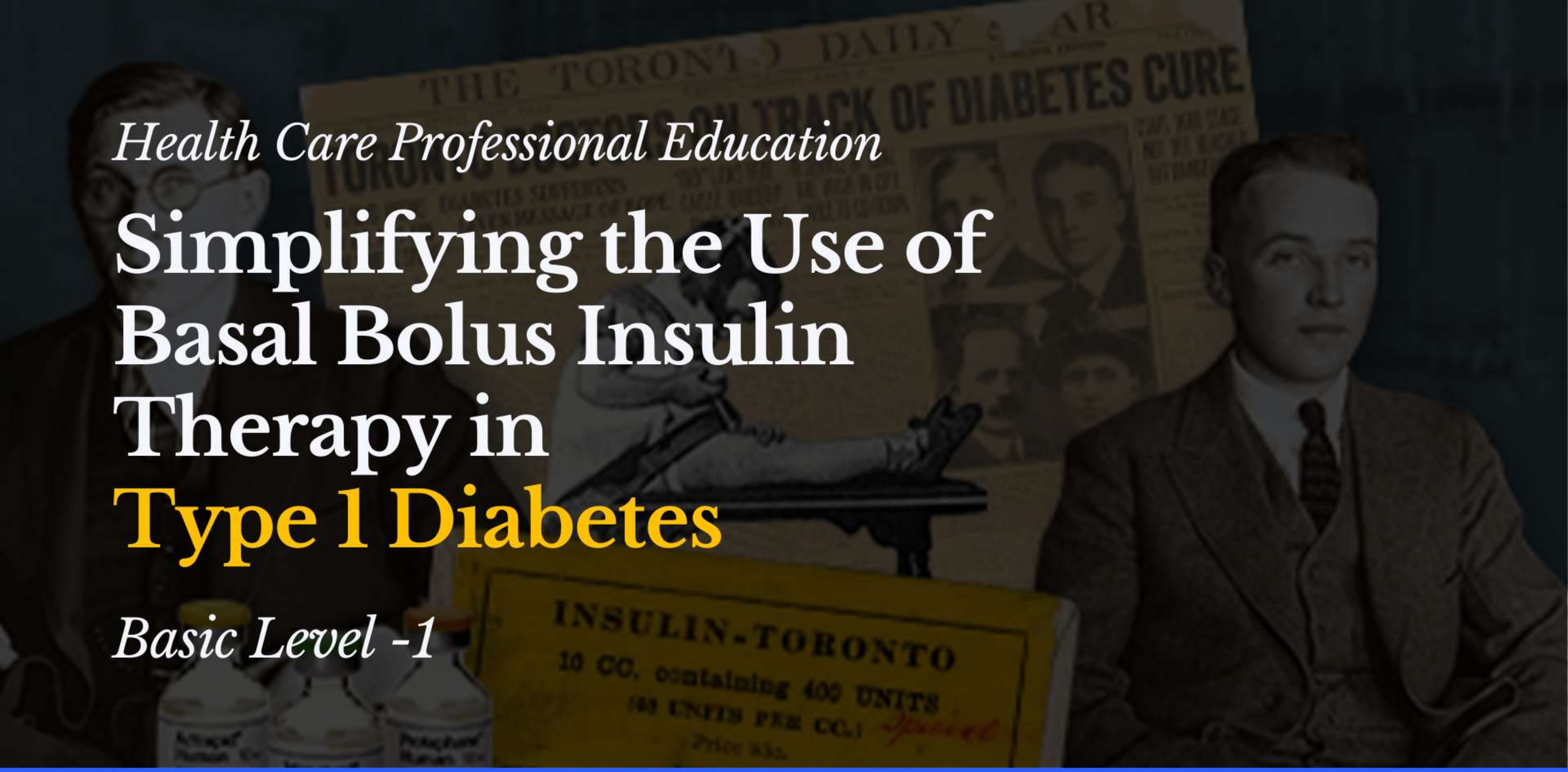


Health Care Professional Education

Simplifying the Use of Basal Bolus Insulin Therapy in Type 1 Diabetes

Basic Level -1

INDIA

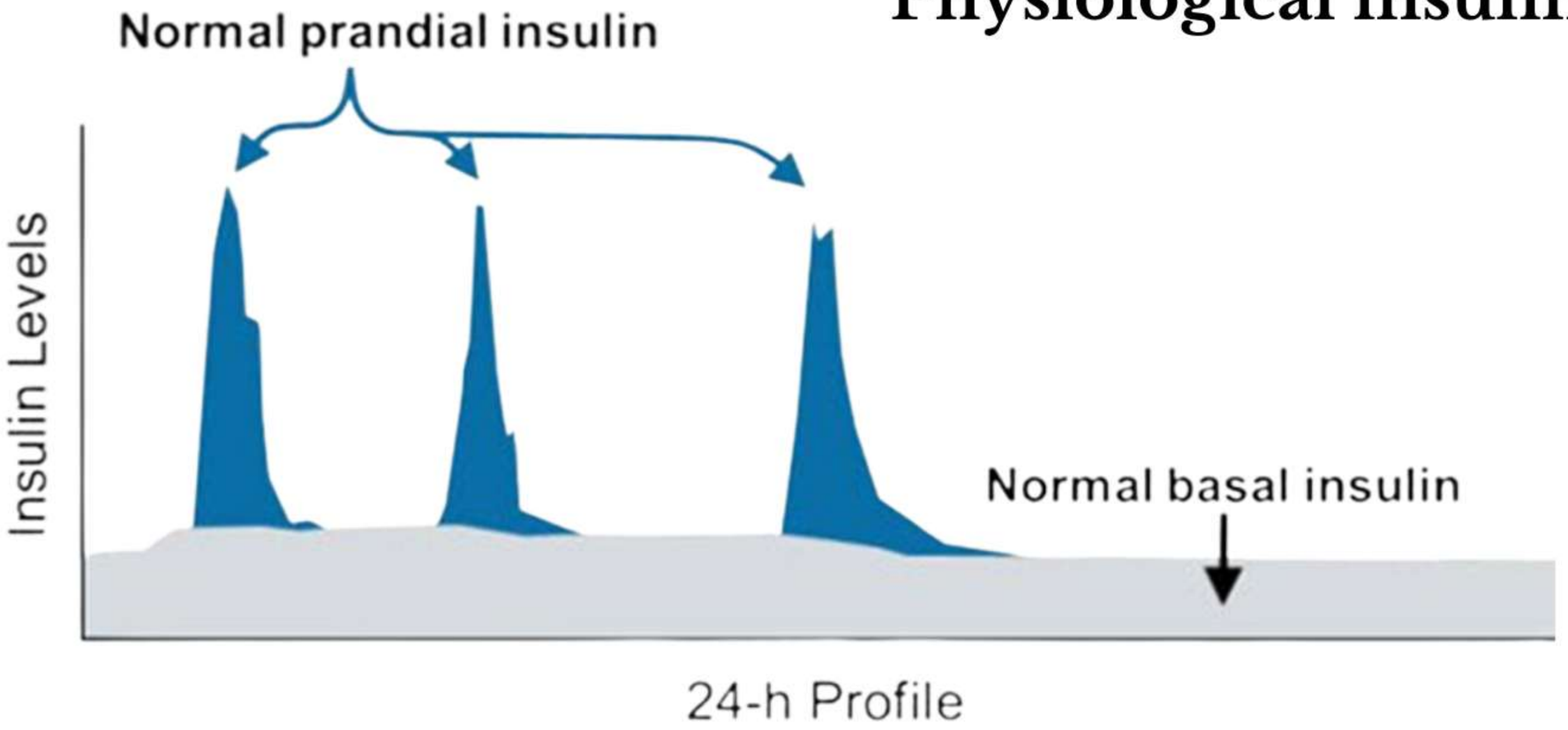
Objective of this talk is to familiarise HCPs with the basics of Basal Bolus insulin therapy in Type 1 Diabetes and how to initiate or convert from Premixed regime.

Understanding Insulin need in Type 1 Diabetes

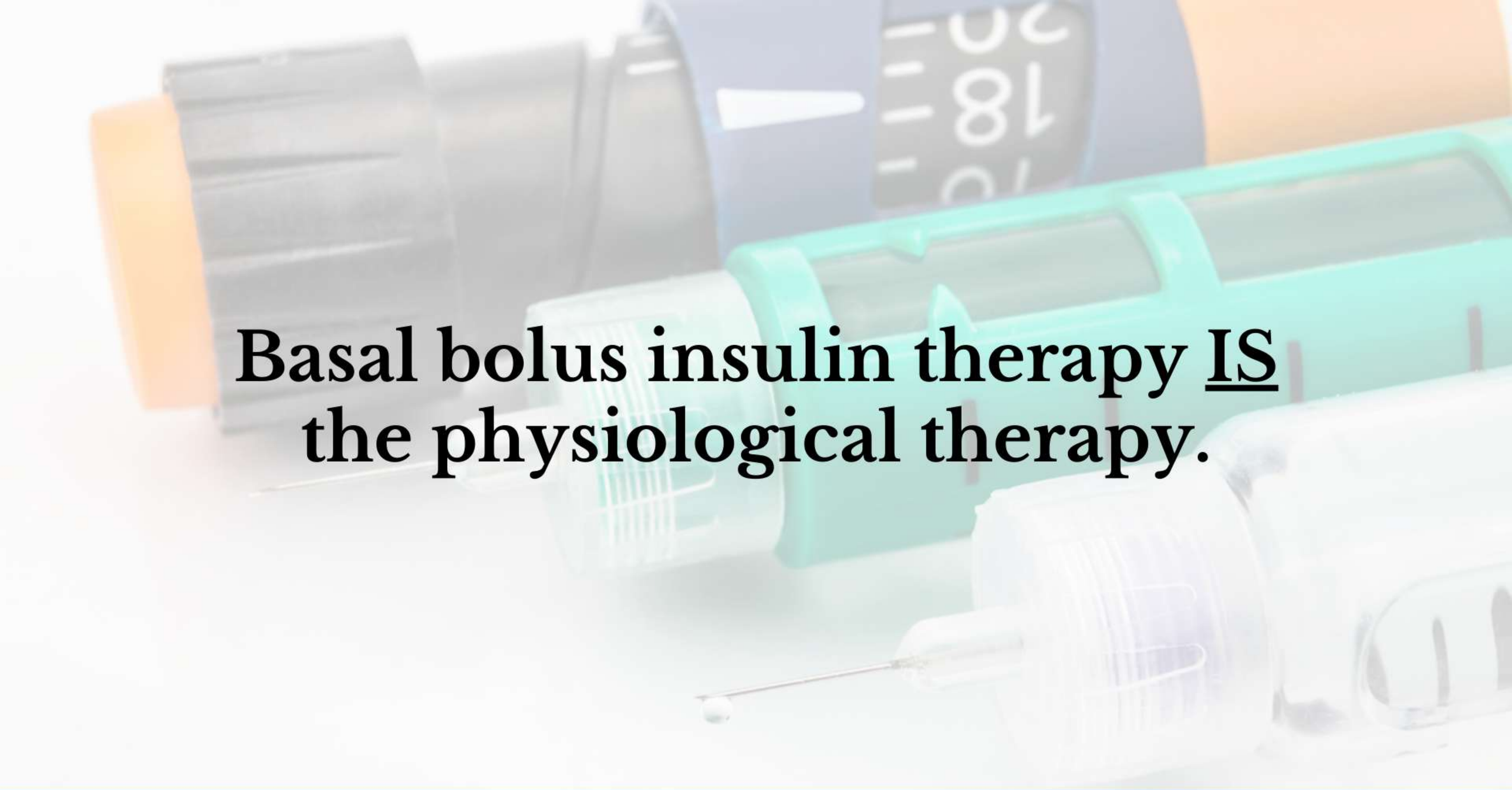
A person with Type 1 Diabetes has **NO** insulin production

The aim of treatment is **Physiological** insulin replacement

Physiological insulin production



Basal insulin is secreted 24 hours a day



Basal bolus insulin therapy IS the physiological therapy.

Basal component

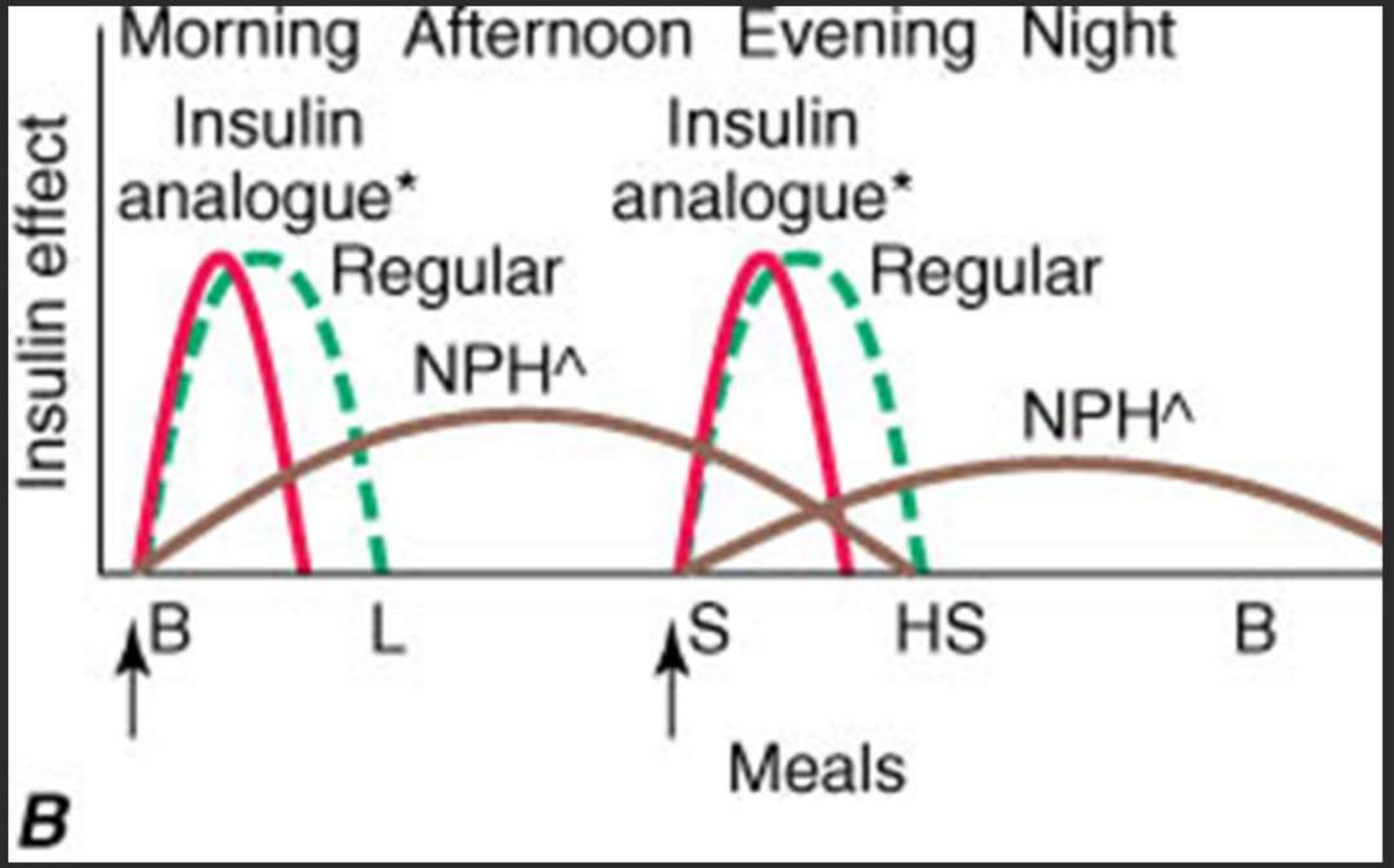
- A long-acting almost peak less insulin , usually given once a day .
  - This is not related to meal intake and covers nighttime, fasting blood sugar and premeal levels.
  - Usually 35~50% of daily needs

Bolus component

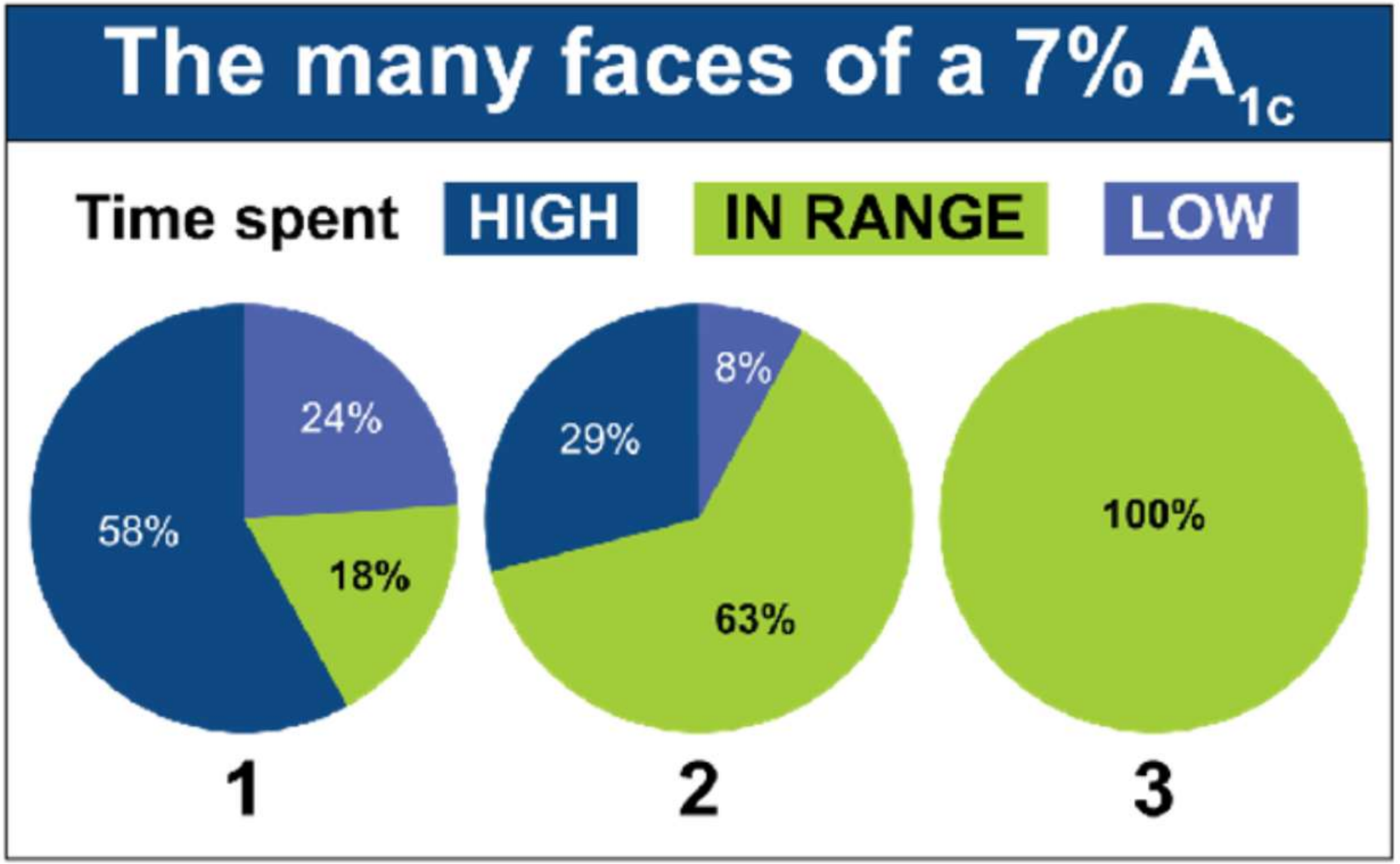
- Also called prandial or mealtime insulin. Limits hyperglycemia after meals , the peak action depends on type of bolus used.
  - 10% to 20% of total daily insulin requirement at each meal
  - Also used for correction bolus

NO Premixed in Type 1 Diabetes

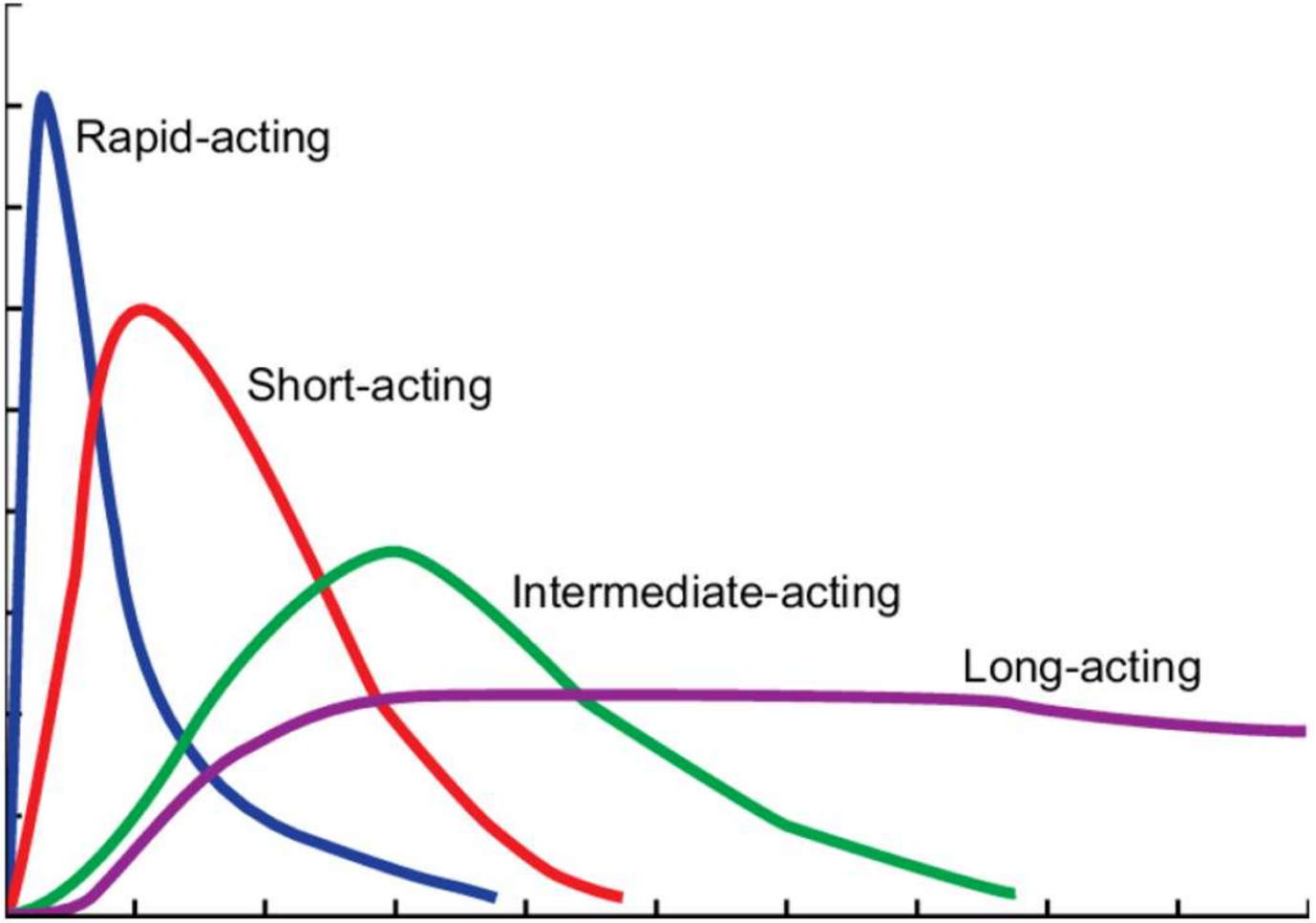
Do not get mislead by seemingly normal readings such as an HbA1C of 7 %



Glycemic Variability

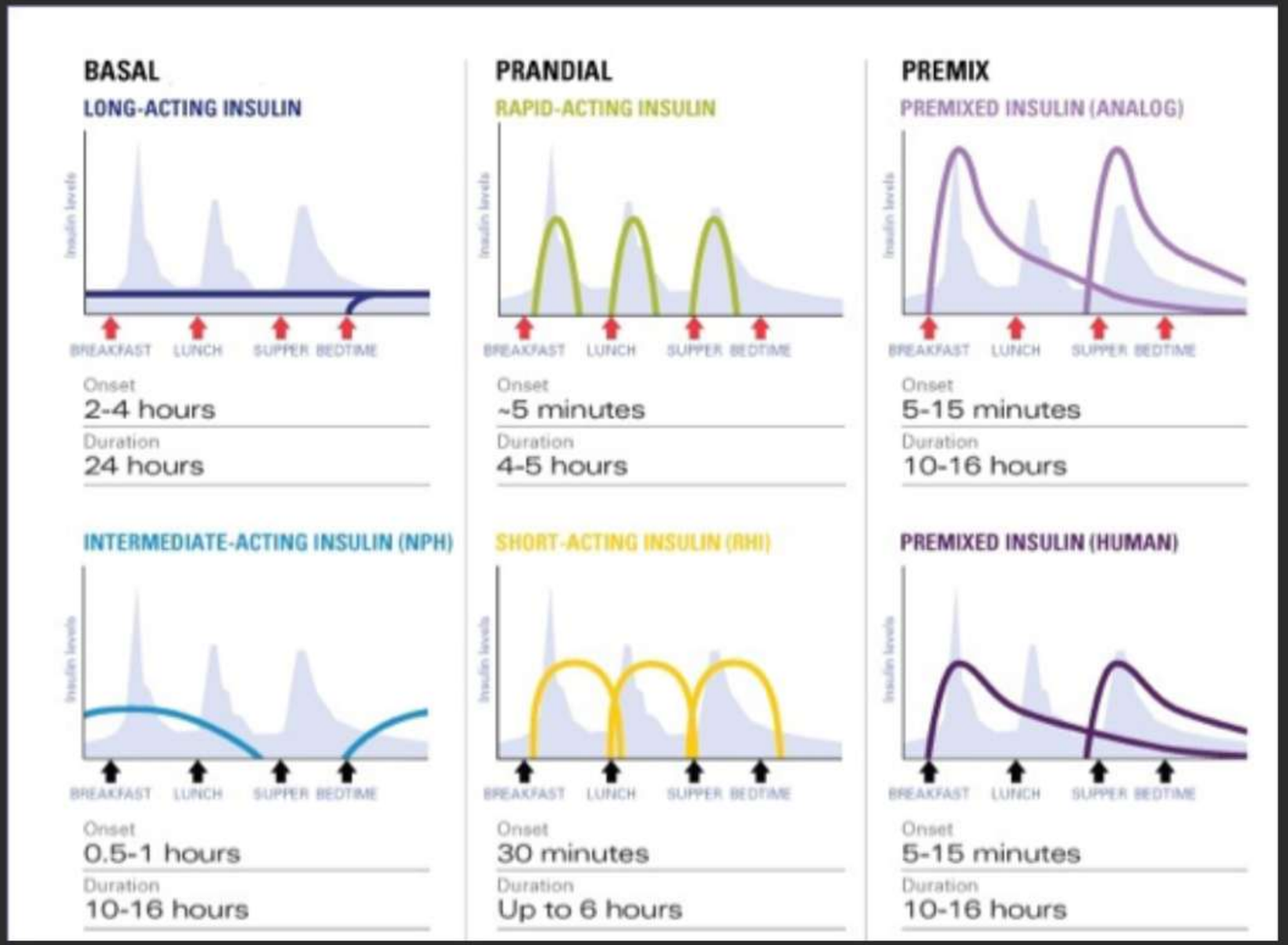


We know available insulins differ in their action profiles



Available insulin with action profiles

Know the insulin
- Understand its onset
- Understand its duration
- Know its peak action time
- Know its cost
- Know its availability



Apply as per need.

Meal Timing

Sleep/Wake pattern

Activity/ Exercise pattern

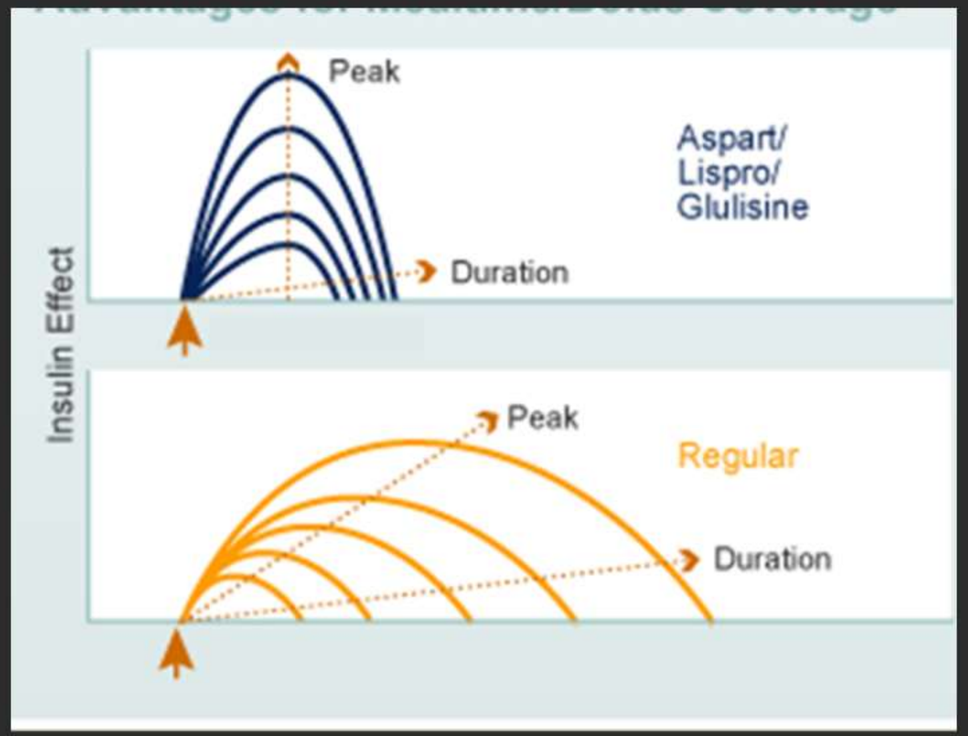
Carbohydrate Intake

Budget

Aim is to replace insulin physiologically

The Bolus Insulins

Regular, Aspart, Lispro, Gluisine, F Aspart



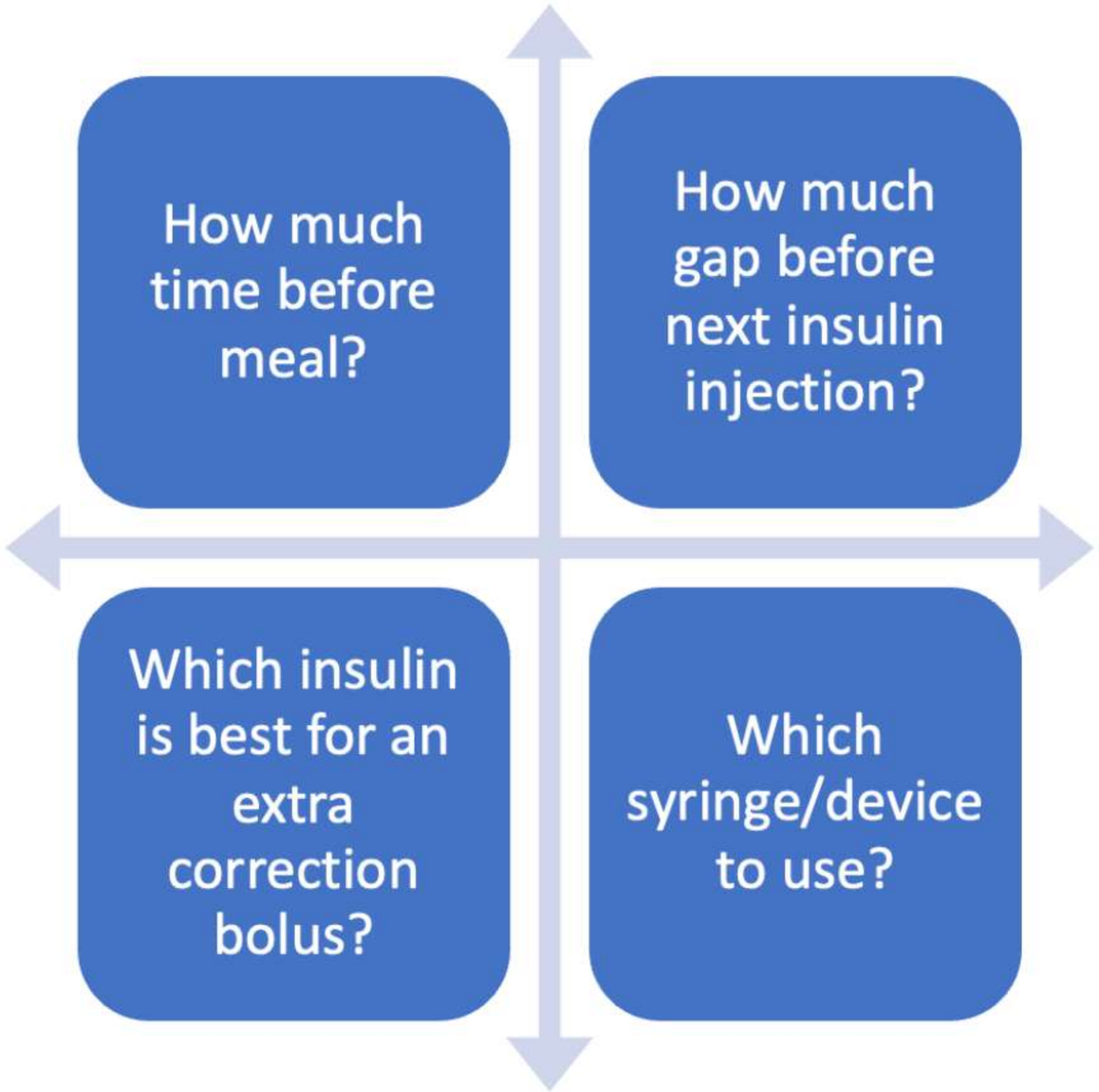
Rapid Acting Insulin Analogs - Advantage for Mealtime/Bolus Coverage

- Advantages over Regular Human Insulin
  - Rapid Onset
  - 1 hour peak action
  - Limited duration

  - More like normal non-diabetic state
  - Less low blood sugar
  - More Convenient

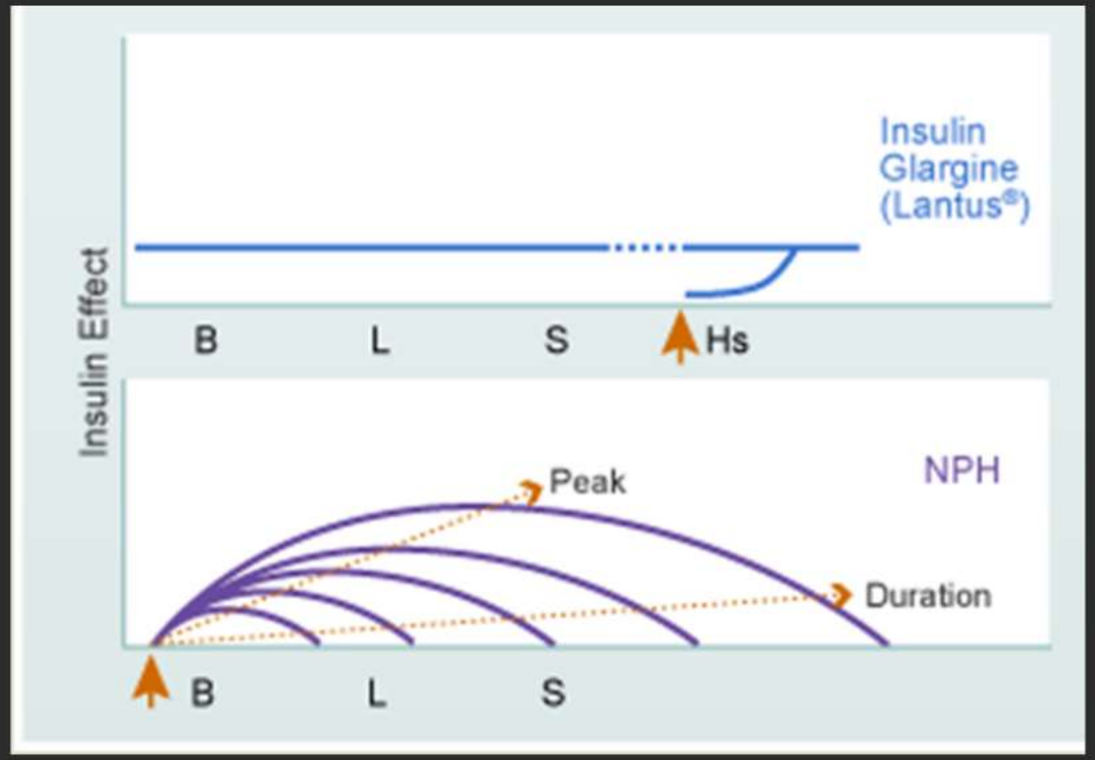
Apply as per need

(Target prandial levels)



The Basal Insulins

NPH, Detemir, Glargine U100, Glargine U300, Degludec



Advantages over NPH:

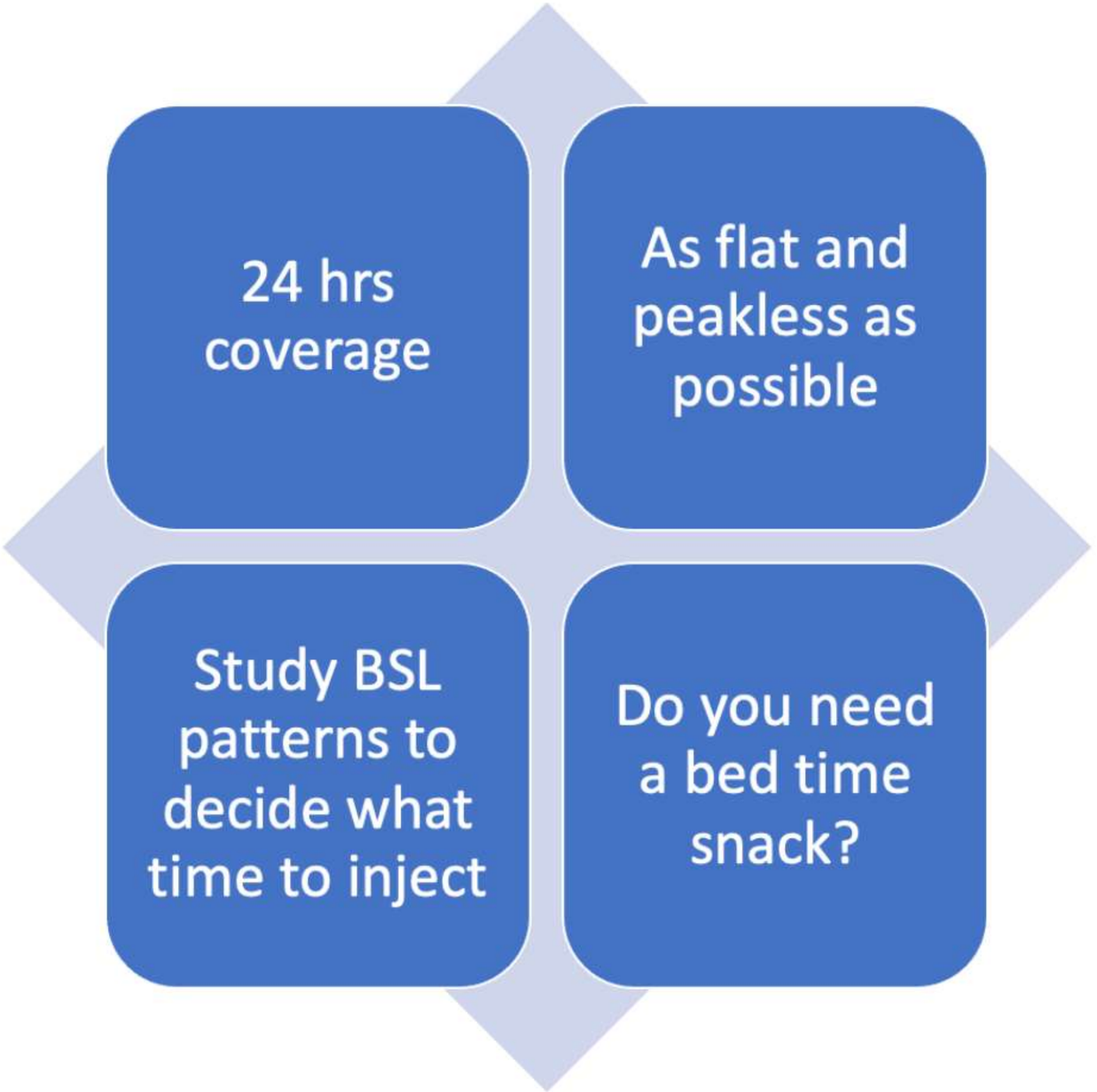
- Peakless low insulin levels
- Soluble
- 24 hour duration

↓

- More like normal non-diabetic state
- Less low blood sugar
- More predictable/reproducible action
- More Convenient

Apply as per need

(Target fasting and premeal levels)



Initiating basal bolus insulin for the first time [insulin naïve]

•Prepubertal children usually require 0.7 to 1.0 IU/kg/day and during puberty, insulin dose requirements may rise to between 1 and 2 IU/kg/day.

•Initial requirement may also be high if detected with infection and or DKA

•The basal insulin may represent between 30% and 50% of total daily insulin

•The rest of the dose is divided into boluses before each meal[3-4 doses]

CASE 1

A pre pubertal girl of 10 years of age weighing 28 kgwas investigated for weight loss and polyurea and found to have Type1Diabetes. Basal Bolus Insulin Therapy is to be initiated.

The total daily dose as per body weight 0.7 of 28 = 19.6 so 20 units TDD

40% of this 20 units = 8 units as Basal dose [Glargine @ 10 pm bedtime]

60% of this 20 units =12 units divided into 3 bolus[prandial] doses of 4 units each before breakfast , lunch and dinner

The initial insulin therapy is always accompanied by a meal planning, self monitoring of blood glucose , insulin injection education and dose titration

Converting from Existing Premix to Basal Bolus Insulin Therapy

When switching from NPH to glargine as basal insulin, dose of basal insulin needs to be reduced by approximately 20% to avoid hypoglycemia. The regular can be divided into three prandial doses.

Example

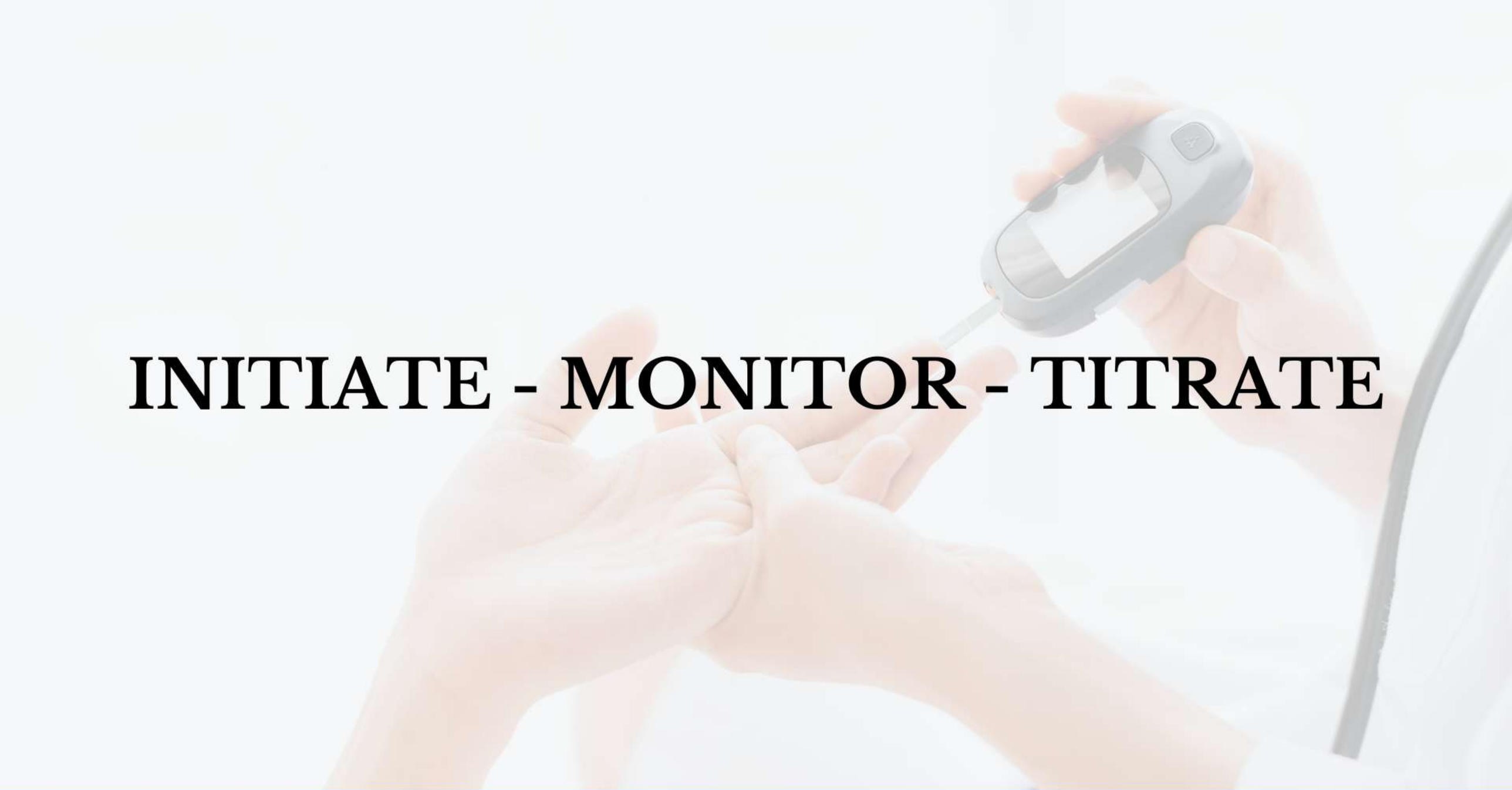
A 15-year-old girl is on premix human insulin 30/70 of 25 units before breakfast and 20 units before dinner. We now convert to Basal Bolus Therapy.

Total Dose is 25+20=45 units

30 % is Bolus [Regular] = 13.5=14 units . Divide into 3 pre prandial bolus of 5U before breakfast -5 U before lunch -4 U before dinner

70 % is Basal [NPH] = 31.5 units. Reduce 20% dose= 25 units of glargine at @ 10 pm[bedtime]

INITIATE - MONITOR - TITRATE



Insulin dosing is dependent on many factors

- Age
- Weight
- Stage of puberty
- Duration and phase of diabetes
- Nutritional intake and distribution
- Exercise patterns
- Daily routine
  - Results of BG monitoring and glycated hemoglobin
  - Intercurrent illness
- Menstrual cycles

More about Basal Bolus Insulin Therapy

•Prandial insulin should be injected before each meal, and ideally giving a dose before snacks as well. Insulin doses are adjusted based on pre-meal glucose level, meal composition (particularly amount and type of carbohydrates) and expected physical activity in the coming hours.

•Basal/long-acting analog is administered once or twice daily. Timing can vary for age and BSL pattern.

•Rapid-acting insulin immediately before and adjusted to glycemia, meal content and daily activity. Rapid-acting analogs may need to be given 15–20 min before the meal to have maximum effect, especially at breakfast.

•Ultra-fast-acting analogs may be given closer to the meal. If regular insulin is used as prandial insulin, it should be administered 30 min before each main meal.

Honeymoon Period

Within a few weeks after the initiation of insulin therapy, it is common for a young person with newly diagnosed diabetes to enter a partial remission phase, also known as the honeymoon period, with an increase in endogenous insulin production. During the honeymoon phase , the total daily insulin dose is usually <0.5 IU/kg/day.

May be mistaken as a ‘cure’
Needs constant monitoring.

FAQs about Basal Bolus Insulin Therapy

•Will number of injections reduce over time?
Ans – No. Requirement will always be of bolus with each meal and snack and basal once or twice a day.

•Is so much pricking harmful?
Ans- Not at all. No local or otherwise problems are seen when taken with right technique.

•What about insulin in school?
Ans- Child must be encouraged to not miss a dose with school meal. Involve the class teachers...they help!

Not to Forget

- Insulin strength [40IU or 100 IU] and the syringe/device used.
- Injection time as per the type of insulin used
- Insulin injection technique
- Insulin storage
- Injection site rotation
- Disposal of supplies after use.

Monitoring and Dose Adjustment

Once insulin has been initiated, it is of utmost importance to monitor blood glucoselevels daily and accordingly titrate the insulin doses.
Doses take a few weeks to stabilize as per routine requirements . Self monitoring and self dose adjustment is our final goal.

Insulin treatment without monitoring and dose adjustment is like driving a car blind folded!
Learn more!!

Thank You