

# 07 - C. Pain

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© SPMM Course 2. Neural basis of physiological functions A. Eating The hypothalamus has 2 centers that control feeding behaviour. Ventromedial hypothalamus acts as the satiety centre while lateral hypothalamus acts as the feeding centre. Neurochemical substances such as ghrelin and neuropeptide Y act as mediators of increased appetite (orexigenic). Leptin, cholecystokinin and serotonin act as mediators of satiety (anorexigenic). Ghrelin is the only orexigenic substance produced outside of the CNS – it is synthesized in the gastric mucosa; adipose cells synthesize leptin. Food and food cues increase dopaminergic activity in nucleus accumbens (reward centre). Destruction of dopamine pathways reduces eating behaviour. In obesity, D2 receptors are reduced in the striatum. B. Temperature The hypothalamus has 2 centers that control body temperature. Preoptic anterior hypothalamus acts as a hypothermic centre while posterior hypothalamus acts as a hyperthermic centre. Stimulating preoptic anterior hypothalamus results in parasympathetic-mediated sweating and vasodilation, resulting in hypothermia. Stimulating posterior hypothalamus results in sympathetic drive, shivers and vasoconstriction, leading to hyperthermia. Body temperature varies diurnally; Lesions in the median eminence reduces the diurnal temperature variation. Certain drugs can induce malignant hyperthermia, but not through hypothalamic mechanism. An abnormal excitation-contraction coupling in skeletal muscles is responsible for this defect. Hyperthermia is also seen in Neuroleptic Malignant Syndrome (NMS) induced by neuroleptic use or levodopa withdrawal. C. Pain Thalamus plays a crucial role in pain perception while higher cortical centres are central to the localization and interpretation of pain signal. Thin unmyelinated C fibres or sparsely myelinated A-delta fibres carry pain sensation to dorsal horn of the spinal cord. Fast transmission takes place along lateral spinothalamic route to aid localization while slow transmission takes place through reticulothalamic tract to aid subjective sensation. Opioid receptors in dorsal horn and possibly those in brain stem (periaqueductal grey mater) modulate pain intensity. Descending fibres from serotonergic raphe nuclei also modulate pain perception; this may explain the role of tricyclic drugs in reducing chronic pain.

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