ISSN: 2574-1241
DOI: 10.26717/BJSTR.2018.07.001540
Uzbekov M G. Biomed J Sci & Tech Res

Short Communication | Open Access

Serum albumin conformation in patients with melancholic depression under antidepressant therapy

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Received: July 31, 2018; **Published:** August 07, 2018

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Short Communication

Discovery of biomarkers of mental disorders for evaluation of efficacy of psychopharmacotherapy is an important task. The last years it became clear that disturbances in molecular processes in pathological conditions can be connected with conformational changes in protein structure [1,2]. The aim of the study was to investigate the blood albumin conformation in patients with melancholic depression (MD) under pharmacotherapy using fluorescent laser spectroscopy.

Material and Methods

There were investigated 22 patients with melancholic depression (dep) (14 women and 8 men). Patient's state according to ICD-10 criteria was defined as a depressive episode in the frame of bipolar depressive disorder (type 2) (F32) and in the structure of recurrent depressive disorder (F33). Patients with MD were investigated in dynamics of antidepressant therapy (venlafaxine - 75-150 mg/daily): at admission, on 15th and 30th days of treatment. Control group (con) consisted of 54 volunteers. Investigation was performed in accordance with the permission of the local ethical committee of Moscow Research Institute of Psychiatry (N 16, 13.03.2017). Sub nanosecond laser time resolved fluorescence spectroscopy (SLTRFS) with K-35 fluorescent probe (dimethylaminonaphthalic acid N-carboxyphenylimide, CAPIDAN) was used for the investigation of albumin conformation.

The fluorescence decay of the K-35 probe bound to serum albumin was measured in nano- and pico-second ranges using a laser device developed at the Lebedev Physical Institute. Fluorescence was excited by a rapid laser flash (7 · 10–10 s) at 405 nm, emission wavelength – 535 nm. Using a personal computer based on the AMD Sempron processor, both the measurement process and the processing of experimental data (TimoHarp and FluoFit programs, Picoquant) were automated [3].

Results and Discussion

There were revealed 3 binding sites in albumin molecule with fluorescent decay time of 1, 3 and 9 nanoseconds (A1, A3 and A9 sites, respectively) in healthy volunteers using SLTRFS approach. There were found significant differences between albumin binding sites of volunteers and patients with melancholic depression, respectively, A1 – 117 ± 7 и 142 ± 10; A3 – 358 ± 14 и and 420 ± 26; A9 – 371 ± 16 и 433 ± 29 arbitrary units (a.u). The application of the Wilcoxon test to independent samples of donors and patients showed a significant difference between these groups ($p < 0.025$).

There was observed significant decrease of amplitude A1 dep, normalized on mean value of A1 for controls (A1 dep /A1 con), for patients with MD after treatment with venlafaxine. In this case A1 dep values decreased and were equal to A1 values of controls ($p< 0.01$): A1 dep /A1 con before treatment - 1.23, after 15 days and 30 days of therapy – 1.09 and 0.97 a. u., respectively; for controls this value was - 1.00 a.u. The same type of normalization was observed for amplitudes A3 (1.21, 1.09 and 0.97 a.u.) and A9 (1.19, 1.05 and 1.03 a.u.) of melancholic patients. There were also revealed significant changes of A3 / A1 ($p < 0.05$) ratio, a characteristic of albumin conformation, that points out on conformational changes of serum albumin molecule in dynamics of venlafaxine therapy [4].

Conclusion

These findings point out that melancholic depression is followed by conformational changes of albumin molecule that can affect its functional properties. We can hypothesize that investigated parameters can serve as potential biomarkers for evaluation of efficacy of psychopharmacotherapy.

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