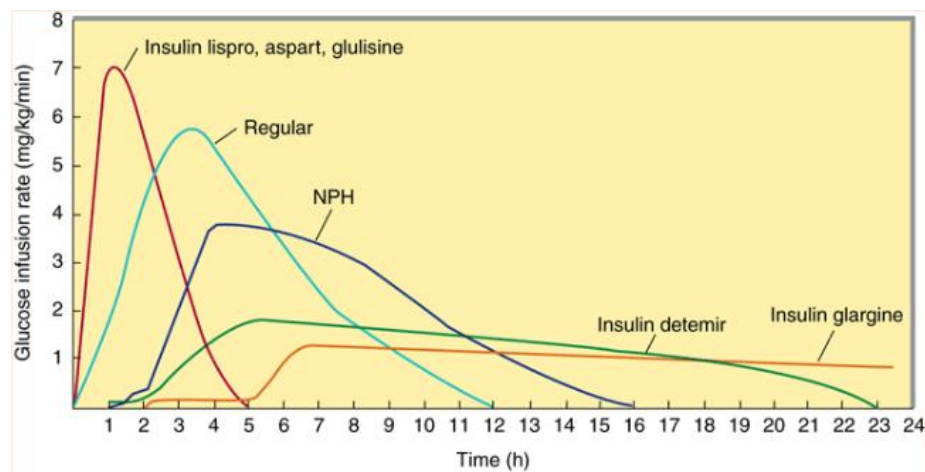




## Unit IV – Problem 1 – Pharmacology: Insulin Therapy

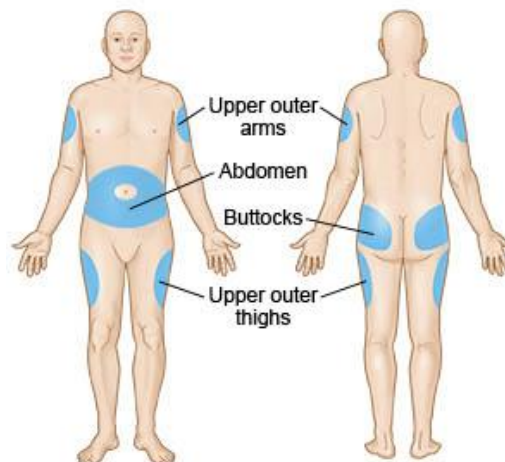
- What are the goals behind treatment of type-1 diabetes?
  - To achieve euglycemia (normal level of blood sugar).
  - To prevent organ damage which occurs as a complication of diabetes.
- Insulin is classified according to their onset and duration of action:

<b>Rapid-acting (Drugs of choice)</b>	<ul style="list-style-type: none"> <li>• <b>Examples:</b> lispro, aspart and glulisine.</li> <li>• Injected immediately before food.</li> </ul>
<b>Long-acting (Drugs of choice)</b>	<ul style="list-style-type: none"> <li>• <b>Examples:</b> glargine and detemir</li> <li>• Always injected in fixed doses at fixed time (e.g. one injection at bed time to maintain blood glucose level for 24 hours).</li> </ul>
<b>Intermediate-acting (2<sup>nd</sup> line drugs)</b>	<ul style="list-style-type: none"> <li>• <b>Example:</b> NPH and lente insulins.</li> <li>• Injected 1-4 times daily at fixed dose and time.</li> </ul>
<b>Short-acting (2<sup>nd</sup> line drugs)</b>	<ul style="list-style-type: none"> <li>• <b>Example:</b> Regular (soluble or crystalline) insulin.</li> <li>• Injected 2-3 times daily, 30-45 minutes before food.</li> <li>• It is the only insulin which is available as IV for management of diabetic ketoacidosis</li> </ul>



- Routes of injection:
  - Insulins are injected subcutaneously by insulin pen or insulin pump (except regular insulin which can be given as IV as mentioned above). **Sites of injection:** shoulders, abdomen and medial aspect of the thigh.

Insulin Injection Sites





- **Insulin regimens:** notice that in all types of regimens there is a rapid-acting insulin used for short-term control (at meals) + long-acting insulin used as a background cover. There are two types of insulin regimens:
  - **Intensive regimen:**
    - ✓ Based on blood glucose level and carbohydrate content of a meal. Dose is calculated as the following:
      - ❖ 1 unit of insulin for each 10g of carbohydrate in the meal.
      - ❖ 1 unit of insulin for every 50 mg/dL above the glucose target (which is 100 mg/dL).
  - **Conventional regimen:**
    - ✓ In this regimen, the carbohydrate content of a meal is not measured. Therefore, the patient has to eat at the same time everyday with the same amount of carbohydrate in food.
- **Complications of insulin therapy**
  - **Hypoglycemia:**
    - ✓ It results in:
      - ❖ Sweating.
      - ❖ Tachycardia.
      - ❖ Seizures.
    - ✓ How to treat hypoglycemia?
      - ❖ If mild: sweet drink.
      - ❖ If severe: IV dextrose or IM glucagon.
  - Insulin allergy.
  - Insulin resistance.
  - Lipodystrophy/scarring of skin (image below).
  - Weight gain (especially in type-2 diabetes).



- **Principles of management of Diabetic Ketoacidosis (DKA):**
  - **Correction of dehydration:** IV saline infusion.
  - **Restoration of euglycemia:** IV bolus insulin, followed by infusion.
  - **Correction of hypokalemia:** IV KCl (if necessary).
  - **Correction of acidosis:** usually not required.
  - **Treat underlying cause:** treat infection with appropriate antibiotics.