



## Lactate as a neuroprotective treatment after a neonatal hypoxic-ischemic event

Hélène Roumes, Stéphane Sanchez, Luc Pellerin, Anne-Karine Bouzier-Sore

### ► To cite this version:

Hélène Roumes, Stéphane Sanchez, Luc Pellerin, Anne-Karine Bouzier-Sore. Lactate as a neuroprotective treatment after a neonatal hypoxic-ischemic event. ESMRMB, Oct 2021, Barcelone, Spain. . hal-04632791

HAL Id: hal-04632791

<https://hal.science/hal-04632791v1>

Submitted on 2 Jul 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Lactate as a neuroprotective treatment after a neonatal hypoxic-ischemic event

Hélène Roumes<sup>1</sup>, Stéphane Sanchez<sup>1</sup>, Luc Pellerin<sup>2</sup> and Anne-Karine Bouzier-Sore<sup>1</sup>.

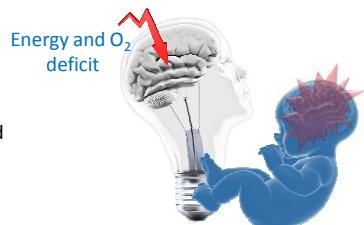
<sup>1</sup>CRMSB, UMR5534, CNRS/Université de Bordeaux, 146 rue Léo Saignat, 33076 Bordeaux cedex, France.

<sup>2</sup>IRTOMIT U1082 Inserm, Université et CHU de Poitiers, 2 rue de la Milétrie, 86021 Poitiers cedex, France.

## Context:

### Neonatal hypoxia-ischemia:

- 1-6 % cases per live births
- 15-20% of death during perinatal period
- 25% of motor and cognitive deficits

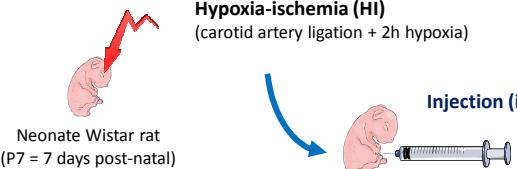


↓ brain oxygen  
↓ energetic substrate supply

⇒ Energy deficit  
⇒ Neuronal death

→ Therapeutic care: hypothermia  
BUT : 50% of infants don't respond to it

## Methods:

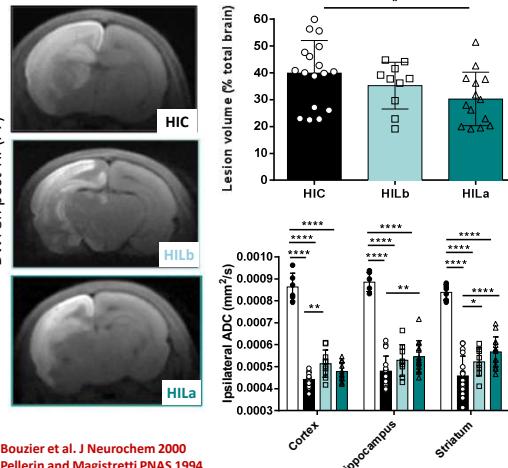


- Hypoxia-ischemia (HI)**  
(carotid artery ligation + 2h hypoxia)
- Injection (i.p.)**
- HIC: NaCl
  - HIG: glucose
  - HIP: pyruvate
  - HILb: lactate before HI
  - HILA: lactate after HI
  - HI3L: 3x lactate after HI
  - HILO: lactate + oxamate

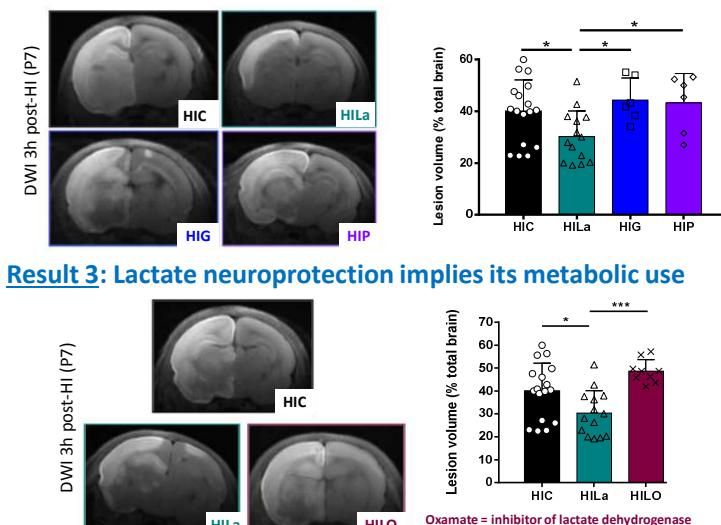
### Experiments:

- DWI (4.7T, Bruker) for lesion volume + Apparent Diffusion Coefficient
- Behavioral tests (motor and memory)

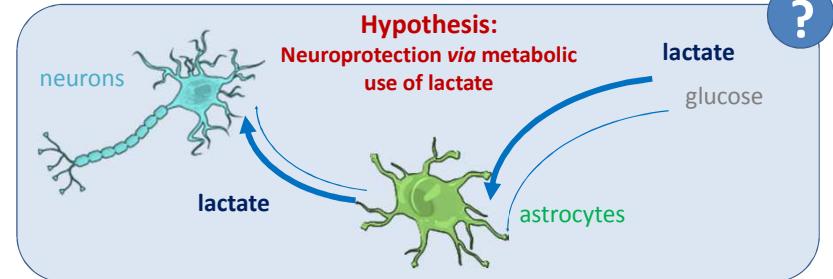
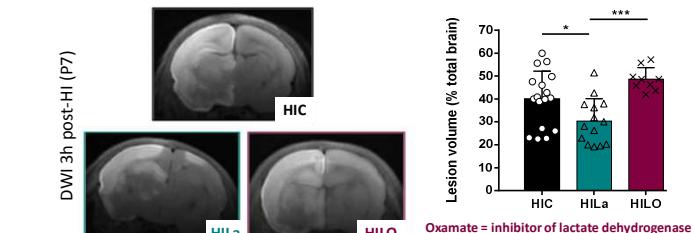
## Result 1: Post-HI lactate administration is neuroprotective and ↓ edema



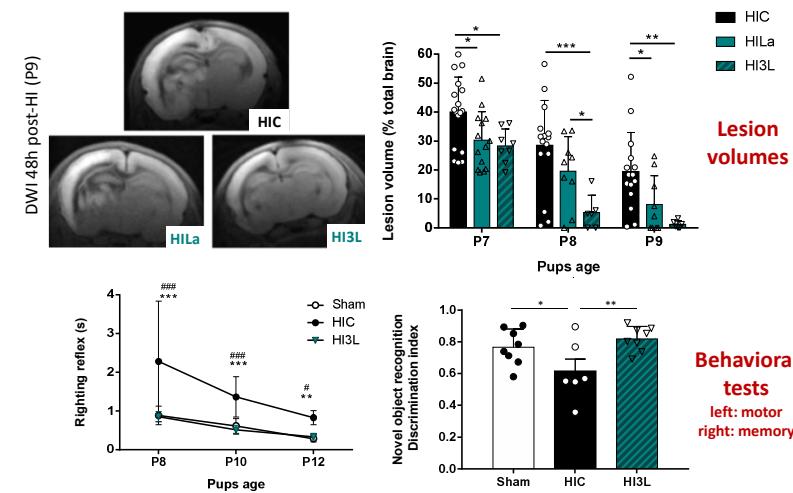
## Result 2: Only lactate decreased brain damages



## Result 3: Lactate neuroprotection implies its metabolic use

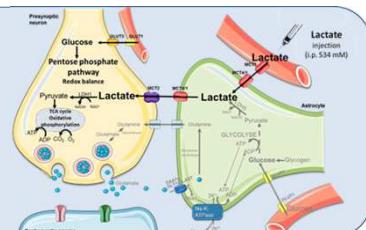


## Result 4: Best neuroprotection obtained with 3 lactate injections (1/day)



## Conclusion:

Lactate, a neuronal substrate<sup>1</sup>, was neuroprotective against HI brain damages, via the astrocyte-neuron lactate shuttle (ANLS)<sup>2</sup>, sparing glucose for its use in the pentose phosphate pathway (which helps fighting against ROS) and restored brain functions<sup>3</sup>.



1: Bouzier et al. J Neurochem 2000

2: Pellerin and Magistretti PNAS 1994

3: Roumes et al. JCBFM 2020