Combined Test of Anterior Pituitary Function (1) - Arginine, TRH, GnRH, Synacthen

Test Name: Please request tests separately (CHILD THYROTROPIN STIMULATION DFT, CHILD SYNACTHEN DFT, CHILD GNRH STIMULATION TEST, CHILD ARGININE STIMULATION DFT)

Principle

Simultaneous administration of GH stimulants and hypothalamic releasing hormones GnRH and TRH does not alter the hormonal response from that seen during a specific single provocation test. When multiple pituitary hormone deficiencies are suspected, it is practical and economical to carry out as many combined tests as possible.

Indication

- Investigation of known/suspected multiple pituitary hormone disease.

Precautions

- The GnRH test cannot be performed if the child has been primed with sex steroid to stimulate GH response.

Side Effects

- Arginine may cause nausea and some irritation at the infusion site, although this is limited by the infusion over a 15-minute time period.
- Arginine may also rarely cause anaphylaxis.
- In children with suspected hypopituitarism prolonged fasting may induce hypoglycaemia. Blood glucose should be checked by POCT in these patients whenever a sample is taken.
- TRH administration can give patients the desire to urinate. It is therefore advisable to ask older children to empty their bladder before commencing the test.
- Asthmatic patients should be carefully monitored throughout the test.
- Order the TRH (protirelin) from pharmacy at least 24 hours in advance.

Preparation

- Patients should have water only for 8 hours prior to the test.

Protocol

1. Insert an indwelling 22-gauge, blue cannula. Take blood samples for growth hormone and U&E (basal t = -30). Cannulation may cause growth hormone to rise; therefore, the patient should rest for 30 min before the test is commenced.

2. Take blood samples for GH, cortisol, prolactin, TSH, fT4, LH, FSH, testosterone (boys) and oestradiol (girls) before commencing the infusion of arginine (t = 0). 4 x 2 mL samples are required.

3. Start arginine infusion. Immediately following the start of the arginine infusion (t = 0 min), check the patient's blood glucose level using a meter.

Generic	***Route***	***Dose***	***Frequency***
L-arginine monohydrochloride (10% solution in 0.9% sodium chloride)	*i.v*	*0.5g/kg body weight up to a maximum of 30g*	*Infusion over 15 mins*

4. Take blood samples for growth hormone 15, 30, 45, 60, 90 and 120 min after **the start** of the arginine infusion (i.e., 15 min sample should be taken during the arginine infusion). At each time point also check the blood glucose of the patient using a blood glucose meter.
5. TRH (protirelin), GnRH (Gonadorelin) and synacthen (Tetracosatide) are all given i.v. following the arginine infusion:

Generic	Route	Dose	Frequency
Protirelin (TRH)	*i.v (slowly over 2 minutes)*	*5 micrograms/kg (to a maximum of 200 micrograms)*	*Bolus*

Age	Generic	Route	Dose	Frequency
<1 year	Gonadorelin	*i.v*	*2.5 micrograms/kg*	*Bolus*
≥ 1 year	Gonadorelin	*i.v*	*100 micrograms*	*Bolus*

Age	Generic	Brand	Route	Dose	Frequency	Comments
<1 month	*Tetracosatide*	*Synacthen*	*i.v*	*36 micrograms/kg*	*Bolus*	
1-12 months	*Tetracosatide*	*Synacthen*	*i.v*	*125 micrograms*	*Bolus*	*Use 36 micrograms/kg for preterm babies who remain in hospital.*
>1 year	*Tetracosatide*	*Synacthen*	*i.v*	*250 micrograms*	*Bolus*	

N.B. For the combined TRH/GnRH/Synacthen omit the first part of the schedule relating to Arginine.

Time Points and samples:

		Arginine		TRH	GnRH	Synacthen	Extra Tests
Time (min) post infusions	**Blood sample**	GH	Blood glucose meter	TSH	LH/FSH	Cortisol	
-30	1.2 mL Clotted 1.2 mL LiHep	+	+				U&E
0	1.2 mL Clotted 1.2 mL LiHep	+	+	+	+	+	Prolactin, fT4, LH, FSH, Testosterone or Oestradiol
15	1.2 mL Clotted 1.2 mL LiHep	+	+				
20	1.2 mL Clotted 1.2 mL LiHep			+			
30	1.2 mL Clotted 1.2 mL LiHep	+	+		+	+	
45	1.2 mL Clotted 1.2 mL LiHep	+	+				
60	1.2 mL Clotted 1.2 mL LiHep	+	+	+	+		
90	1.2 mL Clotted 1.2 mL LiHep	+	+				
120	1.2 mL Clotted 1.2 mL LiHep	+	+				

Interpretation

As for individual stimulation tests.

References

1. Brooks C., Clayton P. & Brown R. (2005) Brook's clinical paediatric endocrinology, 5th edition. Blackwell publishing, Oxford