

Demonstration of Membrane Transport of Histidine using Goat Intestinal Inverted Sacs: An Experiential Pedagogical Tool for Undergraduates

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Citation

Haris, H., Kumar, P., Bhardwaj, V., Taritla, S., Malhotra, V., Narayanasamy, N. Demonstration of Membrane Transport of Histidine using Goat Intestinal Inverted Sacs: An Experiential Pedagogical Tool for Undergraduates. *J. Vis. Exp.* (212), e66882, doi:10.3791/66882 (2024).

Date Published

October 4, 2024

DOI

10.3791/66882

URL

jove.com/video/66882

Abstract

Histidine is an essential amino acid that is also a precursor for metabolites implicated in the immune system, pulmonary ventilation, and vascular circulation. Absorption of dietary histidine relies largely on the sodium-coupled neutral amino acid transport by the Broad neutral amino acid transporter (B⁰AT) present on the apical membrane of the enterocyte. Here, we demonstrate the absorption of histidine by the intestinal villus enterocytes from the lumen using goat jejunal inverted sacs. The jejunal sacs exposed to varying concentrations of sodium and histidine were assayed to determine the concentration of histidine inside the sacs as a function of time. The results show active histidine absorption. Increasing the concentration of salt resulted in higher absorption of histidine, suggesting a symport of sodium and histidine absorption in goat intestinal inverted sacs. This protocol may be applied to visualize the intestinal mobility of amino acids or other metabolites with appropriate modifications. We propose this experiment as an experiential pedagogical tool that can help undergraduate students comprehend the concept of membrane transport.