Monocarboxylate transporter 2 (MCT2) also known as solute carrier family 16 member 7 (SLC16A7) is a protein that in humans is encoded by the SLC16A7 gene.

MCT2 is a proton-coupled monocarboxylate transporter. It catalyzes the rapid transport across the plasma membrane of many monocarboxylates such as lactate, pyruvate, branched-chain oxo acids derived from leucine, valine and isoleucine, and the ketone bodies acetoacetate, beta-hydroxybutyrate and acetate. It also functions as high-affinity pyruvate transporter.

Both Northern blot analysis and inspection of the human expressed sequence tag (EST) database suggest relatively little expression of MCT2 in human tissues. As well, the sequence of MCT2 is far less conserved across species than that of MCT1 or MCT4 and there also appear to be considerable species differences in the tissue expression profile of this isoform.

Highly malignant brain tumors harbor the aberrant propensity for aerobic glycolysis, the excessive conversion of glucose to lactic acid even in the presence of ample tissue oxygen. Lactic acid is rapidly effluxed to the tumor microenvironment via a group of plasma-membrane transporters denoted monocarboxylate transporters (MCTs) to prevent “self-poisoning.” One isoform, MCT2, has the highest affinity for lactate and thus should have the ability to respond to microenvironment conditions such as hypoxia, lactate, and pH to help maintain high glycolytic flux in the tumor. Yet, MCT2 is considered to not respond to hypoxia, which is counterintuitive. Its response to tumor lactate has not been reported.

In a report, Caruso et al., experimentally identify the transcription initiation site/s for MCT2 in astrocytes (normal) and glioma (tumor). They then use a BACmid library to isolate a 4.2-kbp MCT2 promoter-exon I region and examine promoter response to glycolysis-mediated stimuli in glioma cells. Reporter analysis of nested-promoter constructs indicated response of MCT2 to hypoxia, pH, lactate, and glucose, the major physiological “players” that facilitate a tumor's growth and proliferation. Immunoblot analysis of native MCT2 expression under altered pH and hypoxia reflected the reporter data. The pH-mediated gene-regulation studies we describe are the first to record H+-based reporter studies for any mammalian system and demonstrate the exquisite response of the MCT2 gene to minute changes in tumor pH. Identical promoter usage also provides the first evidence of astrocytes harnessing the same gene regulatory regions to facilitate astrocyte-neuron lactate shuttling, a metabolic feature of normal brain [1].

1)
Caruso JP, Koch BJ, Benson PD, Varughese E, Monterey MD, Lee AE, Dave AM, Kiousis S, Sloan AE, Mathupala SP. pH, Lactate, and Hypoxia: Reciprocity in Regulating High-Affinity Monocarboxylate Transporter Expression in Glioblastoma. Neoplasia. 2017 Jan 13;19(2):121-134. doi: 10.1016/j.neo.2016.12.011. [Epub ahead of print] PubMed PMID: 28092823.