Lactate to Pyruvate Ratio

The blood lactate to pyruvate (L:P) ratio is used to distinguish between pyruvate dehydrogenase deficiency and other causes of congenital lactic acidosis. In conjunction with an elevated lactate, an L:P ratio greater than 30 suggests inherited disorders of the respiratory chain complex or tricarboxylic acid cycle disorders. In conjunction with an elevated lactate, an L:P ratio less than 25 suggests a defect in pyruvate metabolism. An artificially high L:P ratio can be observed in acutely ill individuals. Abnormal concentrations of lactate, pyruvate, and the L:P ratio are not diagnostic for any single disorder and must be interpreted in the context of the individual's clinical presentation and other laboratory studies.

Cerebral cytoplasmatic redox state is a sensitive indicator of cerebral oxidative metabolism and is conventionally evaluated from the extracellular Lactate to Pyruvate Ratio.

Ten consecutive patients with severe streptococcus meningitis were included in a prospective cohort study from the Odense University Hospital. Intracranial pressure, brain tissue oxygen tension (PbtO2), and energy metabolism (intracerebral microdialysis) were continuously monitored in nine patients. A cerebral lactate/pyruvate (LP) ratio <30 was considered indicating normal oxidative metabolism, LP ratio >30 simultaneously with pyruvate below lower normal level (70 μ mol/L) was interpreted as biochemical indication of ischemia, and LP ratio >30 simultaneously with a normal or increased level of pyruvate was interpreted as mitochondrial dysfunction. The biochemical variables were compared with PbtO2 simultaneously monitored within the same cerebral region.

In two cases, the LP ratio was normal during the whole study period and the simultaneously monitored PbtO2 was 18 ± 6 mm Hg. In six cases, interpreted as mitochondrial dysfunction, the simultaneously monitored PbtO2 was 20 ± 6 mm Hg and without correlation with the LP ratio. In one patient, exhibiting a pattern interpreted as ischemia, PbtO2 decreased below 10 mm Hg and a correlation between LP and PbtO2 was observed.

This study demonstrated that compromised cerebral energy metabolism, evidenced by increased LP ratio, was common in patients with severe bacterial meningitis while not related to insufficient tissue oxygenation ¹⁾.

During cerebral ischemia induced by severe hemorrhagic shock, intravascular microdialysis of the draining venous blood will exhibit changes of the Lactate to Pyruvate Ratio (LP ratio) revealing the deterioration of global cerebral oxidative energy metabolism. In neurocritical care, this technique might be used to give information regarding global cerebral energy metabolism in addition to the regional information obtained from intracerebral microdialysis catheters. The technique might also be used to evaluate cerebral energy state in various critical care conditions when insertion of an intracerebral microdialysis catheter may be contraindicated, e.g., resuscitation after cardiac standstill, open-heart surgery, and multi-trauma²⁾.

Early low CBF measurements and a high lactate and lactate/pyruvate ratio may be early warning signs of the risk of developing Delayed cerebral ischemia (DCI). The clinical value of these findings

needs to be confirmed in larger studies $^{3)}$.

1)

Larsen L, Nielsen TH, Nordström CH, Andersen AB, Schierbeck J, Schulz MK, Poulsen FR. Patterns of cerebral tissue oxygen tension and cytoplasmic redox state in bacterial meningitis. Acta Anaesthesiol Scand. 2018 Oct 17. doi: 10.1111/aas.13278. [Epub ahead of print] PubMed PMID: 30328110.

Jakobsen R, Halfeld Nielsen T, Granfeldt A, Toft P, Nordström CH. A technique for continuous bedside monitoring of global cerebral energy state. Intensive Care Med Exp. 2016 Dec;4(1):3. doi: 10.1186/s40635-016-0077-2. Epub 2016 Jan 20. PubMed PMID: 26791144.

Rostami E, Engquist H, Howells T, Johnson U, Ronne-Engström E, Nilsson P, Hillered L, Lewén A, Enblad P. Early low cerebral blood flow and high cerebral lactate: prediction of delayed cerebral ischemia in subarachnoid hemorrhage. J Neurosurg. 2017 Jun 2:1-9. doi: 10.3171/2016.11.JNS161140. [Epub ahead of print] PubMed PMID: 28574309.

From: https://neurosurgerywiki.com/wiki/ - **Neurosurgery Wiki**

Permanent link: https://neurosurgerywiki.com/wiki/doku.php?id=lactate_to_pyruvate_ratio



Last update: 2024/06/07 02:49