

## **SELECTIVE ACTIVATION OF REGIONAL CEREBRAL BLOOD FLOW DURING NORMAL AND CAPSAICIN INDUCED MICTURITION. A PRELIMINARY SPET (SINGLE PHOTON EMISSION TOMOGRAPHY) STUDY.**

### **Aims of Study**

The objective of this study is to perform a qualitative and quantitative analysis, by SPET (Single Photon Emission Tomography), of regional cerebral blood flow (rCBF) changes during normal and capsaicin induced voiding reflex in humans.

### **Methods**

The study was performed in 5 volunteers; 4 right-handed and one left-handed. For each subject we performed three measurements: i) Basal recording; ii) normal micturition recording and iii) capsaicin induced micturition recording (the bladder was filled, by a 8 Ch Nelaton catheter, with 90 cc of a saline solution plus 10 cc of a saline solution contained capsaicin at the concentration of  $10^{-6}$ M). SPET acquisition was performed 20 minutes after the intravenous (i.v.) bolus administration of 740 MBq of  $^{99m}\text{Tc}$ -hexamethylpropylene amine oxime (HMPAO) in antecubital prepared vein. The injection was performed by a self-injection device at the moment of micturition. A quantitative analysis was performed by the extraction of activity per region of interest corrected (ROI) for the injected activity.

### **Results**

The qualitative analysis showed an increase of rCBF in four areas of brain during normal micturition: the precentral supero-lateral gyrus, the precentral supero-medial gyrus, the right-anterior gyrus and the hypothalamus. The mean value of activity (ROI counts/sec), during normal micturition, increased from  $75,6 \pm 6,87$  to  $674,8 \pm 125,18$  in the precentral supero-lateral gyrus ( $p < 0.01$ ), from  $82 \pm 5,24$  to  $698 \pm 89,02$  in the precentral supero-medial gyrus ( $p < 0.01$ ), from  $74,2 \pm 1,48$  to  $668 \pm 137,34$  in right (left)-anterior gyrus ( $p < 0.01$ ) and from  $55,8 \pm 3,11$  to  $435,60 \pm 34,70$  in the hypothalamus. The mean value for each area was statistically increased during the capsaicin induced micturition when compared with basal condition but not in hypothalamus. In particular the mean value was increased from  $75,6 \pm 6,87$  to  $400,4 \pm 77,43$  in the precentral supero-lateral gyrus ( $p < 0.01$ ), from  $82 \pm 5,24$  to  $551 \pm 120,26$  in the precentral supero-medial gyrus ( $p < 0,01$ ) and from  $74,2 \pm 1,48$  to  $557,4 \pm 64,23$  in right (left)-anterior gyrus ( $p < 0,01$ ). No statistically significant increase of rCBF was recorded at the level of hypothalamus (from  $55,8 \pm 3,11$  to  $55 \pm 9,35$   $p > 0.05$ ). The rCBF was statistically higher during normal micturition than during capsaicin induced voiding reflex at the level of precentral supero-lateral gyrus ( $p = 0.024$ ), in the right (left)-anterior gyrus ( $p = 0,039$ ) and in the hypothalamus ( $p = 2,93 \times 10^{-5}$ ), but it was not at the level of precentral supero-medial gyrus ( $p = 0,060449$ ).

### **Conclusions**

Our findings show that normal micturition produce the selective activation of four cerebral areas: the precentral supero-lateral gyrus, the precentral supero-medial gyrus, the right (left in the left-handed patient)-anterior gyrus and the hypothalamus. These data support the idea of a highly complex voiding reflex. Further investigation remains mandatory in order to greater understand the physiological cerebral regulation of the lower urinary tract and the causes of lower urinary tract dysfunctions.