

POLYCLONAL ANTIBODIES AGAINST MULTIPLE CHEMICAL THREATS

Vaccines And Monoclonal Antibodies To Counteract Synthetic Opioids' Toxicity, Poisoning, And Lethality

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Our research program is focused on the development and translation of vaccines and monoclonal antibodies (mAb) to prevent, treat and reverse toxicity associated with deliberate and accidental overdose involving synthetic opioids such as fentanyl and its potent analogs. The incidence of fatal drug overdoses has dramatically increased due to the proliferation and widespread availability of fentanyl and its analogs, often found in street drug mixtures. Fatal drug overdoses totaled more than 100,000 in 2021 in the United States. In addition, fentanyl and its analogs are identified as potential chemical agents in both civilian and defense scenarios. Current medications are not always sufficient to reverse and treat overdose from fentanyl and its analogs. To provide a complementary countermeasure strategy, our team has developed a series of vaccines and mAb specific for fentanyl, carfentanil, and other relevant analogs. Vaccine-induced polyclonal antibodies and mAb selectively sequester the target drug from circulation effectively preventing and reversing respiratory depression and bradycardia in pre- and post-exposure animal models including mice, rats and mini-pigs. Due to their selectivity for the target(s), these mAbs do not interfere with endogenous ligands, FDA-approved medications for treating opioid use disorders (OUD) and overdose, and other critical medications. Hence, vaccines and mAbs can be co-administered with standard of care treatments for OUD and overdose. Compared to opioid receptor agonists and antagonists, vaccines and mAbs may offer longer-lasting protection against toxicity and re-narcotization in non-drug user target populations (e.g., soldiers). Translation of Vaccines and mAbs will benefit those civilian and professionals at high-risk of accidental or deliberate exposure to fentanyl(s).

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Dr. Pravetoni is the inventor or co-inventor of patents disclosing vaccines and monoclonal antibodies against opioids, and their application