Adenovirus Hexon-Based Anti-Nicotine Vaccine to Treat Nicotine Addiction

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Background & Unmet Need

- Current strategies to help smokers quit include counseling and medication therapies

- However, due to the strong addictive qualities of nicotine, smokers have a relapse rate of 70% to 80% within 6 months

- One therapeutic approach is to develop an anti-nicotine vaccine, in which nicotine is administered to induce antibodies which can later sequester nicotine

- Because nicotine is a small molecule not seen by the immune system, nicotine (or a nicotine analog) must be coupled to a larger molecule to induce an anti-nicotine immune response

- Clinical trials of anti-nicotine vaccines show varied immune responses among participants, and only a small percentage successfully quit smoking

- **Unmet Need:** A nicotine vaccine which effectively induces immune response and aids in smoking cessation

Technology Overview

- **The Technology:** A conjugate of an isolated adenovirus hexon protein coupled to nicotine or a nicotine analog as a smoking cessation strategy

- **The Discovery:** Coupling the highly immunogenic adenovirus (Ad) hexon protein to the nicotine hapten AM1 increases the immunogenicity of a nicotine vaccine

- **PoC Data:** Mice vaccinated with the conjugate, HexonAM1, generated high titers of anti-nicotine antibodies

- When the mice were challenged with nicotine, IgG-bound serum nicotine increased 5.2-fold compared to naïve control mice and nicotine levels in the brain were reduced by 53%

- The HexonAM1 vaccinated mice also showed significant alleviation of nicotine-suppressed locomotor behavior

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![Weill Cornell Medicine]

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Technology Applications

- Anti-nicotine vaccine for the treatment and prevention of nicotine addiction
- Anti-nicotine vaccine for comorbid indications, including Critical Limb Ischemia or Buerger's Disease

Technology Advantages

- Demonstrated high titers of anti-nicotine antibodies that effectively suppressed the effects of nicotine
- Provides a new platform for vaccines against small molecules
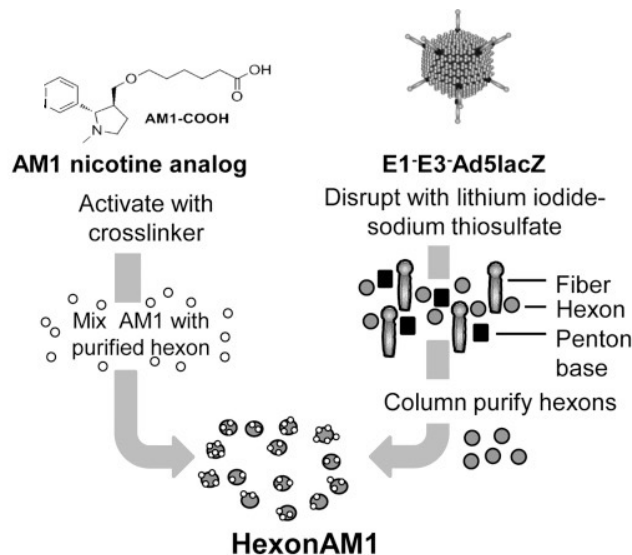
Supporting Data / Figures

Figure 1: Production of HexonAM1.

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Patents:
US Patent 10,004,811

Publications:
Rosenberg et al. *Hum Gene Ther*. 2013.
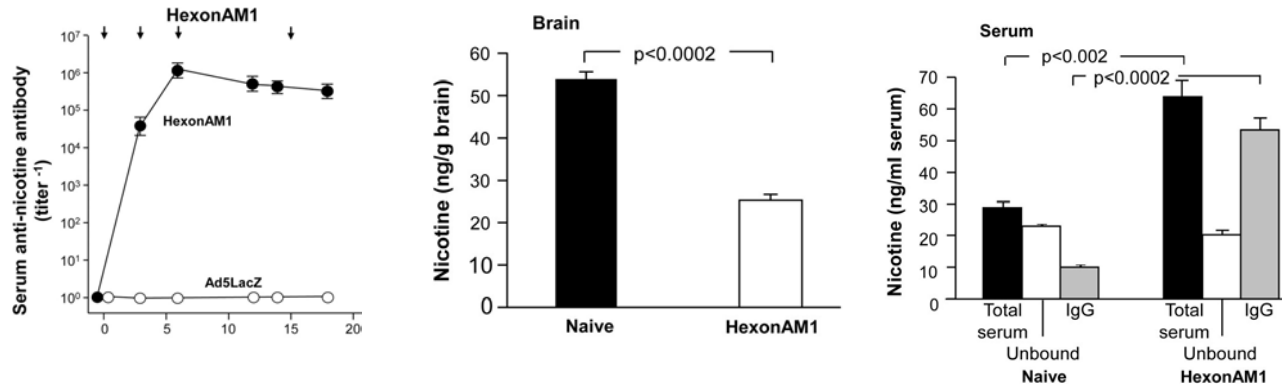
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Supporting Data / Figures

Figure 2: **Left:** Anti-nicotine antibody titers following HexonAM1 vaccination in mice. **Right:** Nicotine levels in the brain and serum following nicotine challenge in HexonAM1-vaccinated mice.

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