

Adverse effects of growth hormone therapy

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Case report

- A 12 year old boy referred to nephrologist for his proteinuria.
- He had 4+ proteinuria.
- He had received growth hormone for 2 years for his short stature.
- For the first year he had received 30mic/kg but in the second year he has received about 160mic/kg !
- He visited by an adult endocrinologist last year.
- He referred for renal biopsy.

Fatal overdose of GH

- A 20 year old bodybuilder boy who had been using GH for 2 years, for a competition injected himself 30mg GH !
- He reffered with hallucination, hypernatremia, hyperkalemia and rhabdomyolysis
- Hypertensive crisis, aspiration pneumonia,
- And he deid probably because of pulmonary embolism and cardiothoracic arrest

Growth hormone adverse effect

Acute effect

- Headach
- Slipped capital femoral epiphysis
- Worsening of existing scoliosis
- Severe hypersensitivity reactions
- Pancreatitis
- Transient gynecomastia
- Increase in the growth and pigmentation of nevi without malignant degeneration
- Capal tunnel syndrome
- Edema
- Arthralgia
- Insulin resistance
- Glucose intolerance

Growth hormone adverse effect long-term risks

➤ Cancer and mortality

➤ Isolated growth factor

dose not increased the risk

➤ Primary cancer diagnosis

a substantial increase in overall

mortality but not related to the

rhgh treatment

➤ Other non cancer primary diagnosis

underlying diseases

➤ Stroke

there is not sufficient evidence

Idiopathic Intracranial Hypertension

- headache, blurred vision, nausea or vomiting
- It has been reported in 1 in 1000 children receiving GH treatment
- It is possibly due to increased salt and water retention that sometimes happens when starting GH treatment
- usually develops in the first few months of GH treatment but can occasionally occur later
- GH can be restarted at a lower dose

Slipped Capital Femoral Epiphysis

- more commonly in children who are growing quickly, overweight, GH deficiency
- particularly after total body irradiation therapy for leukaemia or brain tumours
- There is no evidence that slipped capital femoral epiphysis is caused by GH treatment

Scoliosis

- With some syndromes, such as Turner Syndrome and Prader Willi
- Most frequently between the ages of 10 and 15 years
- More common in girls

Risk of Cancer

- The children most at risk of cancer are those who have been treated for a cancer in the past
- GH treatment does not increase the risk of recurrence of a previously treated cancer
- GH does not increase the number of new cancers in otherwise healthy children

Risk of Diabetes

- Most studies do not show an increased rate of type 1 or type 2 diabetes
- In children who are susceptible to type 2 diabetes for other reasons
 - those treated with high doses of steroids
 - very overweight
 - decrease insulin sensitivity
 - GH may promote the development of type 2 diabetes

Miscellaneous side effects

- Growth spurts can speed up myopia
- GH will not cause child to become nearsighted
- Gynecomastia
- Pancreatitis
- Growth of nevi
- Behavioral change
- Hypertrophy of tonsils
- Adrenal insufficiency
- hypothyroidism

Growth hormone induced rash

- It is reported rare
- Atopic patients may develop rashes
- Allergic and non-allergic skin reaction are uncommon
- local erythema, hives, generalized pruritus and urticarial
- The cause for allergic reaction to rhGH is either due to be preservatives or the GH molecule itself
- Type IV HS can develop to preservatives used in rhGH and can present as itching and dermatitis at an injection site or very rarely as a generalized eczematous eruption

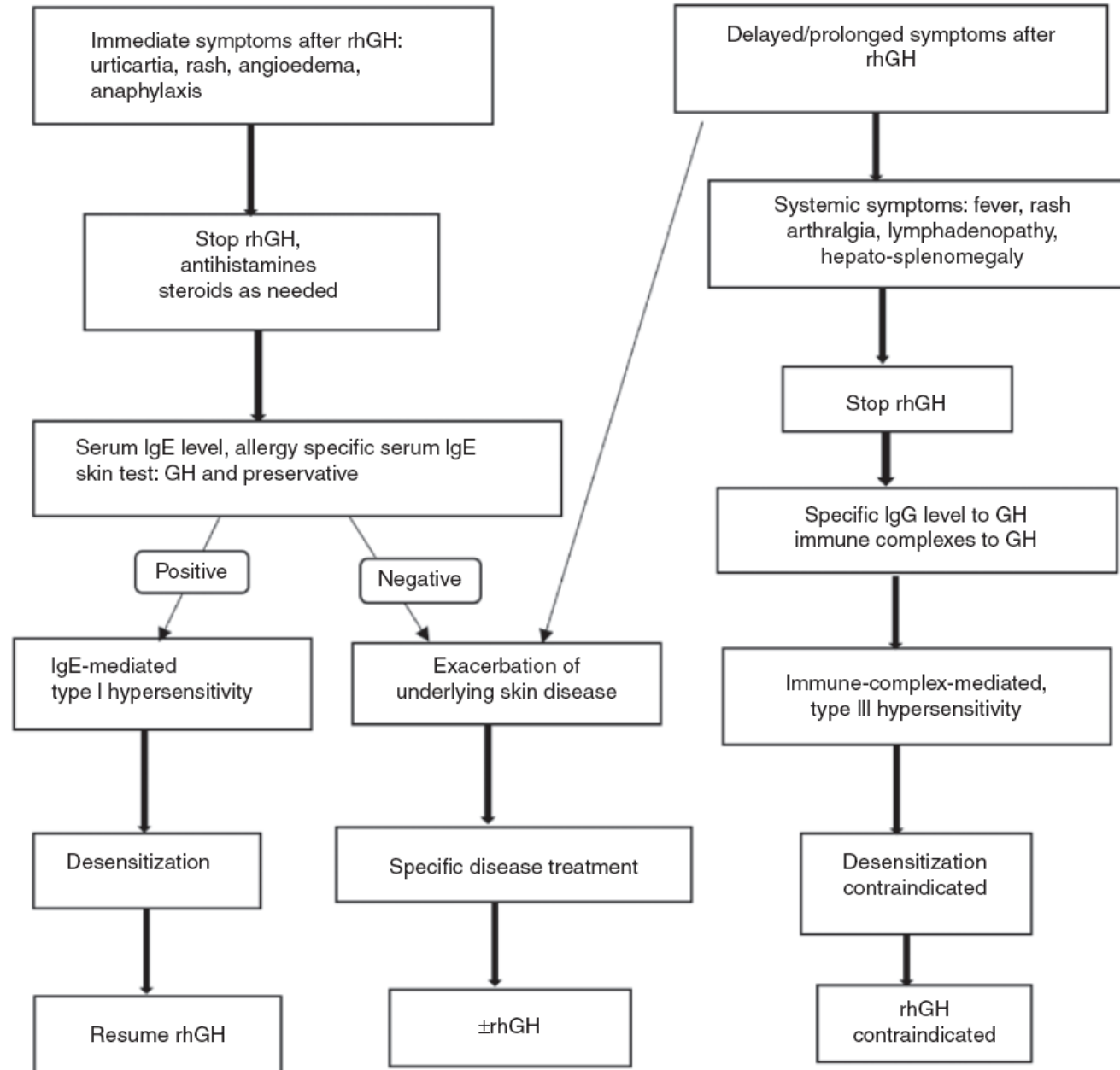
Brand name	Method of delivery	Preservative	Buffer
Genotropin	Pen with cartridge	m-Cresol	Phosphate
	Single dose syringe	No preservative	Phosphate
Humatrope	Vial	m-Cresol	Phosphate
Norditropin	Pre-loaded pen	Phenol	Histidine
Nutropin	Pen with cartridge	Phenol	Citrate
Omnitrope	Vial	Benzyl alcohol	Phosphate
	Pen with cartridge (5 mg)	Benzyl alcohol	Phosphate
	Pen with cartridge (10 mg)	Phenol	
Saizen	Vial	Benzyl alcohol	Phosphate
	Pen with cartridge	m-Cresol	Phosphate
Zomacton	Vial (5 mg)	Benzyl alcohol	No buffer
	Vial (10 mg)	m-Cresol	Phosphate
Accretropin	Vial	Phenol	Phosphate

rhGH	Age, years/ sex	Latency period, years	Time to reaction after rhGH	Reaction	Type HS	Skin test	Blood	Treatment
Humatrope	12/F	3	Immediate	– Hives at injection site – Generalized pruritic urticaria resolved with antihistaminic	I	+ Humatrope – m-Cresol		Desensitization Resume rhGH
			30 min	– Next injection with antihistaminic pretreatment – Generalized pruritic urticaria				
Protropin	5/M	2.5	30 min	– Local erythema – Generalized pruritic urticaria	I	+ Protropin + Humatrope + Nutropin – B.W. – m-Cresol		Desensitization Resume rhGH
rhGH	12/F	None	2 weeks	– Hives on face and trunk – Arthralgia of right knee – Splenomegaly – Lymphadenopathy	III		+ Immune complexes to GH	rhGH contraindicated

Non-allergic reaction to rhGH: exacerbation of underlying skin disease

Age, years/ sex	Diagnosis	Latency period, months	Reaction	Treatment for skin condition	Impact of rhGH on skin condition
9/M	GHD	1	Flat-topped papules plaques of lichen planus	Unresponsive to topical steroid	Improvement with D/C rhGH
9/F	TS	1	Scaly papules on skin and keratotic lines of labial and buccal mucosa due to lichen planus-like drug reaction	Partial improvement with topical steroid	Improvement with D/C rhGH
9.5/F	GHD	N/A	Psoriasiform lesions	Unresponsive to topical steroid	Improvement with D/C rhGH
8/M	GHD	6	Psoriasiform lesions	Partial improvement with topical steroid and clemastine	Improvement with reduction of rhGH
12/F	TS	3	Psoriasiform lesions	Resolution with topical calcipotriol	Continuation of rhGH

Evaluation and management of skin reactions to rhGH



Growth hormone and proteinuria

- Elevated circulating GH levels are associated with podocyte injury and proteinuria in diabetes
- FSGS is a rare complication of acromegaly
- Transsphenoidal resection of the pituitary tumor led to remission of acromegaly and reduction in proteinuria

The fountain of youth

- Growth hormone treatment in aged patients with comorbidities ?!
- GH treatment in children of normal height ?!
- Effect of Growth Hormone Therapy on Pubertal Timing ?!



Long-Acting Growth Hormone

- lonapegsomatropin (Skytrofa)
- Somapacitan (Sogroya)
- somatrogon (NGENLA/Genryzon)

