LCMSMS : Urinary catecholamines and their methoxylated derivatives (G. PANTEIX - July 14)

Modification in the testing of urinary catecholamines and their methoxylated derivatives in Autumn 2014.

Liquid chromatography coupled with Mass spectrometry (LC-MS/MS) will be available from this Autumn for the simultaneous testing of catecholamines and their methoxylated derivatives. This method is at the forefront of specialised pathology for its sensitivity, specificity and its rapidity for analysis linked to simplified extractions.

Utilisation of LC-MS/MS in the testing of urinary catecholamines and their methoxylated derivatives: a precious tool in the diagnosis of pheochromocytomas and neuroblastomas.

Hypertension is a widespread pathology. In the majority of cases, it concerns high blood pressure. In approximately 5% of cases, the cause can be determined.

The main cause is pheochromocytoma which is a tumor of adrenal glands, which is often benign. As a result, hypertension is provoked by a hyper-secretion of noradrenalin or adrenalin in the blood in 95 or 5% of pheochromocytomas respectively. There are also rare malignant pheochromocytomas which are related to genetic diseases.

Catecholamines (Adrenalin, Noradrenalin, Dopamine) and the methoxylated derivatives of catecholamines (or Methoxyamines: normetadrenalin, metadrenalin, 3-ortho-methyladopamine) are therefore the markers to be tested in plasma and/or urine where there are eliminated under free and bound forms.

An increase can also be found in the paragangliomas and a significant increase in dopamine and its metabolite, methyldopamine, can be observed in the neuroblastomas.

Neuroblastomas are solid tumors of the nervous system found particularly in children under one year of age and is characterised by a hypersecretion of dopamine which is discharged in the blood.

The methods currently available are enzyme immunoassay, radio-immunoassay and chromatography techniques (HPLC) with electrochemical detection (EC).

Immonochemical methods require a preliminary reaction of acetylation of catecholamines and their derivatives to be able
to react with the antibodies and these methods are rarely used.

HPLC EC methods after manual or automated extraction have been the method of choice since the end of the nineties and enable the day-to-day diagnosis of pheochromocytomas.

Even though these methods allow simultaneous testing of either urinary catecholamines or methoxyamines, the duration of analysis is 20 minutes and interference is possible, particularly in polymedicated patients (antihypertensives, beta blockers, painkillers...) which can affect the reading of the chromatogramme. If it’s possible to overcome these difficulties of testing catecholamines and Methoxyamines in the same 24-hour urine samples, the use of LC-MS/MS is recommended.

Tandem Mass Spectrometry enables the identification of molecules by their mass/charge ratio after ionisation and this method is at the forefront in most northern European countries and North America since the first decade of the noughties. Due to its specificity and sensitivity, LC-MS/MS allows a shorter testing time, simpler and automated extractions, and as a result, is adapted to big volumes of analyses.

In Autumn 2014, Biomnis Laboratories will be proposing the simultaneous testing of urinary catecholamine and Methoxyamines by LC-MS/MS after solid phase extraction. Our objective is to avoid the performance of too many confirmation tests, to improve specificity, avoid interferences, and speed up turnaround times.