

This article was downloaded by:

On: 27 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Nucleosides, Nucleotides and Nucleic Acids

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713597286>

Effects of Caffeine and/OR L-Phenylisopropyladenosine (LPIA) on Local Cerebral Blood Flow and Glucose Utilization in the Rat

A. Nehlig^a; A. Pereira de Vasconcelos^a; S. Boyet^a

^a INSERM U272, NANCY, FRANCE

To cite this Article Nehlig, A. , de Vasconcelos, A. Pereira and Boyet, S.(1991) 'Effects of Caffeine and/OR L-Phenylisopropyladenosine (LPIA) on Local Cerebral Blood Flow and Glucose Utilization in the Rat', *Nucleosides, Nucleotides and Nucleic Acids*, 10: 5, 1225 – 1226

To link to this Article: DOI: 10.1080/07328319108047286

URL: <http://dx.doi.org/10.1080/07328319108047286>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

EFFECTS OF CAFFEINE AND/OR L-PHENYLISOPROPYLADENOSINE (LPIA)
ON LOCAL CEREBRAL BLOOD FLOW AND GLUCOSE UTILIZATION IN THE RAT

Nehlig A.*, Pereira de Vasconcelos A., Boyet S.
INSERM U272, 30 rue Lionnois 54013 NANCY FRANCE

Abstract. After LPIA injection, cerebral glucose utilization (LCGU) and blood flow (LCBF) were both decreased. Conversely, caffeine with or without LPIA induced an increase in LCGU and a decrease in LCBF, resetting the ratio of LCBF per unit LCGU at a lower level.

In spite of the well known stimulatory effects of caffeine on the central nervous system, its vasoconstrictor properties are currently used in the treatment of migraine. This methylxanthine exerts many of its effects, especially at relatively low doses, by competitive inhibition at the level of adenosine receptors. In the present study, we compared the effects of an acute administration of caffeine and/or of a analogue of adenosine, LPIA, on local cerebral glucose utilization (LCGU) and local cerebral blood flow (LCBF) in adult conscious rats.

The effects of the acute injection of caffeine (10 mg/kg) and/or LPIA (0.1 mg/kg) on LCGU were determined in the adult rat by means of the quantitative [^{14}C]2-deoxyglucose method¹. The quantitative [^{14}C]iodoantipyrine method² was applied to the measurement of changes in LCBF rates after the injection of both pharmacological agents.

As shown in Fig. 1 from the changes in mean values of glucose utilization and blood flow, LPIA induced decreases in LCGU rates, significant in 31 of 61 structures, mainly brainstem monoaminergic cell groupings, extrapyramidal motor system and hypothalamic areas. LPIA injection decreased LCBF rates only in 4 structures. Caffeine induced increases in LCGU values, in 34 structures when injected alone and in 16 areas when given in combination with LPIA. Conversely, caffeine injection with or without LPIA decreased LCBF rates in 14 and 16 brain

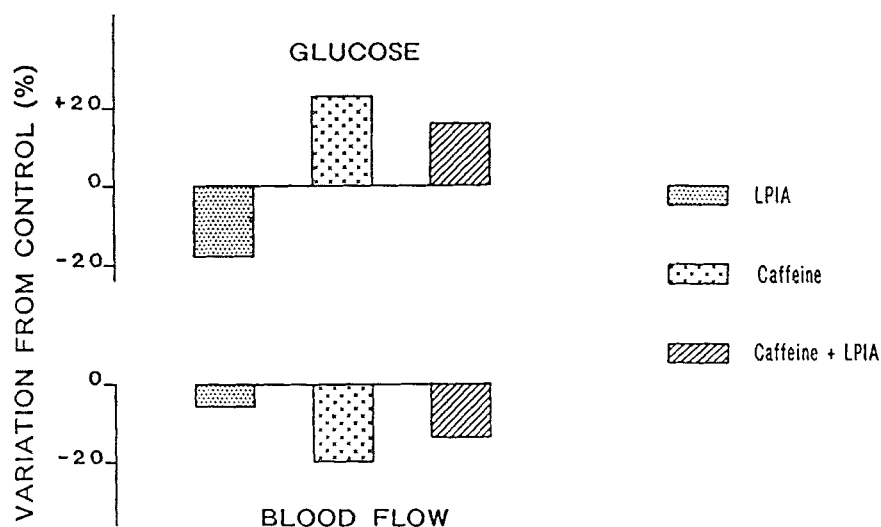


FIGURE 1 : Effects of caffeine and/or LPIA on mean cerebral glucose utilization and mean cerebral blood flow, expressed as percent of variation from control

regions respectively. After caffeine and/or LPIA, changes in LCGU and LCBF were mainly located in brainstem monoaminergic cell groupings, extrapyramidal motor system and thalamic structures.

In conclusion, thalamic areas appear to be very sensitive to caffeine and quite insensitive to LPIA, whereas the reverse is true for hypothalamic structures, indicating that the effects of the two substances on cerebral functional activity may be partly mediated by peripheral mechanisms, for example sensory stimulation for caffeine and hypotensive action for LPIA^{1,2}. These results also show that, if LPIA does not change the level of coupling between LCBF and LCGU, caffeine given alone or in combination with LPIA is able to reset the ratio of cerebral blood flow per unit glucose utilization at a lower level.

REFERENCES

- (1) Nehlig, A.; Pereira de Vasconcelos, A.; Collignon, A.; Boyet, S. *Eur. J. Pharmacol.* 1988, 157, 1.
- (2) Nehlig, A.; Pereira de Vasconcelos, A.; Dumont, I.; Boyet, S. *Eur. J. Pharmacol.* 1990, 179, 271.