### Rapid Acting

**Insulin lispro** (Humalog)
- Source: Recombinant DNA tech and analog
- Onset: 0.25+ hrs
- Peak: <0.75 - 2.5 hrs
- Duration: 3.5 - 5 hrs

**Insulin aspart** (NovoRapid)
- Source: Recombinant DNA tech and analog
- Onset: 0.5 - 1 hrs
- Peak: 2 - 5 hrs
- Duration: 5 - 8 hrs

**Short-acting or Regular Insulin**

**Humulin R**
- Source: Recombinant DNA tech and Human
- Onset: 0.5 - 1 hrs
- Peak: 2 - 5 hrs
- Duration: 5 - 8 hrs

**Novolin ge Toronto**

### Intermediate-acting or NPH

**Humulin N**
- Source: Recombinant DNA tech and Human
- Onset: 1 - 2 hrs
- Peak: 4 - 12 hrs
- Duration: 14 - 18 hrs (range 12-24)

**Iletin II NPH**

### Premixed

**Humulin**
- Forms: v, c
- Source: Recombinant DNA tech and Human
- Onset: 0.5 - 1 hrs
- Peak: 2 - 12 hrs
- Duration: 14 - 18 hrs (range 12-24)

**Novolin GE**
- Forms: v, p
- Source: Recombinant DNA tech and Human
- Onset: 0.5 - 1 hrs
- Peak: 2 - 12 hrs
- Duration: 14 - 18 hrs (range 12-24)

**Humalog**
- Forms: Mix25
- Source: Recombinant DNA tech and analog
- Onset: 0.5 - 1 hrs
- Peak: 2 - 12 hrs
- Duration: 14 - 18 hrs (range 12-24)

### Intermediate-acting or Lente

**Humulin L**
- Source: Recombinant DNA tech and Human
- Onset: 2-4 hrs
- Peak: 7-15 hrs
- Duration: 12-24 hrs

**Iletin II Lente**

### Long-acting or Ultra Lente

**Humulin U**
- Source: Recombinant DNA tech and Human
- Onset: 3-4 hrs
- Peak: 8-24 hrs
- Duration: 24-28 hrs

**Novolin ge UltraLente**
- Source: Recombinant DNA tech and Human
- Onset: 3-4 hrs
- Peak: 8-24 hrs
- Duration: 24-28 hrs

### Insulin Glargine (Lantus)
- Source: Recombinant DNA tech and analog
- Onset: >1.5 hrs
- Peak: No Peak
- Duration: >20 hrs

## Dosing
- **Rapid Acting**
  - **Insulin lispro** (Humalog)
  - **Insulin aspart** (NovoRapid)
- **Short-acting or Regular Insulin**
  - **Humulin R**
  - **Novolin ge Toronto**
- **Intermediate-acting or NPH**
  - **Humulin N**
  - **Iletin II NPH**
- **Premixed**
  - **Humulin**
  - **Novolin GE**
  - **Humalog**
- **Intermediate-acting or Lente**
  - **Humulin L**
  - **Iletin II Lente**
- **Long-acting or Ultra Lente**
  - **Humulin U**
  - **Novolin ge UltraLente**
- **Insulin Glargine (Lantus)**

### Mixing
- **Compatibility**
  - **Regular with all insulins**
  - **NPH with Regular**
  - **Lente/Ultralente with Regular**
  - **Lispro with NPH, UltraLente**

### Hypoglycemia
- **Symptoms**
  - **Mild/moderate** = sweating, tremor, tachycardia, hunger, lethargy, weakness
  - **Severe** = confusion, disorientation, altered behavior/speech, seizures, coma

### Other Side Effects
- **Weight gain**
  - Greater in intensive vs conventional
  - Encourage diet & exercise to minimize

### SC Variability
- **Onset/Peak/duration** for SC insulins is highly variable between patients and even at different times for the same patient; the longer acting the insulin, the greater the variability seen (e.g. +/- 15% with Reg; +/- 30% with NPH)

### Supplement Dosing
- **Rapid or short acting insulin used to correct hyperglycemia**
  - Often given with prandial insulin dose
  - Conservative dose:
    - Type 1 DM: 1 U per 2.7mmol/L above target BG
    - Type 2 DM: 1 U per 1.7mmol/L above target BG (caution if <3 hours since previous insulin, or if planning exercise soon after, etc.)

### Insulin Regimens

#### Conventional Regimens
- **OD insulin**
  - N or L before breakfast
  - Simple but generally poor control (e.g. meal related hyperglycemia) <24hr coverage
- **BID insulin**
  - N or L before breakfast & supper
  - Improved morning control & overnight coverage; no provision for meal coverage
  - Most common; better meal control
  - U more likely to last till next morning
  - Most likely to last till next morning

#### Multidose Intensive Regimens (MDI)
- **R or H/A TID ac**
  - N, L or U ac supper or hs
  - Good control, flexible regarding meals; demands frequent & consistent testing at start
- **R or H/A TID ac**
  - N, L or U BID (ac breakfast & supper or bedtime)
  - Better suited for people with varying schedules; flexibility with regards to meals

#### Intensive Continuous SC Infusion (CSII)
- **R or H/A basal and boluses prn**
  - More flexible & better control; ↑ $; ↑ risk of rapid ketoacidosis, etc upon d/c

#### Insulin + Oral Hypoglycemics
- **Common: N or U at bedtime with 1-2 oral agents during day**
  - Less insulin requirement ~0.1u/kg & weight gain than insulin alone (esp. Metformin!)
10. American Diabetes Association: Clinical Practice Recommendations 2003, Diabetes Care 2003 26:Supplement 1