

“Make in India”—Time for Indian Protocols

Dynamic testing is a fundamental part in the evaluation of endocrine disorders and is based on the feedback mechanisms established at the hypothalamo–pituitary–glandular axes. In a case of suspected hyperfunction, we aim to suppress the hormone, whereas, in hypofunction, we evaluate the residual function after maximal stimulation. In certain conditions, the feedback systems also help in the diagnosis with a single basal blood sample, by looking at the two different locations of the axis. An important prerequisite in the interpretation of the hormone level is to know the normative data in the specific population. The analytical variability and sampling methods also affect the final result of the hormonal parameters.

Endocrinologists have an arduous job of analyzing the symptomatology and check relevant hormonal parameters to confirm the diagnosis. It is pertinent to mention that in certain conditions (such as subclinical thyroid disorders) the diagnosis is based on the test result alone irrespective of the symptoms. Hence, the laboratory is an integral part of every endocrine facility, in order to ensure rapid turnaround time and quality output. The overreliance on the laboratory data led to the need of demonstrating similar results on two separate occasions before the diagnosis in many endocrine conditions.

Endocrine disorders are grouped as per the gland involved and are further classified based on the functional status. The common adrenal and gonadal disorders include pubertal disorders, adrenal insufficiency, congenital adrenal hyperplasia, cryptorchidism and Cushing’s syndrome. The testing protocols and cutoffs used during the dynamic testing of these disorders have wide variability in the published literature. Though the basic principles remain same, the cutoff values vary depending on the sensitivity of the assay employed and the normative data of the population. The multitude of protocols is often confusing and do not give adequate confidence to the clinician during their interpretation, especially in atypical cases.

In this context, the article by Goyal and colleagues lends a helping hand by giving a concise compendium of diagnostic protocols used in pediatric and adult endocrinology.^[1] The article gives an overview of common protocols along with the diagnostic cutoff. In a few cases, the authors have even given the diagnostic cutoff values based on the assay methodology used. This further highlights the importance of learning the assay techniques in detail, including their sensitivity, accuracy and precision. The authors have summarized the protocols from the published literature and also discussed the caveats and limitations during the interpretation.

Endocrine research from the Indian subcontinent is growing by leaps and bounds during the last decade.^[2] The research has progressed from the clinical profiling of a disease

to unravel the hitherto unknown pathophysiological mechanisms.^[3] The dynamic testing protocols in India are limited by the non-availability of preparations like adrenocorticotrophin (ACTH) and gonadotropin releasing hormone (GnRH). Gundugurthi and colleagues have developed and validated a protocol using the porcine ACTH (Acton Prolongatum®) for the evaluation of adrenal insufficiency.^[4] Acton Prolongatum® is widely available, cheap and the diagnostic accuracy has been established in pediatric and adult subjects with adrenal insufficiency from our country.^[5,6]

Many testing protocols employ serial estimation of hormones after a stimulus, thereby increasing the number of samples to be tested for the hormone levels. This model is cumbersome and pose a significant burden on the patient, where the cost is born out of the pocket. The GnRH stimulation test is used during dynamic testing of both early and delayed puberty. The original protocol used intravenous GnRH and serial estimation of luteinizing hormone (LH) for 2 hours. However, the lack of intravenous GnRH preparation in India prompted to look for alternate methods of evaluation. Prasad and colleagues have studied the use of long acting GnRH agonists (GnRHa) for the same and have given comparable efficacy with only two samples after stimulation and also useful in outpatient practice.^[7] Acharya *et al.* have showed the convenience and cost-effectiveness of a single LH sample, drawn 3 hours after depot GnRHa injection during the monitoring of precocious puberty.^[8] Differentiation between self-limited delayed puberty and isolated hypogonadotropic hypogonadism is a Herculean task in adolescents with delayed puberty. Sukumar *et al.* has demonstrated the discriminatory role of LH sample drawn 4 hours after the GnRHa, when performed after withdrawal of testosterone priming.^[9] These protocols have been established in the Indian patients with the available drugs and can easily be replicated by others in the clinical practice.

Undoubtedly, the endocrine disorder that is most difficult to diagnose and localize is Cushing syndrome (CS). There is a multitude of screening and confirmatory tests employed in this condition. Jarial KDS *et al.* has shown the utility of a single late-night plasma cortisol and ACTH in the diagnosis of CS, circumventing the need of dynamic testing.^[10] The anatomical localization of ACTH dependent CS involves establishing the ACTH gradient during the bilateral inferior petrosal sinus sampling (BIPSS). The sensitivity of BIPSS is increased by stimulation of ACTH with corticotrophin releasing hormone (CRH). However, CRH is not available in India and researchers have shown the ability of the injectable vasopressin or intranasal Desmopressin to stimulate ACTH during the BIPSS procedure.^[11,12]

Many of the original endocrine test protocols have been tweaked to suit the requirement for Indian scenario as mentioned above. India is a vast country with many ethnic and regional variations. The endocrine version of “make in India” is to develop indigenous protocols by collaboration between the academic institutions and clinical practitioners. These protocols should achieve the desired result and be comparable to the gold standard tests. The fine balance between the scientific judgement and patient comfort will be the essence of the dynamic testing in future endocrine research.

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