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Working

U Mass - Hyperglycemic clamp [↗](#)

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ABSTRACT

Summary:

Hyperglycemic clamp measures insulin secretion and pancreatic β -cell function in awake mice. Islet function is affected by obesity and insulin resistance, and abnormal islet function predisposes to the development of type 2 diabetes.

EXTERNAL LINK

<https://mmpc.org/shared/document.aspx?id=139&docType=Protocol>

MATERIALS

NAME	CATALOG #	VENDOR	CAS NUMBER	RRID
20 % Dextrose injection USP	NDC0409-7935-19	Hospira(Pfizer)		

MATERIALS TEXT

Note:

Hospira [RRID:SCR_003985](#)

- 1 Survival surgery is performed to establish a chronic indwelling catheter at 5~6 days prior to experiment for intravenous infusion. (refer to M1023: Surgery-jugular vein cannulation)
- 2 Mice are fasted overnight (~15 hours) or for 5 hours prior to the start of experiment.
- 3 Place a mouse in a rat-size restrainer with its tail tape-tethered at one end.
- 4 Expose and flush the intravenous catheter using saline solution. Then, connect the catheter to the CMA Microdialysis infusion pump.
- 5 Collect plasma sample (20 μ l) before the start of infusion (basal-0 min) to measure basal glucose and insulin levels.
- 6 Start infusion of 20% dextrose to quickly reach a target hyperglycemia (~300 mg/dl glucose level) and maintain hyperglycemia by adjusting glucose infusion rates.

- 7 Collect plasma samples (10 μ l each) at 10, 20, 30, 45, 60, 90, and 120 min to measure glucose levels. Adjust glucose infusion rates based on instantaneous glucose levels to maintain at target hyperglycemia.
- 8 Collect additional plasma samples (10 μ l each) at 10, 20, 30, 45, 60, 90, and 120 min to measure insulin concentrations.
- 9 At the end of experiment, mice are euthanized, and pancreas may be collected for further studies.
- 10 For data analysis, plasma insulin concentrations may be plotted during the 120-min hyperglycemic clamp experiment, and area-under-curve may be calculated. Area-undercurve of insulin levels during hyperglycemic clamps may be directly correlated with insulin secretion and pancreatic β -cell function assuming there are no effects on insulin clearance rates.
- 11 Additional plasma samples may be collected to measure serum c-peptide concentrations which may further reflect glucose-induced insulin secretion and pancreatic β -cell function in awake mice.



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