

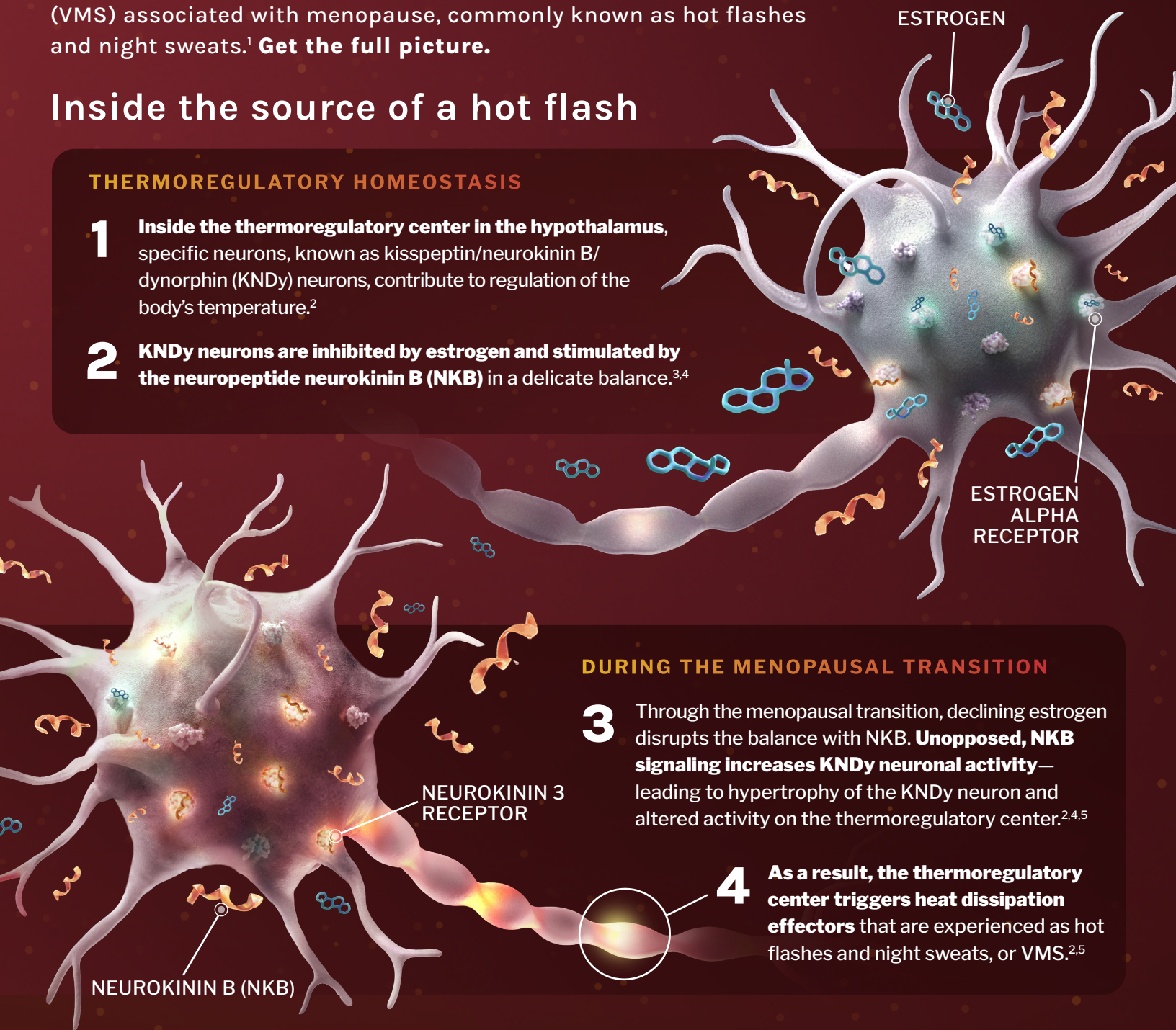
# OUR UNDERSTANDING OF VMS IS HEATING UP

Declining estrogen isn't the only cause of Vasomotor Symptoms (VMS) associated with menopause, commonly known as hot flashes and night sweats.<sup>1</sup> **Get the full picture.**

## Inside the source of a hot flash

### THERMOREGULATORY HOMEOSTASIS

- 1** Inside the thermoregulatory center in the hypothalamus, specific neurons, known as kisspeptin/neurokinin B/dynorphin (KNDy) neurons, contribute to regulation of the body's temperature.<sup>2</sup>
- 2** KNDy neurons are inhibited by estrogen and stimulated by the neuropeptide neurokinin B (NKB) in a delicate balance.<sup>3,4</sup>



### DURING THE MENOPAUSAL TRANSITION

- 3** Through the menopausal transition, declining estrogen disrupts the balance with NKB. **Unopposed, NKB signaling increases KNDy neuronal activity**—leading to hypertrophy of the KNDy neuron and altered activity on the thermoregulatory center.<sup>2,4,5</sup>
- 4** **As a result, the thermoregulatory center triggers heat dissipation effectors** that are experienced as hot flashes and night sweats, or VMS.<sup>2,5</sup>

**References:** **1.** Rapkin AJ. Vasomotor symptoms in menopause: physiologic condition and central nervous system approaches to treatment. *Am J Obstet Gynecol* 2007;196(2):97-106. **2.** Padilla SL, Johnson CW, Barker FD, Patterson MA, Palmiter RD. A neural circuit underlying the generation of hot flashes. *Cell Rep* 2018;24(2):271-7. **3.** Wakabayashi Y, Nakada T, Murata K, et al. Neurokinin B and dynorphin A in kisspeptin neurons of the arcuate nucleus participate in generation of periodic oscillation of neural activity driving pulsatile gonadotropin-releasing hormone secretion in the goat. *J Neurosci* 2010;30(8):3124-32. **4.** Krajewski-Hall SJ, Blackmore EM, McMinn JR, Rance NE. Estradiol alters body temperature regulation in the female mouse. *Temperature* 2018;5(1):56-69. **5.** Krajewski-Hall SJ, Miranda Dos Santos F, McMullen NT, Blackmore EM, Rance NE. Glutamatergic neurokinin 3 receptor neurons in the median preoptic nucleus modulate heat-defense pathways in female mice. *Endocrinology* 2019;160(4):803-16.



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BEHIND VMS



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