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| Department:     | Biochemistry                                       |              |   |
| Site            | All sites                                          | Revision No: | 4 |
| Document title: | Endocrine Dynamic Function Test Protocols - Adults |              |   |

## Mixed Meal Test for Postprandial Hypoglycaemia

### Indications

For use in patients with suspected postprandial hypoglycaemia, or in conjunction with prolonged supervised fast in patients with suspected insulinoma. A proportion of patients with insulinoma will show a positive test (approx. 6%)<sup>4</sup>.

Endocrine Society guidelines do not recommend the use of prolonged oral glucose tolerance test for the diagnosis of reactive hypoglycaemia<sup>5,6</sup>

### Contra-indications

None

### Requirements

- **ENSURE PLUS MILK SHAKE** contains 17% Protein, 29% fat and 50% carbohydrates (CHO) and the standard presentation is 220ml bottle. This will give 330Kcal (13.8g Protein, 10.8g Fat and 44.4g carbohydrates Abbott laboratories, Abbott Park, IL).
- *iv* cannula
- 10 x yellow top fluoride EDTA tubes
- 20 x brown top serum sample tubes for insulin and c-peptide
- 10% dextrose (250ml) or glucagon 1mg available for immediate administration for hypoglycaemia.
- Orange juice or Gluco juice available for treatment of hypoglycaemia

### Procedure

#### PATIENT PREPARATION

- The patient should have been on a diet containing adequate amount of carbohydrate (250g/day) for at least 3 days before the test.
- Patients should be fasted from 10pm prior to the test, water is permitted
- Avoid smoking on the day of test
- If patient is on diazoxide discontinue a week before the test. Other usual medications should be taken.

#### TEST

- Insert cannula and take blood for baseline plasma glucose at time 0
- Give mixed meal
- Take blood for glucose, insulin and c-peptide at 30, 60, 90, 120, 150, 180, 240, 270 and 300 minutes **on ice Send to the laboratory immediately after each timed collection as urgent samples.**
- Observe patient for symptoms and/or signs of hypoglycaemia. Avoid symptomatic treatment if possible, until the test is completed.
- If the laboratory glucose level is found to be <2.2 mmol/L or the patient shows severe symptoms/ signs of hypoglycaemia then carbohydrate should be given or 250ml 10% dextrose IV or 1mg Glucagon IM/IV/SC, see Trust policy on treatment of hypoglycaemia in adults, and the fast should be stopped.

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| Minutes | Procedure                                             | Samples                                                |
|---------|-------------------------------------------------------|--------------------------------------------------------|
| 0       | Take sample for <b>glucose</b>                        | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 0       | <b>Give mixed meal Ensure Plus</b>                    |                                                        |
| 30      | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 60      | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 90      | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 120     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 150     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 180     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 240     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 270     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |
| 300     | Take sample for <b>glucose, insulin and c-peptide</b> | 1 x yellow top fluoride EDTA, 2 x brown top serum tube |

### Interpretation of results

- A laboratory glucose result  $<3$  mmol/L is consistent with reactive hypoglycaemia and requires follow up.
- NB** Insulin and c-peptide samples will only be analysed when laboratory glucose  $<3$  mmol/L

There is no consensus on the threshold of hypoglycaemia required for diagnosing reactive hypoglycaemia on a mixed meal test. In practice, the interpretation of the test results is the same as when the tests are done during a spontaneous episode of hypoglycemia or during a 72-hour fast. Therefore inducing symptoms consistent with hypoglycaemia in the presence of a low glucose (usually below 3.0 mmol/L), would constitute a positive test finding.

### References

<sup>4</sup>Placzkowski KA, et al 2009 Secular trends in the presentation and management of functioning insulinoma at the Mayo Clinic, 1987-2007. *J Clin Endocrinol Metab* 94(4): 1069-73

<sup>5</sup>Cryer PE, Axelrod L, Grossman AB, Heller SR, Montori VM, Seaquist ER, Service FJ 2009 Evaluation and Management of Adult Hypoglycemic Disorders: And Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab* 94(3): 709-728

<sup>6</sup>Hogan MJ, Service FJ, Sharbrough FW, Gerich JE 1983 Oral glucose tolerance test compared with a mixed meal in the diagnosis of reactive hypoglycemia. A caveat on stimulation. *Mayo Clin Proc* 58:491-496

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