

Insulin Therapy in Diabetes

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Insulin Therapy

- First discovered in 1921 by Banting and colleagues
- First used as a treatment in 1922
- Required several injections a day – as had a short duration period
- Given through re-useable glass syringes with large and often blunt needles



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Insulin in Type 1 diabetes

- Usually multiple daily injection (MDI)
- Often analogue insulins
- Adjustment often based on carbohydrate counting and ratios
- Insulin requirement usually approximately $\frac{1}{2}$ -1unit per kg in weight
- Split approximately 50% basal/50% bolus

Why use Insulin in Type 2?

- UKPDS – Type 2 is a progressive disorder¹
- Beta cell function may be reduced by 50% at diagnosis. Decline continues regardless of therapy²
- 80% of people with Type 2 are obese with a BMI greater than 30Kg/m²

- 1 UKPDS (49). JAMA (1999). 281(21): 2005-12
- 2 Williams G & Pickup JC. (2004). Handbook of Diabetes, 3rd Ed. Pp 63 & 59

National Service Framework for Diabetes 2001

- Effective management of the condition increases life expectancy and reduces the risk of complications
- Improving BG control reduces the risk of developing microvascular complications
- Improving BG control may reduce the risk of developing cardiovascular disease³
- DH. (2001). NSF for Diabetes: Standards. Pages 6 and 26.

Who would you consider for Insulin?

- Those with Type 2 who have poor control despite being on maximum oral or injectable treatment and improved lifestyle
- Those with Type 2 where other diabetes treatments are contraindicated i.e. renal impairment
- Those with Type 2 unable to tolerate other diabetes treatments due to side effects

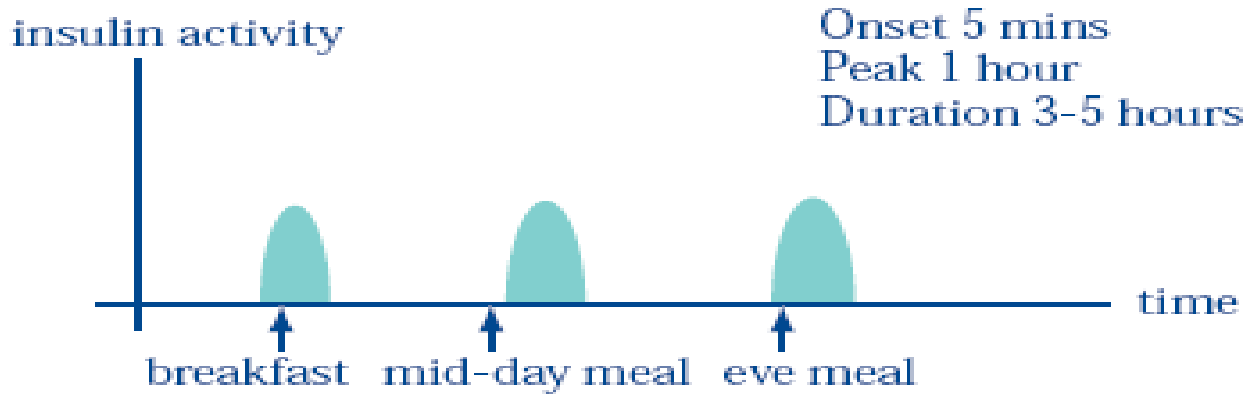
Who would you consider for Insulin? (2)

- Gestational diabetes
- Those with Type 2 after an acute MI
- Some people with Type 2 with acute illness or infection
- Those with Type 2 who go on to oral steroids and the OHA's are not managing blood glucose control

What are the different types of insulin

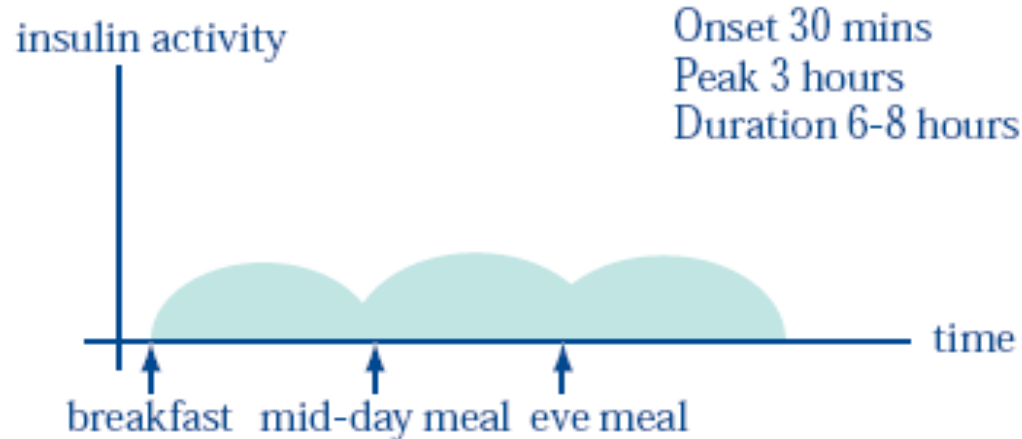
- Rapid Acting
- Short Acting
- Intermediate Acting
- Long Acting
- Mixed Insulin

Rapid Acting Insulin



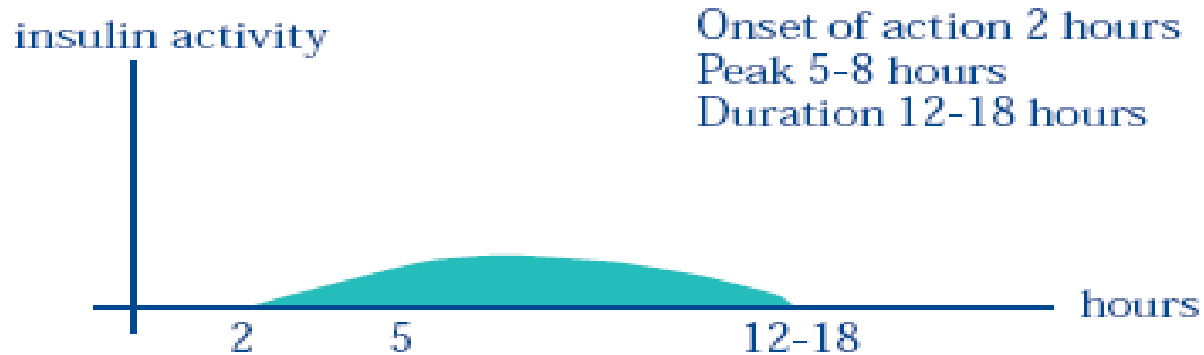
- Onset 5 - 15 minutes
- Peak 1-2 hours
- Duration 3-5 hours
- Can be injected immediately before meals or up to 15 minutes after
- Used pre-meals with intermediate or long acting background insulin
- (basal bolus therapy)

Short Acting Insulin



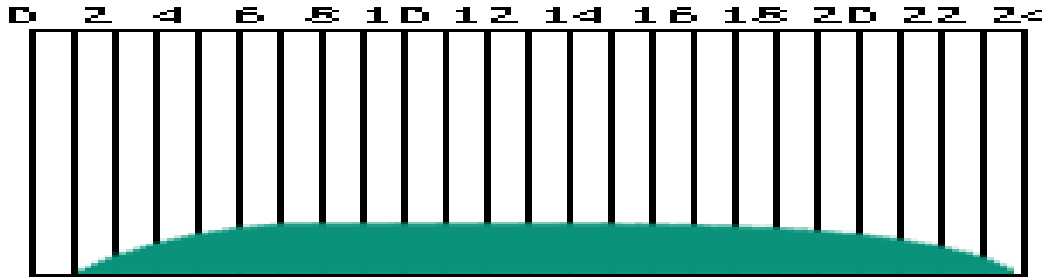
- Onset 30 - 45 minutes
- Peaks 2 - 4 hours
- Duration 6 - 8 hours
- Often used pre meals combined with intermediate or long acting
- background insulin (basal bolus) or in a ‘free-mix’

Intermediate Acting Insulin



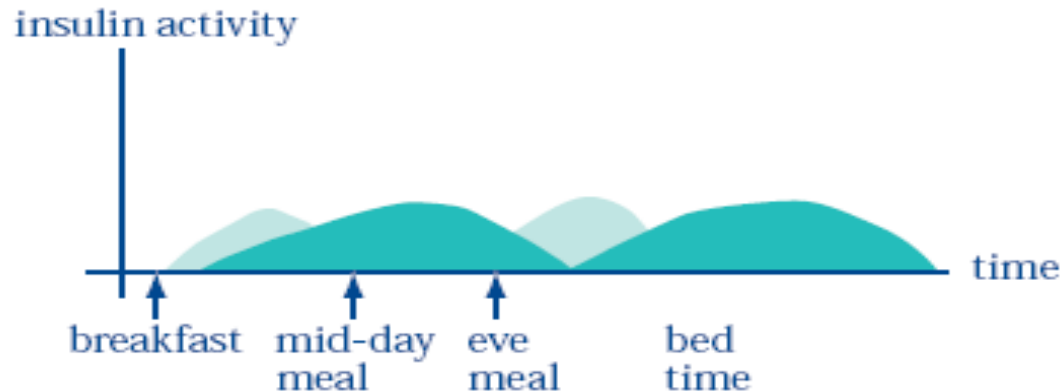
- Onset 2 - 4 hours
- Peak 4 - 8
- Duration 10 - 16 hours
- Can be used daily/ twice daily on its own or in combination with
- analogue or short acting insulin

Long Acting Analogues



- Onset 2 hours
- Peak none
- Duration 18 - 24 hours once daily or once/twice daily
- Less variation in absorption than NPH
- Level profile with no peaks

Mixed Insulin



- Premixed short acting and intermediate insulin e.g. Humulin M3 or Insuman Combi 50
- Or analogue insulin combined with intermediate acting insulin e.g. Humalog Mix 25 or NovoMix 30
- Generally used twice daily
- Suits people with regular lifestyle pattern
- Mixtures - not re-suspending alters mix

Insulin in combination therapy

- Metformin (with any insulin) – helps to minimise weight gain
- Gliclazide – will need to be gradually decreased once insulin started and in the majority of cases will be discontinued
- Glitazones – although Pioglitazone licensed with insulin usually discontinued

Insulin in combination therapy

- Gliptins – licensed to be used as triple therapy with insulin and metformin but can be stopped depending on control achieved
- GLP-1 agonists:-
 - Licensed with basal insulin only
- SGLT2 – licensed for use with insulin

Insulin in combination therapy

All combinations need to be reconsidered and stopped if not having desired effect apart from Metformin

What we know

- There are different types of insulin
- There are different people with variable lifestyles i.e work shift patterns, irregular eating patterns etc
- Some may have special needs i.e. visual problems, dexterity problems etc
- Some may have other concerns i.e. job loss, weight an issue and number of injections per day etc

What we know

- Insulin initiation is NOT a science but an art – working with what you know about the persons lifestyle their blood glucose readings and very importantly - what they want
- It's about individualised care

Common Pitfalls

- Injection sites
- Needle length
- Time of insulin administration
- Storage
- Under/Over titration
- Omitting insulin due to blood glucose results



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New Insulins

- A Biosimilar Insulin is defined as a copy of a biological molecule that is already approved. <http://www.medscape.com/viewarticle/831441>
- Biosimilar rather than a generic version can't be said to be identical to the original. This is because tiny changes in the structure of the product and in the manufacturing process can change the way the drug works.
- ABASAGLAR (Insulin Glargine by Lilly) – 1st Biosimilar Insulin to market

High Strength Insulins

Insulin Glargine

- Lantus 100units/mL
- Abasaglar 100units/mL
- Toujeo U300 300units/mL

Degludec

- Tresiba 100/200units/mL

Case Study 1

- 56 yr Male
- BMI 27
- T2DM 10yrs
- HbA1c 60mmol/mol Next steps?
- Renal – >90

- Metformin 500mg bd
- Gliclazide 80mg 2 bd
- Saxagliptin 5mg od

Case Study 2

- 68 yr male
- BMI 29
- T2DM 15yrs
- Hba1c 75mmol/mol
- eGFR 73
- What next?
- Metformin 1g bd
- Gliclazide 160mg bd
- Lixisenatide 20mcg od

References

1. UKPDS (49). JAMA (1999). 281(21): 2005-12
2. Williams G & Pickup JC. (2004). Handbook of Diabetes, 3rd Ed. Pp 63 & 59
3. DH. (2001). NSF for Diabetes: Standards. Pages 6 and 26.