Dopaminergic and serotonergic alterations in plasma in three groups of dystonia patients

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Introduction:
Dystonia is a movement disorder in which patients have twisting and repetitive movements or abnormal fixed postures. Dopaminergic alterations are considered to be responsible for the motor symptoms. Recent attention for the highly prevalent non-motor symptoms suggest also a role for serotonin in the pathophysiology.

Aims:
• Study the dopaminergic, serotonergic and noradrenergic metabolism in blood samples of dystonia patients.
• Investigate its relationship with (non-)motor manifestations.

Methods:
Concentrations of metabolites of dopaminergic, serotonergic and noradrenergic pathways were measured in platelet-rich plasma. (Non-)motor symptoms were assessed using validated instruments and correlated with concentrations of metabolites.

Participants:
• 41 myoclonus-dystonia (M-D),
• 25 dopa-responsive dystonia (DRD),
• 50 cervical dystonia (CD) patients
• 55 healthy individuals.
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Results part 1:

• A significantly higher concentration of 3-methoxytyramine (0.03 vs. 0.02 nmol/L, p<0.01), a metabolite of dopamine, and a reduced concentration of tryptophan (50 vs. 53 µmol/L, p=0.03), the precursor of serotonin was found in dystonia patients compared to controls.

• The dopamine/levodopa ratio was higher in CD patients compared to other dystonia groups (p<0.01).

• Surprisingly, relatively high concentrations of levodopa were found in the untreated DRD patients.
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Results part 2:
Low concentrations of levodopa were associated with severity of dystonia ($r_s=-0.3$, $p<0.01$), depression ($r_s=-0.3$, $p<0.01$) and fatigue ($r_s=-0.2$, $p=0.04$).

Conclusion:
This study shows alterations in the dopaminergic and serotonergic metabolism of patients with dystonia, with dystonia subtype specific changes. Low concentrations of levodopa, but not of serotonergic metabolites, were associated with both motor and non-motor symptoms. Further insight into the dopaminergic and serotonergic systems in dystonia with a special attention to the kinetics of enzymes involved in these pathways, might lead to better treatment options.