ferrets were mostly similar to those seen in infected badgers. In-contact animals presented some responses to mycobacterial antigens but without any visible granuloma observed at post-mortem. Overall, these findings are promising chronic features of bTB, to be further explored for testing the protective efficacy of vaccines.