JIHS
Japan Institute for Health Security

Mucosal LC-Plasma Immunization to Induce Innate Immune Memory against Respiratory Virus Infection

Researchers

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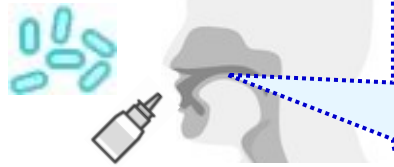
Concept

- **Mucosal LC-Plasma Immunization (in the upper airway)**
- **Vaccine to induce mucosal broadly cross-reactive innate immune memory** (trained innate immunity) against respiratory virus infection
  - ➢ **Potential to protect viral infection in the upper airway**, leading to the control of respiratory virus/variant epidemics/pandemics
  - ➢ **Potential primary countermeasure** against emerging respiratory virus outbreaks, particularly during the period for emergent vaccine development inducing effective acquired immune responses

Backgrounds

- ✓ Controlling respiratory viral infections is crucial for preventing pandemics.
- ✓ Current COVID-19 & Flu vaccines inducing neutralizing antibodies can inhibit disease progression but fail to prevent variant epidemics.
- ● Immunization for mucosal trained innate immunity cross-reactive to varieties of viruses and variants may be an important strategy for preventing respiratory viral epidemics.
- ☐ We previously identified a lactic acid bacterial species, ***Lactococcus lactis* strain Plasma (LC-Plasma)**, which can activate plasmacytoid dendritic cells and enhance innate immune responses.

LC-Plasma
mucosal immunization

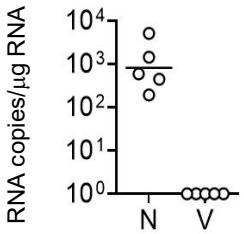


Upper respiratory tract

pDC activation

Innate immune "memory" induction

Broadly-reactive anti-virus response



Protective efficacy against SARS-CoV-2 (QHmusX) challenge: Significant reduction in sgRNA in NALT 2 days post-challenge in LC-Plasma-immunized mice (V).

Research Summary

- **Mucosal LC-Plasma immunization in mice**
- ● Protection against intranasal SARS-CoV-2 challenge
- ● Protection against intranasal influenzavirus challenge
- ● Induction of anti-virus innate immune responses
- ➢ Induction of durable anti-virus innate immune memory responses

Future

- **Non-clinical ongoing: POC in mice/Device optimization in macaques**
  ⇒ Clinical trial
- ● **1st: Vaccine against SARS-CoV-2 & Influenzavirus infection**
- ● **2nd: Primary vaccine against respiratory virus infection**