

Metabolic changes following perinatal Asphyxia: Role of astrocytes and their interaction with neurons

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Perinatal Asphyxia (PA) represents an important cause of severe neurological deficits including delayed mental and motor development, epilepsy, major cognitive deficits and blindness. The interaction between neurons, astrocytes and endothelial cells plays a central role coupling energy supply with changes in neuronal activity. Traditionally, experimental research focused on neurons, whereas astrocytes have been more related to the damage mechanisms of PA. Astrocytes carry out a number of functions that are critical to normal nervous system function, including uptake of neurotransmitters, regulation of pH and ion concentrations, and metabolic support for neurons. In this work, we aim to review metabolic neuron-astrocyte interactions with the purpose of encourage further research in this area in the context of PA, which is highly complex and its mechanisms and pathways have not been fully elucidated to this day. © 2016 Logica, Riviere, Holubiec, Castilla, Barreto and Capani.

Astrocyte

Brain

Interaction

Metabolism

Neuron

Perinatal asphyxia

glucose

glucose transporter 1

glucose transporter 3

glutamic acid

glutamine

glutathione

glycogen

ion

ketone body

lactic acid

potassium ion

sodium ion

astrocyte

blood brain barrier

brain blood flow

brain blood vessel

brain development

cell interaction

cell metabolism

cell migration

energy metabolism

energy transfer

glia cell

human

immaturity

ion transport

nerve cell

nerve cell differentiation

neurotransmission

nonhuman

oxidation reduction potential

pathogenesis

perinatal asphyxia

primary energy failure

Review

secondary energy failure

synapse