

SEARCH



an education resource from the Society for Endocrinology

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Melanocyte-stimulating hormone

Melanocyte-stimulating hormone describes a group of hormones produced by the pituitary gland, hypothalamus and skin cells. It is important for protecting the skin from UV rays, development of pigmentation and control of appetite.

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Alternative names for melanocyte-stimulating hormone

MSH; α -melanocyte-stimulating hormone; alpha-MSH; α -MSH; alpha-melanotropin; alpha-melanocortin; alpha-intermedin; melanophore-stimulating hormone

What is melanocyte-stimulating hormone?

Melanocyte-stimulating hormone is a collective name for a group of peptide hormones produced by the skin, pituitary gland (/glands/pituitary-gland/) and hypothalamus (/glands/hypothalamus/). In response to ultraviolet (UV) radiation (/glossary/r#radiation) its production by the skin and pituitary is enhanced, and this plays a key role in producing coloured pigmentation (/glossary/p#pigmentation) found in the skin, hair and eyes. It does this by inducing specialised skin cells called melanocytes to produce a pigment called melanin; melanin protects cells from DNA (/glossary/d#DNA damage, which can lead to skin cancer (melanoma).

Melanocyte-stimulating hormone is produced from the same precursor molecule as adrenocorticotrophic hormone (/hormones/adrenocorticotrophic-hormone/) called pro-opiomelanocortin (POMC).

Although named for its stimulatory effect on pigment cells, melanocyte-stimulating hormone produced in the hypothalamus can also suppress appetite by acting on receptors (/glossary/r#receptors) in the hypothalamus in the brain. This effect is enhanced by leptin (/hormones/leptin/), a hormone released from fat (/glands/adipose-tissue/) cells.

Melanocyte-stimulating hormone also affects a range of other processes in the body; it has anti-inflammatory effects, can influence the release of the hormone aldosterone (/hormones/aldosterone/), which controls salt and water balance in the body, and also has an effect on sexual behaviour.

How is melanocyte-stimulating hormone controlled?

Melanocyte-stimulating hormone secretion from the pituitary is increased by exposure to UV light. Unlike most hormones, melanocyte-stimulating hormone release is not thought to be controlled by a direct feedback mechanism.

What happens if I have too much melanocyte-stimulating hormone?

A direct consequence of high levels of melanocyte-stimulating hormone is increased production of melanin. This can occur as a result of prolonged exposure to the sun or skin tanning. However, people with a high blood level of melanocyte-stimulating hormone do not necessarily tan very well or have even skin pigmentation. Very fair-skinned people tend to produce less melanin due to variations in their melanocyte-stimulating hormone receptors, which means they do not respond to melanocyte-stimulating hormone levels in the blood.

Hyperpigmentation or abnormal darkening of the skin is found in patients with primary adrenal insufficiency (/endocrine-conditions/addisons-disease/) (Addison's disease (/endocrine-conditions/addisons-disease/)). In Addison's disease, the adrenal glands (/glands/adrenal-glands/) do not produce enough hormones (including cortisol (/hormones/cortisol/)). As a consequence, the hypothalamus stimulates the pituitary gland to release more adrenocorticotrophic hormone to try and stimulate the adrenal glands to produce more cortisol. Adrenocorticotrophic hormone can be broken down to produce melanocyte-stimulating hormone, leading to hyperpigmentation of the skin.

Melanocyte-stimulating hormone levels are also raised during pregnancy and in women using birth control pills, which can cause hyperpigmentation of the skin. Cushing's syndrome (/endocrine-conditions/cushings-syndrome/), due to an excess production of adrenocorticotrophic hormone, can also lead to hyperpigmentation.

What happens if I have too little melanocyte-stimulating hormone?

A deficiency in melanocyte-stimulating hormone results in a lack of skin pigmentation and subsequent loss of natural protection from UV rays of the sun. In secondary adrenal insufficiency, damage to the pituitary gland prevents release of adrenocorticotrophic hormone and melanocyte-stimulating hormone and there is reduced pigmentation of the skin. Melanocyte-stimulating hormone deficiency can cause increased inflammation ([/glossary/i#inflammation](#)), pain, and sleeping problems, as well as a reduction in the levels of anti-diuretic hormone ([/hormones/anti-diuretic-hormone/](#)), which causes thirst and frequent urination. Melanocyte-stimulating hormone deficiency may also result in increased food intake and obesity ([/endocrine-conditions/obesity/](#)).

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