Puberty is the process of physical changes through which a child's body matures into an adult body capable of sexual reproduction.

The neuroendocrine system consists of a heterogeneous collection of neuropeptidergic neurons in the brain, among which hypothalamic KNDy neurons represent an indispensable cell subtype controlling puberty onset. Although neural progenitors and neuronal precursors along the cell lineage hierarchy adopt a cascade diversification strategy to generate hypothalamic neuronal heterogeneity, the cellular logic operating within the lineage to specify a subtype of Neuroendocrine cells remains unclear. As human genetic studies have recently established a link between TBX3 mutations and delayed puberty onset, we systematically studied Tbx3-derived neuronal lineage and Tbx3-dependent neuronal specification and found that Tbx3 hierarchically established and maintained the identity of KNDy neurons for triggering puberty. Apart from the well-established lineage-dependent fate determination, they uncovered rules of interlineage interaction and intralineage retention operating through neuronal differentiation in the absence of Tbx3. Moreover, they revealed that human TBX3 mutations disturbed the phase separation of encoded proteins and impaired transcriptional regulation of key neuropeptides, providing a pathological mechanism underlying TBX3-associated puberty disorders [1)]

1)
Shi X, Zhuang Y, Chen Z, Xu M, Kuang J, Sun XL, Gao L, Kuang X, Zhang H, Li W, Wong SZH, Liu C, Liu L, Jiang D, Pei D, Lin Y, Wu QF. Hierarchical deployment of Tbx3 dictates the identity of hypothalamic KNDy neurons to control puberty onset. Sci Adv. 2022 Nov 18;8(46):eabq2987. doi: 10.1126/sciadv.abq2987. Epub 2022 Nov 16. PMID: 36383654.