Itch (also known as pruritus) is a sensation that causes the desire or reflex to scratch.

Itch has resisted many attempts to classify it as any one type of sensory experience. Modern science has shown that itch has many similarities to pain, and while both are unpleasant sensory experiences, their behavioral response patterns are different. Pain creates a withdrawal reflex, whereas itch leads to a scratch reflex.

Unmyelinated nerve fibers for itch and pain both originate in the skin; however, information for them is conveyed centrally in two distinct systems that both use the same nerve bundle and spinothalamic tract.

Chronic itch is clinically correlated with the development of mood disorders such as anxiety and depression. Nonetheless, whether this relevance exists in rodents is unknown, and evidence demonstrating chronic itch can affect mood is lacking. The aim of this study is to characterize the affective consequences of chronic itch, and explore potential mechanisms and interventional strategy. We subjected mice to chronic itch by repetitively cutaneous treatment with acetone and diethylether followed by water (AEW) that models “dry skin”. Following 3-4 weeks AEW treatment, the mice developed behavioral phenotypes of anxiety and depression assessed by a battery of behavioral paradigms, such as light dark box and forced swim test. These behavioral symptoms of mood disturbance were independent of cutaneous barrier disruption, but correlated well with the degree of the irritating itch sensation. Although AEW mice showed normal circadian hypothalamo-pituitary-adrenal (HPA) axis activity, their neuroendocrine functionality was dampened, including impaired endocrine stress responsivity, altered neuroendocrine-immune interaction and blunted corticosterone response to both dexamethasone and CRF. Parameters of HPA functionality at the level of mRNA transcripts are altered in stress-related brain regions of AEW mice, implying an overdrive of central CRF system. Remarkably, chronic treatment of AEW mice with antalarmin, a CRFR1 antagonist, ameliorated their both mood impairment and stress axis dysfunction. This is the first evidence revealing mood impairment, HPA axis dysfunction and potential therapeutic efficacy by CRFR1 antagonist in mice with chronic itch, thus providing a preclinical model to investigate the affective consequence of chronic itch and the underlying mechanisms [1)].

1)
Zhao X, Yu C, Ye F, Wang YG, Mei QY, Ma Q, Cui WG, Zhou WH. Chronic itch impairs mood and HPA axis function in mice: modulation by CRFR1 antagonist. Pain. 2018 Jun 22. doi: 10.1097/j.pain.0000000000001319. [Epub ahead of print] PubMed PMID: 29939958.