

**Sex-related differences in the muscarinic acetylcholinergic receptor  
in the healthy human brain  
—A positron emission tomography study—**

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We evaluated the sex-related differences in the decline of the cerebral muscarinic acetylcholinergic receptor (mACh-R) due to aging by using  $^{11}\text{C}$ -*N*-methyl-4-piperidyl benzilate ( $^{11}\text{C}$ -NMPB) and positron emission tomography (PET). The subjects consisted of 37 (20 males and 17 females) healthy volunteers. The  $^{11}\text{C}$ -NMPB uptake was evaluated by the ratio method (regional  $^{11}\text{C}$ -NMPB uptake/Cerebellar  $^{11}\text{C}$ -NMPB uptake; rNMPB ratio). The correlation between sex, aging, and the rNMPB ratio in normal aging was evaluated by a multiple regression analysis. The rNMPB ratio was higher in females than in males throughout the entire cerebral region ( $p < 0.01$ – $p < 0.0001$ ) and the rNMPB ratio might thus possibly decline with age more rapidly in females. Our study therefore revealed the existence of sex-related differences in the cerebral mACh-R.

**Key words:** cerebral muscarinic acetylcholinergic receptor, normal aging, sex-related differences, C-11-NMPB, positron emission tomography