Catechol neurochemistry in the autonomic clinic: helpful but not absolutely required

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Received: 9 May 2018 / Accepted: 10 May 2018 / Published online: 23 May 2018
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Keywords Catecholamines · Autonomic testing · Dysautonomia · Norepinephrine · Epinephrine · Dopamine

This issue of *Clinical Autonomic Research* brings the next installment in the series on Autonomic Function Testing. Goldstein and Cheshire provide a tour-de-force of catechol neurochemistry that extends from the biosynthesis and metabolism of these compounds through their diagnostic and therapeutic relevance in clinical disease [2]. As usual, the authors do so thoroughly and with a writing style that will be accessible to students as much as to experts in autonomic function.

The article opens with an historical perspective on the early descriptions of catechols, important groundwork for our field laid by Irwin Kopin and Julius Axelrod. Candid photographs of these men may seem out of place in a scientific review article, but here the memorialization seems appropriate and comes first-hand from Kopin's mentee. While most readers will already be familiar with the endogenous human catecholamines (epinephrine, norepinephrine [NE], and dopamine), they will likely benefit from the concise discussions of the other catechols and their chief metabolites, even more so as they are reviewed in the context of clinical syndromes and diseases that alter their levels and ratios.

Particularly important, and reflected in the structure of this review, is the fact that plasma catechol testing is rarely diagnostic in isolation but is frequently supportive in light of other clinical, radiographic, or laboratory features. As these authors have previously argued [1, 3], nothing replaces the well-performed medical history-taking and physical

examination in the assessment of suspected autonomic dysfunction. For those clinicians or researchers who choose to pursue catechol testing in their patients or subjects, the authors provide a detailed protocol, in Table 2, for collecting and processing samples.

Perhaps most helpful for the clinician is the extended discussion of many of the common and uncommon autonomic disorders and their respective neurochemical patterns (summarized in Table 1). For example, the clinician is often faced with a patient with parkinsonism and some degree of orthostatic lightheadedness. Is this run-of-the-mill Parkinson disease (PD), dementia with Lewy bodies (DLB), or multiple system atrophy (MSA)? This question can sometimes be answered with the help of neuroimaging [6], cardiac metaiodobenzylguanidine scintigraphy [8], or autonomic reflex screen and thermoregulatory sweat test [5] data, but these diagnostic tools are not always available or the results revealing. Enter plasma catechol testing. OH will be associated with a low 3,4-dihydroxyphenylglycol (DHPG) to NE ratio in PD, low NE and blunted orthostatic change in DLB, and normal NE when supine and standing and normal DHPG in MSA. The authors classify the catechol pattern in MSA as unhelpful, but in fact normal NE and DHPG in the setting of parkinsonism and OH is quite telling. Similarly, normal NE (and DHPG) predicts conversion to a central synucleinopathy in patients whose initial phenotype suggests pure autonomic failure [4, 7].

Goldstein and Cheshire have brought together a great deal of work on clinical catechol neurochemistry in a concise review. While catechol testing is not necessary in every patient, it can be informative in many and diagnostic in a few. Such testing should be considered as we seek additional clarity in the often murky world of “dysautonomia”.

This comment refers to an article available at <https://link.springer.com/article/10.1007/s10286-018-0528-9>.

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Compliance with ethical standards

Conflict of interest None.

Funding sources None.

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