VAC_10 - Safety and immunogenicity of the anti-cocaine vaccine UFMG-VAC-V4N2 in a non-human primate model

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Introduction: A promising strategy for cocaine addiction treatment is the anti-drug vaccine. These vaccines induce the production of anticocaine antibodies, capable of linking to the cocaine molecule decreasing the passage of drug throughout the blood–brain barrier, decreasing drug activity in the brain. Our research group developed a new vaccine candidate, the UFMG-V4N2, to treat cocaine use disorders (CUD) using an innovative carrier based on calixarenes.

Objectives: This study assessed the safety and immunogenicity of the anti-cocaine vaccine UFMG-VAC-V4N2 in a non-human primate toxicity study using single and multiple vaccine doses.

Methodology: Five adult *Callithrix penicillate* marmosets, three females, and two males, received 0.3 mL of the vaccine UFMG-VAC-V4N2 through 5 intramuscular injections on days 0, 7, 21, 28, and 42. Food intake, animal weight and body temperature were recorded throughout the experiment. Tissue samples were immediately collected after the euthanasia for histopathologic analysis. Biochemical tests, ELISA and competitive inhibition assay were used to evaluate vaccine safety and immune response induction parameters.

Results: The mean levels of anti-cocaine IgG were significantly higher in the vaccinated marmoset compared to the baseline from day 7 until the end of the study. No deaths occurred during the study. None of the animals treated with the tested formulation presented severe adverse reactions at the vaccine site during the study. Renal function biomarkers, hepatic function biomarkers, amylase, proteins and glucose levels were stable during all the follow-ups. Histopathological evaluation of the injection site revealed moderate focal fibrinonecrotic panniculitis, and myositis with mild fibrosis, while the evaluation of systemic samples showed no changes linked to adverse vaccine reactions.

Conclusion: The anti-cocaine vaccine UFMG-VAC-V4N2 presented a favorable safety profile and induced the expected immune response in a non-human primate model of Callithrix penicillata. This preclinical UFMG-VAC- V4N2 study responds to the criteria required by international regulatory agencies contributing to future anticocaine clinical trials of this anti-cocaine vaccine.

Keywords: Cocaine use disorder, Anticocaine vaccine, Preclinical study