

Can Urinary Neurotrophins Be Used to Monitor OAB Symptoms?

Introduction and Objective: Nerve growth factor (NGF) may constitute a useful biomarker of overactive bladder (OAB). Less is known about brain-derived neurotrophic factor (BDNF). Recently, BDNF was found in high concentration in the urine of OAB patients and appears to be sensitive to lifestyle intervention (LSI). The aim of our study was to assess urinary levels of NGF and BDNF in OAB patients, before and after LSI, followed by antimuscarinic treatment (AMT).

Materials and Methods: Urine samples from 25 female naïve OAB patients were collected at baseline, 3 months (after LSC) and 6 months (after 3-month AMT: oxybutynin chloride ER, 10 mg/d). Urine samples from 20 healthy female controls were also collected. Samples were processed for ELISA analysis of NGF and BDNF. Urinary content of NGF and BDNF was normalized against creatinine concentration. At each time point of evaluation, the bladder condition was assessed using the number of urgency episodes per week (NUE/w).

Results: At baseline, urinary NGF/Cr and BDNF/Cr ratios were significantly higher in OAB patients, compared to controls (NGF/Cr: 485 ± 493 vs 188 ± 290 , $p=0.006$; BDNF/Cr: 792 ± 641 vs 110 ± 160 , $p<0.001$). Three months after LSC, there was a decrease in urinary NGF (to 320 ± 332 , $p>0.05$) and BDNF (to 432 ± 589 , $p=0.013$). After 3 months of AMT, NGF had an additional decrease to 180 ± 238 , while BDNF had a further reduction to 147 ± 265 . At 6 months, after LSC plus AMT, both neurotrophins were significantly lower than at baseline ($p<0.05$). At baseline, the mean NUE/w was 68 ± 9 . After 3-month LSC, there was a decrease to 56 ± 9 ($p<0.05$), and, after 3-month AMT, there was a further reduction to 35 ± 14 ($p<0.05$). A significant correlation was only found between BDNF/Cr ratio and NUE/w variations, from baseline to 6 months ($r=0.607$, $p<0.01$). Using ROC analysis, the area under the curve was higher for BDNF (0.88) compared to NGF (0.75). BDNF had better sensitivity (84.0%) and specificity (89.5%) than NGF (sensitivity of 52.0%, specificity of 78.9%).

Conclusions: Urinary neurotrophins significantly decreased after AMT and may constitute potential biomarkers of OAB, with eventual monitoring interest. This variation was more pronounced for BDNF. Funded by INComb FP7 HEALTH project no 223234.