

Glucose uptake in the intestine of the common carp *Cyprinus carpio*: Indications for the involvement of the sodium-dependent glucose cotransporter 1 and its modulation under pathogen infection

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<b>Title</b>	Glucose uptake in the intestine of the common carp <i>Cyprinus carpio</i> : Indications for the involvement of the sodium-dependent glucose cotransporter 1 and its modulation under pathogen infection
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<b>Abstract</b>	<p>Exploring the mechanism of glucose uptake in the fish intestine is a part of studies aiming to explain the possible usage of carbohydrate, which could reduce the dietary protein level in fish diet This serves as an effort to make aquaculture more economically and environmentally sustainable. In mammals and few fish species, the sodium-dependent glucose cotransporter 1 (SGLT-1) is supposed to be involved in luminal glucose absorption. In the present study, the gene encoding SGLT-1 was partially identified in common carp (<i>Cyprinus carpio</i>) and the tissue distribution of gene transcripts was analysed semi-quantitatively. The activity of the co-transporter was observed in isolated intestinal samples by assessing the effects of adding phlorizin on short-circuit current Finally, intestinal expression of mRNA encoding this gene was determined under infection of carp with Cyprinid herpesvirus 3 (CyHV-3) and <i>Aeromonas hydrophila</i> intubation. A cDNA sequence of 1396 bp was obtained, in silico translated into 465 aa, and confirmed as partial sequence of the gene encoding SGLT-1 in carp. The expression level of mRNA of this gene was higher in the upper part of the carp's mid gut than in the lower part Besides the intestine, the SGLT-1 encoding gene was also highly expressed in the kidney and at a lower level in the liver, brain, gill, spleen and head kidney. This might indicate a diverse role of the co-transporter in glucose metabolism in common carp. In contrast to the expression level of the gene, samples from the lower mid gut of carp showed a higher level of short-circuit current reduction in comparison to samples from the upper mid gut after adding phlorizin. The transcriptional level of the SGLT-1 encoding gene was downregulated in the carp intestine during CyHV 3 infection but not during <i>Aeromonas hydrophila</i> infection. This downregulation of SGLT1 was found to correspond with a previously reported simultaneous increase in pro-inflammatory responses of the intestine, indicating that intestinal glucose uptake of carps is apparently impaired during infection processes.</p>
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