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A cell-based assay for tetanus toxin as an alternative to animal models used in safety testing of tetanus toxoid

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Chemically inactivated tetanus toxin (TeNT), known as tetanus toxoid, is the active component of vaccines and batches of tetanus toxoid undergo routine batch testing to confirm absence of specific toxicity. This testing is currently done in animals and has a 21-day observation period. As a potential alternative non-animal model, we have developed a sensitive and specific TeNT cell-based assay (CBA) based on LAN5 neuroblastoma cells that were genetically modified to express a NanoLuciferase-VAMP2 reporter (because VAMP2 is the intracellular target for TeNT). The CBA is highly sensitive to TeNT and specific for the tetanus holotoxin. Specificity has also been shown using tetanus antitoxin which completely prevents the VAMP2 cleavage caused by the toxin, suggesting that the CBA has potential additional utility as a potency test for measurement of functional anti-tetanus antibodies. Based on preliminary observations from studies using representative batches of tetanus toxoid from manufacturers of human and veterinary tetanus vaccine, we will discuss the potential utility of the CBA as a routine batch control test for safety testing of tetanus toxoid and considerations for its implementation.

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