Specific involvement of gonadal hormones in the functional maturation of growth hormone releasing hormone (GHRH) neurons

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Résumé en anglais	Growth hormone (GH) is the key hormone involved in the regulation of growth and metabolism, two functions that are highly modulated during infancy. GH secretion, controlled mainly by GH releasing hormone (GHRH), has a characteristic pattern during postnatal development that results in peaks of blood concentration at birth and puberty. A detailed knowledge of the electrophysiology of the GHRH neurons is necessary to understand the mechanisms regulating postnatal GH secretion. Here, we describe the unique postnatal development of the electrophysiological properties of GHRH neurons and their regulation by gonadal hormones. Using GHRH-eGFP mice, we demonstrate that already at birth, GHRH neurons receive numerous synaptic inputs and fire large and fast action potentials (APs), consistent with effective GH secretion. Concomitant with the GH secretion peak occurring at puberty, these neurons display modifications of synaptic input properties, decrease in AP duration, and increase in a transient voltage-dependant potassium current. Furthermore, the modulation of both the AP duration and voltage-dependent potassium current are specifically controlled by gonadal hormones because gonadectomy prevented the maturation of these active properties and hormonal treatment restored it. Thus, GHRH neurons undergo specific developmental modulations of their electrical properties over the first six postnatal weeks, in accordance with hormonal demand. Our results highlight the importance of the interaction between the somatotrope and gonadotrope axes during the establishment of adapted neuroendocrine functions.
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