# PITUITARY INSUFFICIENCY

# (Somatotropic deficiency)

## DESCRIPTION :

Pituitary insufficiency, caused by hormonal dysfunction, is due to mutations in one or more of the genes coding for transcription factors involved in the early stages of pituitary development. The pituitary gland, a small gland located at the base of the brain, produces several essential hormones, including growth hormone. People in whom growth hormone is not produced in sufficient quantities see their growth inhibited. Without replacement therapy, their size will be significantly below average.

The type of transmission can be recessive or dominant, depending on the transcription factor involved and the genetic mutation [see the "genetics" fact sheet]. The incidence of an isolated growth hormone deficiency is estimated to be one birth per 4,000 or 10,000.

## CHARACTERISTICS AND DIAGNOSIS :

When growth hormone deficiency occurs, all bones are shorter. The affected individual will therefore exhibit a proportionate form of dwarfism. Other characteristics are as follows:

- An accumulation of fat in the abdomen and limbs;
- A shorter, narrower face and a rounded forehead;
- Late onset of permanent teeth (some baby teeth are never replaced).

It is important to note that pituitary insufficiency can present as a deficiency of several hormones. In this case, in addition to growth hormones, other hormones are affected such as cortisol (maintenance of blood glucose and blood pressure), thyroid hormones (psychomotor development, growth and bone maturation), sex steroids (puberty, sexual function, fertility) or antidiuretic hormone (kidney function). These individuals will not only show short stature but with the diagnosis of multiple pituitary insufficiency they are also prone to other hormonal complications.

Pituitary insufficiency is often diagnosed between 1 and 5 years of age, when differential growth rates become apparent. To establish the diagnosis, blood levels of hormones produced by the pituitary gland are first measured. However, this method has its limitations because pituitary growth hormone production is difficult to assess. Indeed, the hormone is secreted in peaks during the day and is rapidly used. Thus, the blood level of the hormone at any given time does not allow confirmation that the production is normal during the day. Therefore, it is preferable to measure the levels of insulin-like growth factor-1 (IGF-1). The production of IGF-1 is controlled by growth hormone and its level varies as a function of the total amount of growth hormone produced by the pituitary gland. In infants and young

children, doctors may prefer to use a similar substance, IGF-binding protein type 3. Another option is to perform a simulation test by measuring the response of growth hormone to certain drugs.

If the blood tests reveal pituitary insufficiency, a computed tomography (CT) scan or magnetic resonance imaging (MRI) of the pituitary gland is then performed to identify structural abnormalities.

## MAIN POSSIBLE COMPLICATIONS :

As its name suggests, the primary role of growth hormone is to stimulate growth. However, this hormone has other important functions in children and adults, such as maintaining blood sugar levels and the function of fat and muscle cells. As a result, a growth hormone deficiency can cause certain problems, such as an increase in body fat, especially in the abdomen and limbs. Weight monitoring should therefore be carried out.

In infants: Presence of potentially severe hypoglycemia (low blood sugar) that may require emergency treatment. Hypoglycemia in infants may be manifested by profuse sweating, increased heart rate, irregular breathing and tremors.

## TREATMENT:

Short stature caused by pituitary insufficiency is the most treatable form of dwarfism. However, diagnosis must be made quickly, because the earlier in childhood it is discovered, the more effective the treatment plan.

### Treatment can:

- Compensate for the growth hormone deficiency;
- Increase the child's final height. Girls can reach an average height of 150 cm (4'11") and boys 160 cm (5'3");
- Promote bone density and therefore bone strength;
- Improve the child's abilities (movement, etc.);
- Increase self-esteem;
- Modify the child's physical makeup (fat and muscle mass).

The treatment consists of injecting biosynthetic growth hormones once a day, preferably in the evening. The duration of treatment varies depending on several factors (age at diagnosis, gender, etc.), but should preferably be continued until the end of growth (around 16-18 years of age). Throughout the duration of treatment, clinical monitoring (growth, puberty, etc.) every six months and annual biological monitoring (IGF-1, etc.) is necessary.

In Quebec, treatment is covered by the Régie de l'assurance maladie through the exceptional drug measure. This measure allows the entire population to obtain coverage for certain drugs if they are used in accordance with the indications recognized for payment by the INESSS. To be reimbursed for an exceptional drug, an insured person must obtain prior authorization from the Régie. To do so, a request for authorization of payment must be submitted by an authorized prescriber.
In Ontario, the treatment is covered by the Trillium Drug Program.

**RESOURCES :**

Association québécoise des personnes de petite taille
https://www.aqppt.org/

Little People of Ontario
https://littlepeopleofontario.com/

Regroupement québécois des maladies orphelines - Centre iRARE
https://rqmo.org/centre-dinformation-et-de-ressources-en-maladies-rares/

Orphanet – fact sheet on non-acquired multiple pituitary insufficiency
https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=en&Expert=467

Manuel Merck – fact sheet on short stature in children
https://www.merckmanuals.com/en-ca/professional/searchresults?query=Petite%20taille%20chez%20les%20enfants&icd9=253.3

Manuel Merck – hypopituitarism fact sheet
https://www.merckmanuals.com/en-ca/home/hormonal-and-metabolic-disorders/pituitary-gland-disorders/hypopituitarism

Reference Center for Rare Endocrine Growth Diseases - Diagnostic Announcement of Pituitary Insufficiency http://robertdebre.aphp.fr/wp-content/blogs.dir/137/files/2013/09/Annonce_Diagnostique_Insuffisance_hypophysaire.pdf

Multiple Pituitary Hormonal Insufficiency (Panhypopituitarism), booklet #11, patient support guide, 2009
http://robertdebre.aphp.fr/wp-content/blogs.dir/137/files/2013/08/Insuffisance_Pituitaire_Hormonale_multiple_-_L_11_moyen_27_AVRIL_09.pdf

Régie de l'assurance maladie du Québec - exception drugs
http://www.ramq.gouv.qc.ca/fr/professionnels/pharmaciens/medicaments/medicaments-patient-exception/Pages/medicaments-exception.aspx

The Ontario Trillium Program (TDP)
https://www.ontario.ca/page/get-coverage-prescription-drugs

Association Québécoise des Personnes de Petite Taille

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Avec la participation financière de
Office des personnes handicapées Québec