



Pheochromocytoma and BP



Only about 1,000 pheochromocytomas—rare neuroendocrine tumors of the adrenal gland medulla—are diagnosed in the United States annually, mostly in young or middle-aged adults. Below is an unusual case reported in a poster at **ENDO 09** by Ajikumar V. Aryangat, M.D., of the University of Rochester Medical Center, N.Y., and colleagues.*

Case

This patient, a 55-year-old male with no known medical problems, presented with palpitations, chest pain, shortness of breath, and a severe headache. He was pale, with a blood pressure (BP) of 80/55 mm Hg, and telemetry revealed unstable ventricular tachycardia. He was cardioverted to a normal sinus rhythm.

Physical Exam and Treatment

Coronary angiography was normal, with wide systolic BP variation indicating (in retrospect) that the BP cyclic nature started on the day of presentation with ejection fraction of 15%–20%, hypokinetic bases, and preserved apical function—findings consistent with inverted takotsubo cardiomyopathy. The patient began treatment for non-ischemic cardiomyopathy, but after a single dose of carvedilol 6.25 mg PO, he developed respiratory failure and cyclic hyper- and hypotension. This led us to suspect a pheochromocytoma. Intermittent use of vasopressors, including dopamine and norepinephrine, were required to manage the paroxysms.

Investigating Pheochromocytoma

A CT scan showed a 5.2 × 4.3 × 5 cm right adrenal mass. Intravenous fluids helped maintain urine output, but did not affect the cyclic BP. The pre-operative values were as follows:

- serum epinephrine: 18,820 pg/ml (normal 10–200) pg/ml)
- norepinephrine: 17,973 pg/ml (normal 80–520) pg/ml)
- dopamine: 198,687 pg/ml (normal

0–20 pg/ml)

- plasma metanephrine: 14.4 nmol/L (normal 0.00–0.49 nmol/L)
- plasma normetanephrine: 8.19 nmol/L (0.00–0.89 nmol/L).

After resection of the adrenal mass, the patient had an unremarkable post-operative course. The pathology revealed pheochromocytoma with extensive hemorrhagic necrosis and stained strongly positive for chromogranin A and synaptophysin. The patient is doing well 3 months post-discharge.

Discussion

Takotsubo cardiomyopathy (TC) can be related to pheochromocytoma due to high catecholamine levels, differential distribution of the cardiac adrenergic receptors, and variable response to catecholamines that lead to different forms of stress cardiomyopathy. TC has been associated with high catecholamine states—much higher levels than measured even in Acute MI—suggesting that TC might be an endocrine/catecholamine disorder. Perhaps differences in beta-adrenergic receptor density in the heart account for the inverted takotsubo pattern. We suspect that hemorrhage of the pheochromocytoma precipitated this acute event. ■

* Aryangat AV, Jindal V, Baker ML, Bisognano JD, Richter HS, Wittlin SD. Case report of inverted takotsubo cardiomyopathy with cyclical blood pressure changes due to hemorrhagic pheochromocytoma. Poster P3-589 at ENDO 09.

CME connections



NEW! Pediatric Board Review Course

The Endocrine Society and the Lawson Wilkins Pediatric Endocrine Society (LWPES) are thrilled to present this unique interactive course in conjunction with the **LWPES/ESPE 8th Joint Meeting** in New York City, September 7 and 8, 2009. The meeting offers outstanding preparation for the 2009 ABP Exam in Pediatric Endocrinology. For registration information and program details, visit www.endo-society.org/educationevents/ceul/boardreview/index.cfm.

Board Review Before CEU 09

The Endocrine Society's **Board Review Course** is a fantastic resource for fellows seeking preparation for the 2009 ABIM Board Certification Examination in Endocrinology, Diabetes, & Metabolism. The course will be held October 6 and 7 in Atlanta, Ga., 2 days before the **Clinical Endocrinology Update 09 (CEU 09)**. This unique, interactive program is an intensive review of the seven key areas of endocrinology: calcium/bone, pituitary, lipids/obesity, thyroid, reproductive endocrinology,

diabetes, and adrenal. For registration information and program details, visit www.endo-society.org/educationevents/ceul/boardreview/index.cfm.

Now Available! ESAP 09 & ESAP 09 Maintenance Of Certification

This is the most respected testing and training tools on the market! Based on the ABIM blueprint for endocrinology, diabetes, and metabolism, these case-based exams offer two options for career advancement. See www.endo-society.org/education/esap.



Growth Hormone: Use and Abuse

What is human growth hormone?

Human growth hormone (GH) is a substance that regulates your body's growth and metabolism. GH is made by the *pituitary gland*, located at the base of the brain. GH helps children grow taller (also called *linear growth*), increases muscle mass, and decreases body fat. In both children and adults, GH helps control the body's metabolism—the process by which cells change food into energy and make other substances needed by the body.

If children or adults have too much or too little GH, they may have health problems. Growth hormone deficiency (too little GH) and some other health problems can be treated with synthetic (manufactured) GH. Sometimes GH is used illegally for non-medical purposes.

How is growth hormone therapy used?

The United States (US) Food and Drug Administration (FDA) has approved GH treatment for specific conditions. GH is only available by prescription and is injected.

In children, GH is used to treat

- growth hormone deficiency
- conditions that cause *short stature* (being shorter than children of the same age), such as chronic kidney disease, Turner syndrome, and Prader-Willi syndrome

In adults, GH is used to treat

- growth hormone deficiency
- muscle wasting (loss of muscle tissue) from HIV
- short bowel syndrome

In addition to these uses, doctors outside of the US sometimes prescribe GH for other conditions. (When doctors prescribe medicines for conditions other than the ones officially approved, the process is called “off-label” use.)

Is growth hormone use appropriate for healthy adults?

Studies of healthy adults taking GH have produced conflicting results. Some short-term studies showed that older adults increased their endurance and strength, with increased muscle and decreased fat mass. But other studies did not show similar benefits. More studies are needed to fully understand the benefits and risks of GH use in healthy adults.

Aside from its use in research studies, prescribing or using GH off-label is illegal in the US. Adults can achieve improved health, body composition, strength, and endurance by following a healthy diet and getting regular exercise.

How is growth hormone abused?

People sometimes take GH illegally to stop or reverse the effects of aging or to improve athletic performance. Some athletes believe taking GH alone will not achieve the desired results, so take it along with anabolic (tissue-building) steroids in an effort to build muscle, increase strength, and decrease body fat. Some athletes also use insulin to increase the muscular effects of GH, which is a dangerous practice because it lowers blood sugar.

What are the risks of growth hormone abuse?

People can experience harmful side effects when they abuse GH. Side effects of short-term use include joint and muscle pain, fluid build-up, and swelling in the joints. If GH is injected with shared needles, people may be exposed to HIV, AIDS, or hepatitis. Taking high doses of GH over a long period of time may contribute to heart disease. GH sold illegally may contain unknown and potentially harmful ingredients. For example, if people take

GH derived from human tissue, they risk developing a fatal brain condition called Creutzfeldt-Jakob disease, a condition similar to mad cow disease.

Growth hormone sold without a prescription

Some companies sell human GH pills or GH releasers, claiming that the pills are “anti-aging” substances. But these substances have not been proven to increase the body's production of GH or fight aging, increase muscle, or provide other benefits. GH has no effect if it's taken as a pill because it is inactivated during digestion.

What are the most important things to remember?

- Synthetic GH is safe and effective when used for certain conditions approved by the FDA.
- GH must be prescribed by a physician.
- Abuse of GH can have serious side effects.
- Healthy adults can improve their health and fitness with diet and exercise.
- If you're worried about GH deficiency in yourself or a family member, talk with a doctor.

Resources

Find-an-Endocrinologist:

www.hormone.org or call
1-800-HORMONE (1-800-467-6663)

The Hormone Foundation's web site about growth disorders:

www.hormone.org/Growth

MedlinePlus: www.medlineplus.gov

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June 2009

For more information on how to find an endocrinologist, download free publications, translate this fact sheet into other languages, or make a contribution to The Hormone Foundation, visit www.hormone.org or call 1-800-HORMONE (1-800-467-6663). The Hormone Foundation, the public education affiliate of The Endocrine Society (www.endo-society.org), serves as a resource for the public by promoting the prevention, treatment, and cure of hormone-related conditions. The development of this fact sheet was supported by unrestricted educational grants from Genentech and Novo Nordisk and may be reproduced by health care professionals and health educators to share with patients and students.

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Hormona del crecimiento: Uso y abuso

¿Qué es la hormona del crecimiento humano?

La *hormona del crecimiento humano* (Growth Hormone o GH) es una sustancia que regula el metabolismo y el crecimiento del cuerpo. La *glándula pituitaria*, ubicada en la base del cerebro, produce la GH. Esta hormona ayuda a los niños a aumentar de estatura (también llamado *crecimiento lineal*), aumenta la masa muscular y disminuye la grasa corporal. Tanto en niños y adultos, la GH ayuda a controlar el metabolismo del cuerpo, que es el proceso por el cual las células convierten la comida en energía y producen otras sustancias que el cuerpo necesita.

Si un niño o un adulto tiene demasiada GH o insuficiente GH, esto puede ocasionar problemas de salud. La deficiencia de hormona del crecimiento (insuficiente GH) y otros problemas de salud pueden ser tratados con GH sintética (producida artificialmente). A veces, la GH se usa ilegalmente para propósitos no médicos.

¿Para qué se usa la terapia con hormona del crecimiento?

La Dirección de Alimentos y Medicinas (Food and Drug Administration o FDA) de Estados Unidos ha aprobado el tratamiento con GH para enfermedades específicas. La GH sólo está disponible con receta médica en inyectable.

- En niños, la GH se usa para tratar
- la deficiencia de hormona del crecimiento
- trastornos que causan *baja estatura* (si el niño es más bajo que otros de la misma edad), tales como enfermedades renales, el síndrome de Turner y el síndrome de Prader-Willi

- En adultos, la GH se usa para tratar
- la deficiencia de hormona del crecimiento
- la pérdida de masa muscular (tejido muscular) debido al VIH
- el síndrome de intestino corto

Además de estos usos, los médicos fuera de Estados Unidos recetan la GH para

otras enfermedades. (Cuando los doctores recetan medicamentos para trastornos diferentes a los oficialmente aprobados, el proceso se denomina "uso no regulado.")

¿La hormona del crecimiento es apropiada para adultos sanos?

Se han estudiado los efectos de la GH en adultos sanos y los resultados no han sido concluyentes. Algunos estudios a corto plazo descubrieron que los adultos mayores desarrollaron musculatura, perdieron grasa corporal y aumentaron su resistencia y fuerza física. Pero otros estudios no mostraron beneficios similares. Se requieren más estudios para comprender plenamente los beneficios y riesgos del uso de la GH en adultos sanos.

Además de su uso en la investigación, recetar o consumir GH para usos no regulados es ilegal en Estados Unidos. Los adultos pueden mejorar su salud, estructura corporal, fuerza física y resistencia con una dieta saludable y ejercicio con regularidad.

¿De qué se trata el abuso de la hormona del crecimiento?

La gente a veces toma la GH ilegalmente para detener o revertir los efectos del envejecimiento o para mejorar el desempeño atlético. Algunos atletas creen que la GH por sí sola no logra los resultados deseados, de modo que la toman con esteroides anabólicos (que generan tejidos) en un esfuerzo por aumentar la musculatura y la fuerza física, y disminuir la grasa corporal. Algunos atletas también usan insulina para aumentar los efectos musculares de la GH, lo cual es peligroso, porque disminuye la glucosa en la sangre.

¿Cuáles son los riesgos del abuso de la hormona del crecimiento?

Los efectos del abuso de la GH pueden ser serios. Los efectos secundarios del uso a corto plazo son dolores en las articulaciones, dolores musculares, retención de líquidos e hinchazón en las articulaciones. Si la GH se inyecta con agujas usadas, las personas pueden exponerse al VIH, SIDA o hepatitis. Las dosis altas de GH a

largo plazo pueden provocar enfermedades cardíacas. La GH de venta ilegal puede contener ingredientes desconocidos y potencialmente nocivos. Por ejemplo, si se toma GH derivada de tejido humano, se corre el riesgo de desarrollar una enfermedad similar al síndrome de las vacas locas, la enfermedad de Creutzfeldt-Jakob, que es mortal.

Venta de hormona del crecimiento sin receta

Algunas compañías venden pastillas de GH o "sustancias liberadoras de GH," y sostienen que son sustancias "anti envejecimiento." Pero no se ha probado que éstas aumenten la producción de GH en el cuerpo ni que contrarresten el envejecimiento, aumenten la musculatura o produzcan otros beneficios. La GH no tiene efecto alguno en la forma de pastilla, porque la digestión la desactiva.

¿Qué es importante que recuerde?

- La GH sintética es segura y eficaz si se usa para las enfermedades aprobadas por la FDA.
- La GH debe ser recetada por un médico.
- El abuso de la GH puede ser muy nocivo para la salud.
- Los adultos sanos pueden mejorar su salud y condición física con dieta y ejercicio.
- Si le preocupa una probable deficiencia de GH en usted o un familiar, hable con su médico.

Recursos

Encuentre un endocrinólogo:
www.hormone.org o llame al
1-800-467-6663

La página de Internet sobre trastornos del crecimiento de la Fundación de Hormonas: www.hormone.org/Growth
MedlinePlus: www.medlineplus.gov

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Junio del 2009

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