
Review

YAWNING AND THE RETICULAR FORMATION

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Abstract

Any change in the steady state as perceived by the brain provokes a reaction by the reticular formation. Yawning may be triggered by boredom, sadness, surprise, suffering, fatigue, stress, somnolence, which represent a change in the central nervous system situation.

The brain areas involved in the elaboration of yawning are the neocortex, the limbic system, the hypothalamic-hypophyseal system, the autonomic nervous system and the reticular system. The reticular formation is a structure located in the brainstem, between the thalamus and the spinal cord, with a width of only an inch, having a critical function in the yawning mechanism.

Yawning entails a perfect match of the rhythmic vital functions of breathing and the cardiovascular circulation under a harmonic regulation of the nervous system. The complex biochemistry of the neuronal synapses involved in this action ensure the harmony and the perfect synchronization mechanism of the respiratory, cardiovascular, and muscular systems, with the yawning. Inaccuracies in the harmonic regulation function occurs on pathologic basis, at different levels of the central nervous system, but always involving the essential regulator "the reticular network".

Keywords: Yawning, steady state, boredom, hyperventilation, peripheral hearts, reticular system

Rezumat

Orice schimbare în homeostazia (starea de echilibru dinamic) al sistemului nervos, provoacă o reacție a formației reticulare (ascendente sau descendente). Căscatul este provocat de plictiseală, tristețe, suroriza, suferință, oboseală, stres, somnolență.

Ariile cerebrale care reacționează împreună cu formația reticulară în elaborarea căscatului sunt neocortexul, sistemul limbic, sistemul nervos autonomic și sistemul hipotalamic-hipofizar. Formația reticulată este o structură localizată în trunchiul

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cerebral, între talamus și măduva spinării, de 2,5 cm grosime cu o importanță capitală pentru mecanismul căscatului.

Căscatul este armonizat cu funcțiile vitale ale organismului, printr-o perfectă adaptare a modificărilor inerente pe care le produce în respirație, funcțiile cardiovasculară și musculare. Biochimia complexă a sinapselor neuronale este cea care asigură această armonie. Neregularitățile acestei armonii au o bază patologică, la diferite nivele ale sistemului nervos, dar în special la nivelul formației reticulate.

Cuvinte-cheie: Căscat, homeostazia (stare de echilibru dinamic), plictiseală, hiperventilație, "inimi periferice", formație reticulară

The act of yawning begins during fetal life. The complex biochemistry involved in this action includes many enzymes and neurotransmitters, including: dopamine, acetylcholine, muscarine, histamine, adenosine, serotonin, nitric oxid, adrenocorticotrophic hormone, oxytocin, alpha-melanocyte hormone, opioids and gammaaminobutyric acid.

An early research into the physiology of yawning was conducted by Charcot. His famous case was a woman with relentless yawning who was hospitalized for months in Salpetriere hospital. This patient presented with a yawning frequency of 8 yawns per minute, and Charcot noted that although her breathing pattern was severely disturbed her ventilation was not reduced (**figure no.1**).

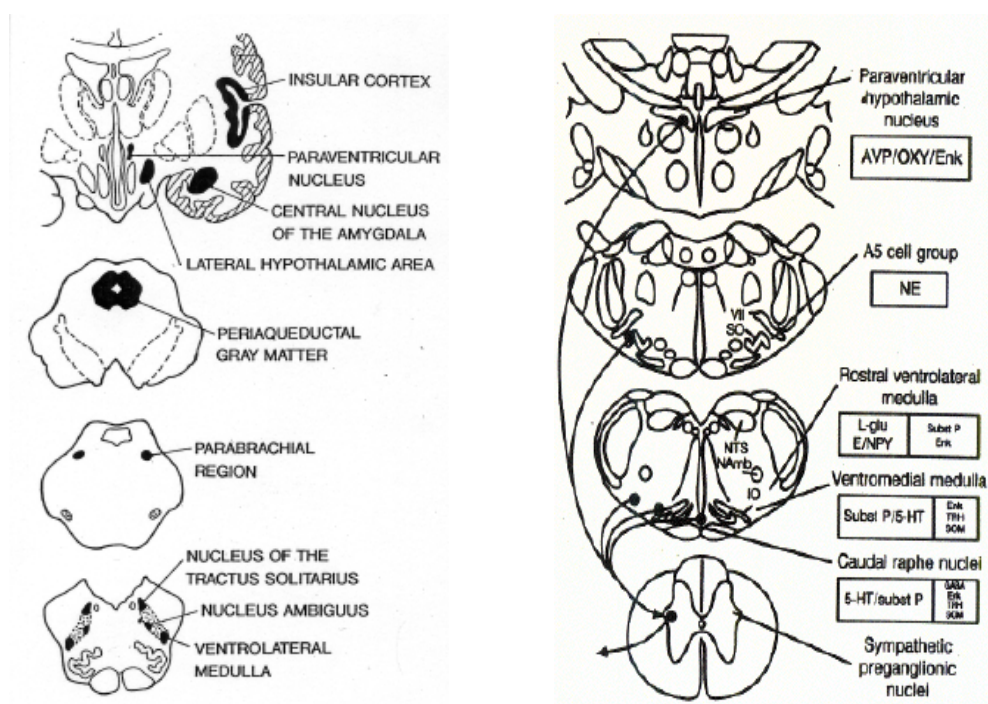


Figure 1 - Schematic diagram of the autonomic nervous system involvement in yawning on the left side and of the neurotransmitters involved on the right side.