

A thin 46 year old with a 7 year history of type 2 diabetes requiring insulin has been having difficulty adjusting glargine insulin to achieve fasting plasma glucose levels consistently less than 130 mg/dl, while trying to avoid overnight episodes of hypoglycemia. He is currently injecting 18 units of glargine at bedtime, and takes repaglinide 2 mg before meals, and metformin 1000 mg daily. He is resistant to going on 2 injections of insulin per day. You discuss with him the potential future option of using an ultra-long acting basal insulin, which might provide 24-hour coverage with one daily injection.

Concerns have been raised regarding ultra long-acting insulin preparations. What is the main determinant of the duration of biologic activity following an injection of insulin?

- a) **Insulin adsorption from the subcutaneous depot**
- b) Duration of insulin residence on the insulin receptor
- c) Insulin clearance following receptor activation
- d) Renal function

An ultra-long acting basal insulin with a duration of biologic action of over 40 hours will necessarily be associated with which of the following?

- a) Greater risk of stacking and subsequent hypoglycemia
- b) Greater peaks and troughs (variability) over a 24-hour period
- c) More effective lowering of A1C
- d) **More consistent biologic activity over a 24-hour period**

Which of the following is used as a “stabilizer” to facilitate formation of hexamers when insulin is in solution (prior to subcutaneous administration)?

- a) Phenol
- b) **Zinc**
- c) Glycine
- d) Ethylene glycol