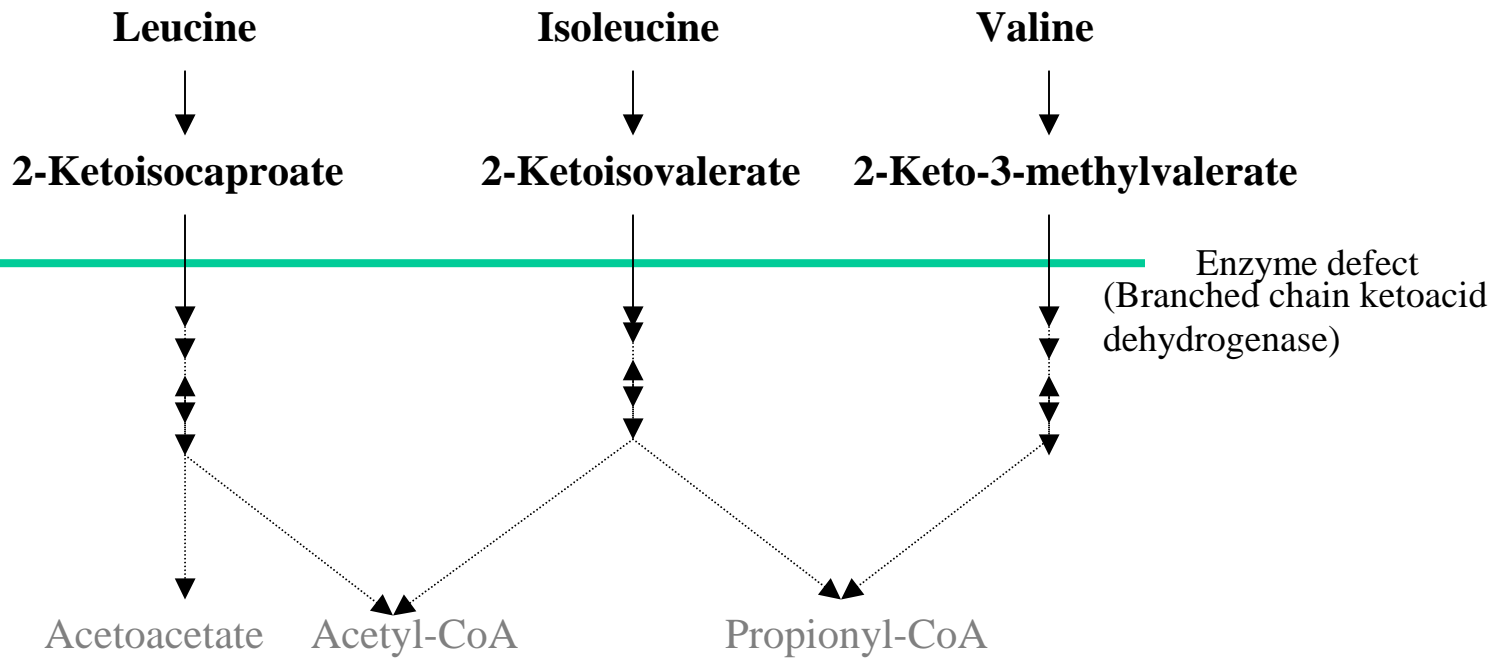


**ACUTE ILLNESS PROTOCOL  
ORGANIC ACIDEMIAS  
MAPLE SYRUP URINE DISEASE (MSUD)**

**PATHOPHYSIOLOGY**



Patients with MSUD are unable to metabolize the branched chain ketoacids. As a consequence, they have increased ketoacids and the precursor branched chain amino acids (leucine, isoleucine and valine). The toxic metabolic components are **leucine** and the **ketoacids**. When excessive protein is ingested or, more frequently, when the infant/child is under metabolic stress from an acute illness (febrile upper respiratory infection, gastroenteritis, etc.) or in the immediate neonatal period, the increased metabolic rate requires many more calories than the child is ingesting, the cells begin to break down protein to supply the needed calories (catabolism). In MSUD, this results in marked increases in the branched chain amino acids and corresponding ketoacids, resulting in metabolic ketoacidosis and leucine toxicity. The leucine further increases because its high level (and the high levels of isoleucine and valine) block transport of other amino acids into the cells, thus depleting cells of amino acids required for incorporation of leucine back into protein. Brain edema is probably a result of high levels of osmotically active amino acids entrapped in brain cells by the high leucine levels

producing increased intracellular osmolarity plus low extracellular sodium levels, both acting together to cause movement of water into the cells.