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Bioinformatics comparison of human lactate dehydrogenase5 as a new tumor marker candidate to lactate dehydrogenase1

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Background and Aims: LDH5 (lactate dehydrogenase 5) is an isoenzyme of LDH that converts pyruvate to lactate under anaerobic conditions to energy production. LDH5 abundantly expresses in some tumors, versus adjacent normal tissues. It has been proposed as a new tumor marker that increases in some cancers. Bioinformatics analysis of LDH5 and comparison with LDH1 that is predominant isoenzyme in normal tissues can help to design its inhibitors and
Methods: The data have been obtained by online analysis at bioinformatics websites like EXPASY, NCBI,BRANDA, NCBI. Alignment, PDB, uniprot,SWISS PDB WIEVER and JMOL software
Results: LDH5 composes four M polypeptides, expresses by A gene contains 13830 bp located on chromosome 11p15.4. it has 6 variants that variant 1 is predominate. LDH1 compose four H polypeptides and expresses by B gene with 22515 bp located on chromosome 12p12.2/12.1. it has 2 variants that both of them encode the same proteins. Their similarity in DNA, mRNA and protein is 100%, 85% and 76% respectively. LDH5 and LDH1 have 332 and 334 amino acids respectively. Both of isoenzymes have 5 types of sites. 2 dimer interface sites and 1 NAD and 1 substrate binding site in both of them is the same but There are 10 acetylation and 2 phosphorylation sites in LDH5 and 7acetylation, 3 phosphorylation sites in LDH1. Substrate binding site residues in LDH1 and LDH5 are quite similar and respectively include Gln100/101, Arg106/107, Asn138/139, Arg169/170, His193/194, Ala238/239, and Thr248/249. Also all of amino acids of their NAD binding site is the same except 67th amino acid that in LDH5 is Histidine and in LDH1 is Glutamine.
Conclusions: Understanding about Bioinformatics differences of LDH5 as a new tumor marker candidate with LDH1 that express in normal tissue may help to cancer research.

Keywords: Bioinformatics analysis; LDH5; LDH1; Tumor marker