

EFFECT OF SPINAL CORD STIMULATION ON CEREBRAL BLOOD FLOW AND METABOLISM: A POTENTIAL APPROACH FOR STROKE TREATMENT.

1,2,F. Robaina; 1,2,3,B. Clavo; 1,2,L. Catala; 4,R. Montz; 1,M.A. Rodriguez; 1,2,I. J. Jorge; 1,E. Otermin; 1,M.A. Carames; 1,V. Alvarez-Santullano; 4,J.L. Carreras.

1Dr. Negrín University Hospital, Las Palmas, Spain Email:
2ICIC (Canary Institute for Cancer Research), Las Palmas, Spain
3GICOR (Grupo de Investigación Clínica en Oncología Radioterápica), Spain
4FOCUSCAN - P.E.T. Institute, Madrid, Spain.
frobpad@gobiernodecanarias.org

Background: A decreased cerebral blood flow (CBF) and decreased cerebral metabolism is involved in several low perfusion syndromes as stroke. Cervical spinal cord stimulation (cSCS) is being used successfully for the treatment of ischemic syndromes such as vasospastic, peripheral vascular disease, and angina pectoris. The aim of this study was to assess the effect of cSCS on CBF and cerebral glucose metabolism.

Material and Methods: Forty seven non-stroke-patients with cSCS devices were evaluated in two different periods with two different techniques. Mean age 53 years old (26-70). In the first group, from April-95 to February-1999, CBF was evaluated in 33 patients by transcranial Doppler (TCD): 27 cancer-patients and 6 non-cancer patients under follow-up for the Chronic Pain Unit. Before and after cSCS, the same day, they were bilaterally measured systolic and diastolic velocities (cm/s) in the middle cerebral artery (MCA). In the second group, from March-2000 to December-2004, glucose cerebral metabolism was evaluated by positron emission tomography (PET) in 14 patients with brain tumors or radiation induced brain lesions. Before and after cSCS, the same day, it was recorded the standard uptake value (SUV) in the healthy cerebral hemisphere.

Results: TCD-studies during cSCS showed a significant ($p < 0.001$) and bilateral increase in: systolic (23%) and diastolic (28%) velocities in the MCA. PET-study during cSCS showed a 44% increase in SUV in the healthy cerebral hemisphere (from 5.22 ± 0.47 to 7.52 ± 0.67 ; $p < 0.001$). The estimated maximal residual contribution from first to second PET studies was $< 17.1\%$.

Conclusions: cSCS increased blood flow in the MCA and glucose metabolism in healthy cerebral hemisphere. The consistent increase in CBF and metabolism supports the potential usefulness of cSCS as an adjuvant treatment for CBF diseases and stroke. Further researches are warranted.

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