Lung stiffness affects the response to methacholine in two strains of mice

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INTRODUCTION

What is the relationship between **lung stiffness** and the **response to methacholine**?

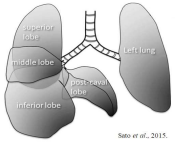
BALB/c ●
(Charles River, Saint-Constant, Canada)

vs

C57BL/6 ■
(Jackson, Bar Harbor, MA, USA)

The response to methacholine differs between strains of mice

Elucidating the lung mechanisms governing the response to methacholine may be crucial for understanding the causes of hyperresponsiveness in lung diseases.



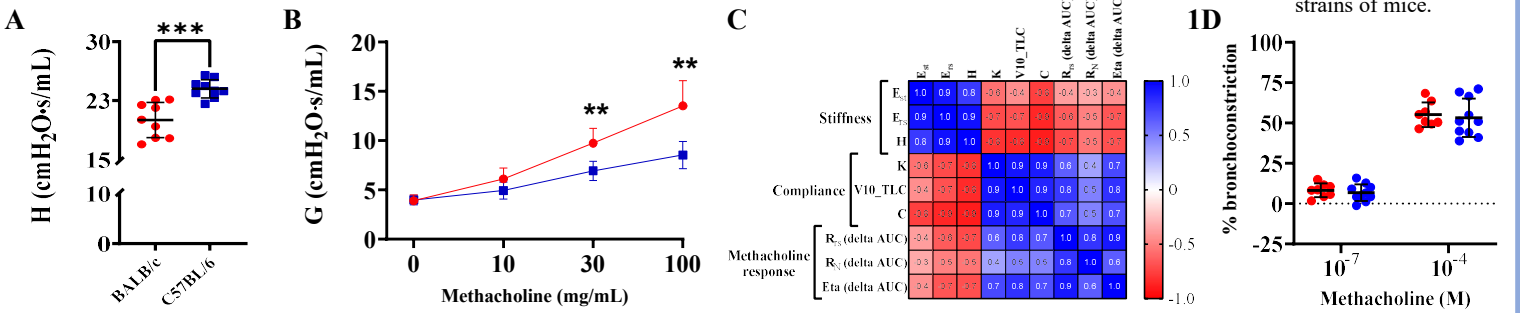
Mouse lung structure

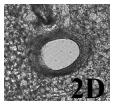
OBJECTIVE

Examine whether differences in lung stiffness between two strains of mice coincide with their differing response to methacholine.

RESULTS

Lung tissue elastance is greater in C57BL/6 vs BALB/c mice → The **response to methacholine** is greater in BALB/c vs C57BL/6 mice. → There is a negative correlation between **lung stiffness** and the **response to methacholine** → There is no difference in **airway constriction** between the two strains of mice.





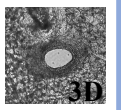


Figure 1. Lung readouts assessed in both strains of mice. Red circles and blue squares represented BALB/c and C57BL/6 respectively. **A.** Tissue elastance at baseline (**H**). **B.** Tissue resistance (**G**) in response to methacholine. **C.** Pearson's correlation between lung stiffness and the response to methacholine. Quasi-static elastance (E_{st}); Respiratory system elastance (E_{rs}); Tissue elastance (**H**); Parameter K of Salazar-Knowles equation (**K**); Volume at 10 cmH_2O, expressed in % of total lung capacity (**V10_TLC**); Lung compliance (**C**); Respiratory system resistance (R_{rs}); Newtonian resistance (R_n), Hysteresivity (**Eta**). Area under the curve (**AUC**) 1**D.** Average percentage of constriction of airways in each mouse. Photograph of the airway induced to constriction with two concentrations of methacholine **2D** 10-7 and **3D** 10-4. Bars are means ± SD. Significant differences are indicated by asterisks (**and *** means $p<0.01$ and $p<0.001$, respectively).

METHODS

Respiratory mechanics, lung volume and the response to nebulized methacholine were measured with the flexiVent and compared between male BALB/c and C57BL/6 mice (n=9). The auxotonic contraction of airway smooth muscle was also assessed in vitro by measuring small airway constriction in lung slices using the physioLens.

CONCLUSION

The greater **lung stiffness** observed in C57BL/6 vs BALB/c mice is associated with a lower response to methacholine. This is not due to weaker airway smooth muscle.

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