Inter- and intraindividual variations of methylphenidate in serum and oral fluid of ADHS patients

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In the therapy of attention deficit hyperactivity disorder (ADHD) methylphenidate represents nowadays first line treatment in combination with psychotherapy. Since methylphenidate shows different metabolic characteristics in children, therapeutic monitoring is advised, but not being applied in daily clinical practice. To avoid burdening invasive blood collection, oral fluid may be a non-invasive, simple and cost-effective alternative laboratory matrix. However, in pediatric drug therapy, there are only few reliable studies about the inter- and intraindividual pharmacodynamics of methylphenidate in oral fluid.

From 43 ADHD patients (30 children, 3 adolescents and 10 adults) taking methylphenidate, serum and oral fluid were obtained. Methylphenidate and its major metabolite ritalinic acid were quantified using LC-MS/MS measurements. Sample preparation was performed using the Chromsystems MassTox TDM Parameter Set Antidepressants 2/Psychostimulants-kit. From 15 of these patients, 10 oral fluid samples were obtained about 2 hours after intake on different days to analyze intraindividual variance.

As a result, the LC-MS/MS kit “MassTox TDM Parameter Set Antidepressants 2/Psychostimulants” is suitable and reliable for the determination of methylphenidate and ritalinic acid in oral fluid. Oral fluid methylphenidate concentrations were about 5 times higher than in serum, while the concentrations of ritalinic acid were significantly lower in oral fluid. Oral fluid methylphenidate measures were strongly pH-dependent. Daily variance in children taking constant medication was at about 30%.

Oral fluid may well serve as an alternative matrix for therapeutic drug monitoring of methylphenidate in ADHD patients. Nevertheless further research is essential prior to a possible clinical use.