

## What is itch?

Itch (also called pruritus) is the subjective, unpleasant feeling, which makes a person rub or scratch an affected part of the skin. Itch is experienced by all human beings, but is further a symptom of many diseases, including both skin- and systemic diseases. The intensity varies depending on the underlying condition, ranging from only minimally affecting patients to constantly bothering patients, destroying sleeping patterns and dramatically lowering patient's quality of life. All patients suffering from the skin disease 'atopic eczema' (also called atopic dermatitis or AD) experience itch, while up to 80% of psoriasis patients itch.

## Which types of itching exists?

Itch can be divided into *peripheral* and *central* itch depending on the origin (i.e. underlying cause) of the itch:

- 1) *Peripheral itch* (pruriceptive itch) is caused locally in the skin by dryness, infections, allergens or different kinds of damage to the skin causing inflammation. The itch is caused by the interaction of activated cells in the skin being part of the immune system and specific nerve fibres, which transmit the sensation of itch to the brain. This interaction is mainly caused by either histamine (a signaling molecule) *dependent* or histamine *independent* mechanisms (through other signaling molecules like proteases and cytokines). The histamine independent way is the most prominent in psoriatic and atopic dermatitis itch which concludes, that itch from these diseases cannot be treated with classical non-sedative antihistamines.
- 2) *Central Itch* is not caused by the skin, but originates from within the body. It is caused either by a disease located anywhere along the nerve fibers transmitting sensory inputs from the skin (neuropathic itch), or caused by something else in the body, not directly affecting the itch-transmitting nerves, but still causing a sensation of itch (neurogenic itch). Central itch is not necessarily affecting a well defined area of the skin, and hence, it is often hard for patients to define a specific skin area, which is affected by itch. Central itch also plays a role in psoriatic and atopic dermatitis itch.

It is important to emphasize, that a *patient's perception* of itch (i.e. how the itch is subjectively experienced) is depending on:

- 1) the actual severity of the itch (the symptom itself) and
- 2) the patient's emotional state (e.g. how he/she feels about his/her itch, coping strategies and psychiatric comorbidities like depression and anxiety).

## What stimuli causes itch?

Different stimuli cause itch. In general, a stimulus can lead to two different, distinct feelings of itch depending on the underlying cause:

- 1) A well localised itch, only present in the part of the skin directly affected by the stimulus. As the stimulus is removed, the itch will only persist shortly hereafter. This kind of itch is usually caused by peripheral itch.
- 2) A diffuse, poorly localized intense itch, which (might) occur when the skin is exposed to only a minor stimulus (called *alloknesis*). This itch can be experienced both when it originates centrally and peripherally.

Patients suffering from itchy skin conditions like psoriasis and especially atopic dermatitis tell, that stimuli like hot surroundings, hot and frequent baths and intensive sweating often worsens or cause itch. Likewise, stress is also capable of inducing or worsening an itch. Scratching an itchy area often worsens an existing itch leading to a vicious circle. This is referred to as the *itch-scratch* cycle.

## Which consequences does itch have for the patient in the period?

Patients with itchy skin conditions describe their itch as a very unpleasant symptom with crucial daily consequences. Itching (in patients suffering from psoriasis and atopic dermatitis) is significantly associated with poor sleep quality, depressive symptoms, higher levels of anxiety and a lowered quality of life. The depressive symptoms experienced by patients who itch badly is partly explained by the patient's poor sleep quality due to itching skin, but also by the psychosocial consequences of the skin condition itself.

## Itch and Atopic Eczema

All patients with atopic eczema are annoyed by itch and itch is the most burdensome symptom of atopic eczema. AD patients scratch their skin repeatedly - both awarely and unawarely. This results in an *itch-scratch* vicious cycle, in which scratch damage to the skin enhances itch. In atopic dermatitis, minor, normally non-itch provoking stimuli of the skin are known to induce intense itching (*alloknesis*, see above) which explains the severe itching sensation AD patients often experience when sweating, when the temperature changes or when patients dress or undress.

The underlying causes of itch in atopic eczema are not fully understood, and likely both central causes and itch originating locally in the skin are important. A real problem for patients with atopic eczema is their tendency of unaware scratching during sleeping (especially during light sleep). This scratching increases nightly itch, resulting in poor sleep quality and hence tiredness and irritability of atopic eczema patients. For AD patients, skin dryness and secondary infections of the skin due to rash are further known to cause and worsen itch.

## Itch and Psoriasis:

Up to 80% of patients suffering from psoriasis report itch. Although itch can occur any time during the day, patients with widespread psoriasis usually experience the worst itch during the night, resulting in impaired sleep. Further, itch is not necessarily restricted to the psoriatic skin, but can arise in all areas of the skin. Dry skin for patients with psoriasis also enhance the itch sensation.

The local inflammation of psoriatic skin is partly responsible of the the origin of the itch (e.g. peripheral itch). Psoriatic skin has furthermore increased nerve fiber density and increased expression of a number of neuropeptides, which may explain the increased local itch. However, the fact, that itch not only occurs in the psoriatic skin suggests, that a central origin of the itch is also involved.

## During patient's daily life, certain factors are known improve itchy skin.

To minimize patients itch, patients are advised to keep their skin moist and soft. Further, cold, short showers once daily, washing off sweat properly after sports also minimize itch.

Patients often report, that sleeping in cool surroundings lowers the itching sensation. Patients are advised to rub their skin instead of scratching, and to keep their nails short, as this minimises 'habit scratching' i.e. unaware scratching.

Tight clothes and shoes should be avoided as well as contact with wool and animal furs, whereas wearing cotton and silk is recommended. The sensation of pain is also known to minimize itch.

## How is itch treated today?

Treatment of itch is directed towards to *underlying cause* of the itch. As itch arises from different causes, currently no single treatment is effective for all patients suffering from itch, and often patients are not satisfied with their itch treatment. Further, the task of treating itch can be very challenging and hence a task for dermatologists or other specialized physicians, sometimes even in collaboration with psychologists or psychiatrists, in order to identify and treat the root cause of the itch.

Itch caused by atopic dermatitis and psoriasis usually gets better, when the skin condition is treated. All patients are advised to avoid itch triggering stimuli as outlined above. If patients suffer from dry skin, they are advised to use emollients and moisturisers (sometimes with anti-itching additives). Itch caused by inflammation of the skin is treated by anti-inflammatory drugs (either with an ointment locally or with systemic drugs). If the itch is caused by central mechanisms or causing bad sleep, mild sedative drugs might sometimes be helpful. Light therapy (UVB) sometimes also minimizes itch. Non-sedative antihistamine drugs are not recommended, as they do not help psoriatic and atopic dermatitis itching.