Is human growth hormone effective in improving ovarian stimulation?

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Synthetic human growth hormone was developed in 1985 and approved by the FDA for specific uses in children and adults (1996; 2003). In children, Human Growth Hormone (HGH) injections are approved for treating short stature of unknown cause as well as poor growth due to a number of medical causes, including: Turner's syndrome, Prader-Willi syndrome, Chronic kidney insufficiency, HGH deficiency or insufficiency, children born small for gestational age, short bowel syndrome, HGH deficiency due to rare pituitary tumors or their treatment, muscle-wasting disease associated with HIV/AIDS.

Though not approved by the FDA, HGH supplementation is potentially useful in ovulation induction. Over the last decade as recombinant growth hormone has become commercially available there have been many studies looking at the effects of growth hormone on ovulation induction. Almost all of these studies administered growth hormone along with routine fertility medication during the ovulation induction cycle. Most studies used HGH doses between 4 units and 12 Units. A few studies started HGH on day 21 of the previous cycle.

A recent Cochrane review found that while HGH did not improve results in routine IVF cycles there is "some evidence of increased pregnancy and birth rates in women who are considered "poor responders" to in vitro fertilization."

Growth hormone is reported to modulate the action of FSH on follicles by up-regulating local synthesis of IGF-1. Interestingly a similar effect was noted in early experiments using DHEA with treated patients having increased IGF-1. Much of the focus on gonadotropin /IGF-1 interaction has revolved around the effects on granulosa cell cultures to increase aromatase activity, estradiol production progesterone production and LH receptor formation. However, IGF-1 also has a proposed role in stimulating early follicle development and oocyte maturation.

In July 2014 CHR began an open label randomized control trial of HGH versus no-HGH in poor prognosis patients < 45 years old with a history of two or fewer oocytes produced at a previous IVF cycle. Thus far we have randomized 15 patients to the trial, with one dropout. Since most of the physiological effects of growth hormone appear to be directed at earlier stages of follicle development, we designed our trial to expose participants to HGH for 8 weeks before beginning their ovulation induction cycle. The trial is still ongoing, but since it is an open label trial I will be able to report some of the preliminary findings.

We have also been offering HGH treatment to women who do not qualify for the trial because they are more than 44 years old. Thus far seventeen women are in this group. Together these patients begin to give us some insight into how HGH might be used to augment follicular recruitment and development.

Translational relevance: In another presentation in this conference Dr. Gleicher discussed the paradigm of expanding current infertility treatments from only the last 2 weeks into earlier stages of follicle maturation. HGH supplementation of small growing follicles in women with low ovarian reserve is an example of one modality for doing so. Supplementations of early growing follicle stages is an exciting new area for investigation.