The Levels of Chitinases Activity and Protein Expression in Stomach Tissues

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Outline

As described above, we found that mouse stomach expressed large amount of AMCase, whereas the human counterpart did not. To check whether these mRNA changes are reflecting actual differences in the levels of protein expression, we measured chitinolytic activity at pH 2.0 and pH 5.0 using the synthetic substrate of 4-methylumbelliferyl β-D-*N, N'*-diacetylchitobiose (4MU-chitobiose). We detected robust activity in mouse stomach extract at pH 2.0 and strong activity at pH 5.0. In contrast, no activity was detected in that of human at pH 2.0 and very low activity was observed at pH 5.0 (Figure 1). Furthermore, the anti-AMCase antibodies recognized a robust single protein band in extract from mouse stomach but not from human (Figure 2). Thus, mRNA differences between human and mouse stomach tissues were reflecting differences in the chitinolytic activities and levels of protein expression. These results indicated that the expression level of the AMCase in the stomach is species-specific.

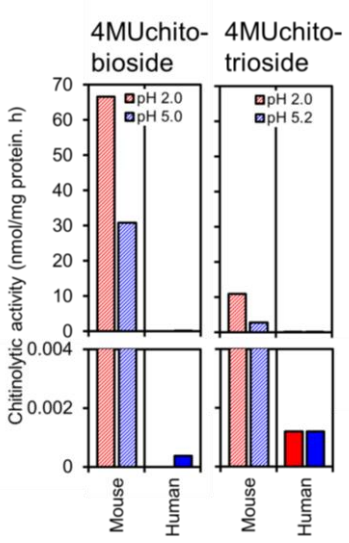

Figure 1. The chitinolytic activity in the stomach extracts from mouse and human.

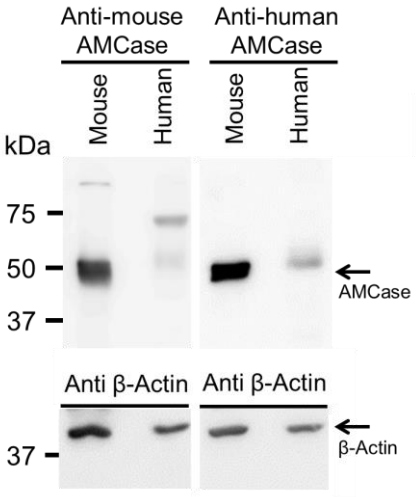

Figure 2. Western blotting of mouse and human AMCase in mouse or human stomach proteins.

Novelty

Our results indicate that mouse AMCase functions as a digestive enzyme that breaks down polymeric chitin and as part of the host defense against chitin-containing pathogens in the gastric contents. In contrast, AMCase may not play a role in the defense against chitin-containing organisms in the human stomach.

Application

Many stomach diseases are associated with infection by exogenous organisms. It thus remains a matter of debate whether the low level of AMCase in the human stomach participates in the response to gastric disorders.

Related information

● Original paper Ohno, M., Togashi, Y., Tsuda, K., Okawa, K., Kamaya, M., Sakaguchi, M., Sugahara, Y. and Oyama. F. (2013) Quantification of chitinase mRNA levels in human and mouse tissues by real-time PCR: species-specific expression of acidic mammalian chitinase in stomach tissues. ***PLoS ONE* 8**: e67399.

● URL http://dx.plos.org/10.1371/journal.pone.0067399.

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