Addition of BronchoVaxom to inactivated H1N1 influenza virus to augment adaptive immune response in mice.

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1. Abstract

Influenza remains a global health problem and improved vaccines are needed. Broncho-Vaxom (BV), a bacterial lysate, may serve as a promising adjuvant candidate. The aim was to investigate whether BV enhances cross-reactive antibody responses against Influenza, and to determine the role of neutrophils in the BV-mediated immune response. In both experiments IgG and IgA responses were assessed by ELISA in serum and bronchoalveolar lavage fluid (BAL). Results showed enhanced adaptive antibody responses against influenza A strain H3N2, but not against a more distant influenza B strain. After depletion of neutrophils IgG and IgA titers did not significantly decrease, suggesting either residual tissue neutrophils or a limited role of neutrophils in B-cell activation.

2. Introduction and Background

- Influenza causes 3-5 million serious cases, and up to 650 000 respiratory deaths/year.[1]
- Mutations as well as antigenic drift and shift are ongoing processes that result in a genetically heterogeneous Influenza population, which impacts the effectiveness of vaccines.[2]

Broncho-Vaxom (BV)

BV consists of 21 inactivated bacterial strains that are frequently involved in respiratory tract infections. Clinical studies have shown that BV can specifically influence the body's immune response and thereby strengthen the body's resistance to infections. [3]

The BV-Projects BV-021 and BV-028

Previously the Lab proved that BV induces an innate immune response with a strong neutrophil infiltration in the lungs.

In BV-021 the lab measured higher adaptive IgG and IgA titers against the vaccination strain in mice vaccinated with H1N1+BV. Cross-reactivity still had to be measured.

BV-028 investigates if the previously detected neutrophils in the lungs may have influenced the adaptive immune response measured in BV-021.

3. Aims and leading questions

Evaluate the efficacy of BV as an adjuvant in Influenza vaccines.

How does the cross-reactivity of antibodies to other influenza strains (H3N2, influenza B) develop after immunization with or without BV after 28 days?
Does the adaptive immune response to BV+H1N1 remain intact or is weakened in the absence of the neutrophils?

4. Methods and Study Design

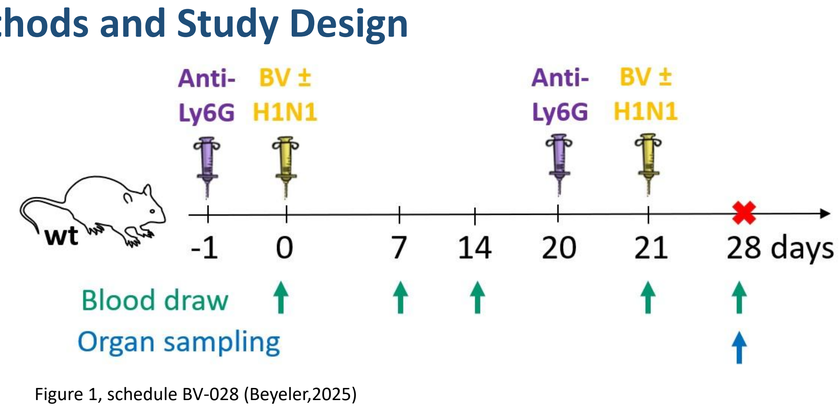

Figure 1, schedule BV-028 (Beyeler,2025)

Both experiments were structured the same way:

- Vaccine virus → inactivated A/Brisbane/59/2007 H1N1
- Two-step intranasal immunization: prime immunization on day 0, and booster immunization on day 21.
- IgG and IgA responses assessed by ELISA in serum and BAL

BV-021 → adaptive cross-reactivity.
BV-028 → adaptive immune response following neutrophil depletion using an anti-Ly6G antibody. (see figure 1)

5. Results

BV-021:

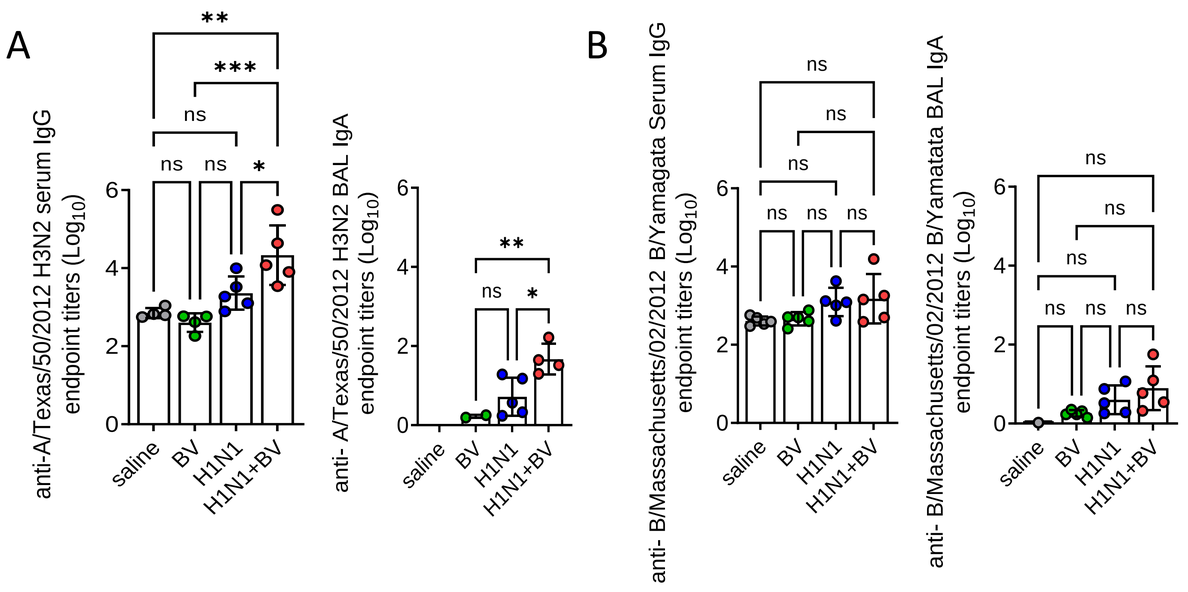

Figure 2: Results BV-021 at day 28 after two immunizations. (A) Adaptive-cross reactivity against the heterologous strain A/Texas/50/2012 H3N2. (B) Adaptive cross reactivity against the heterologous B (Yamagata) type strain B/Massachusetts/02/2012. Results were obtained using ELISA. Comparison of IgG or IgA endpoint titers between the 4 groups in serum and BAL. (Beyeler, 2025)

Highest cross-reactive anti-H3N2 serum IgG and BAL IgA titers were measured in the H1N1+BV group with statistical significance to H1N1 group ($p < 0.05$) against the A/Texas H3N2 strain.
No significant differences in serum IgG and BAL IgA was shown between those groups against the B/Massachusetts strain.

BV-028:

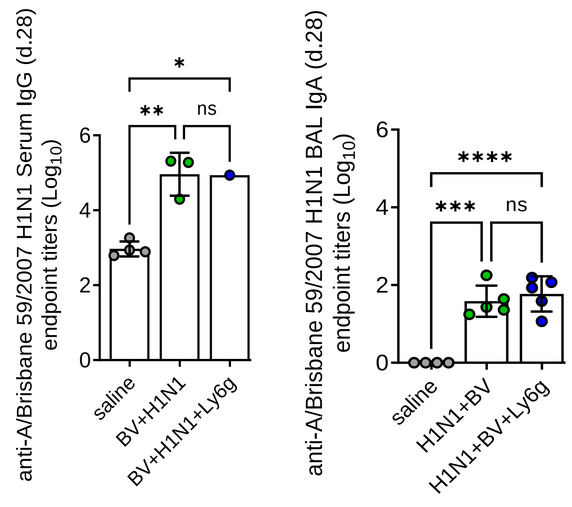

Figure 3: Results BV-028, adaptive immune response against A/Brisbane 59/2007 H1N1 at day 28 after neutrophil depletion and two immunizations. Results were obtained using ELISA. Comparison of IgG or IgA endpoint titers between the 3 groups in the serum and BAL. (Beyeler, 2025)

No significant difference in serum IgG and BAL IgA was shown between groups H1N1 and H1N1+BV after neutrophil depletion.

6. Discussion and conclusion

- BV enhances cross-reactive antibody responses to heterologous influenza A strains (H3N2).
- No effect on more distant influenza B strains.
- Adaptive immune response persists without circulating neutrophils.
- BV is a promising adjuvant candidate for influenza vaccines.

List of references

[1] Influenza (Seasonal), 2025, para. 1
[2] Webster & Govorkova, 2014, p. 1
[3] BronchoVaxom, 2025, para. 12

Figures