

Insulin Treatment of Diabetes Mellitus

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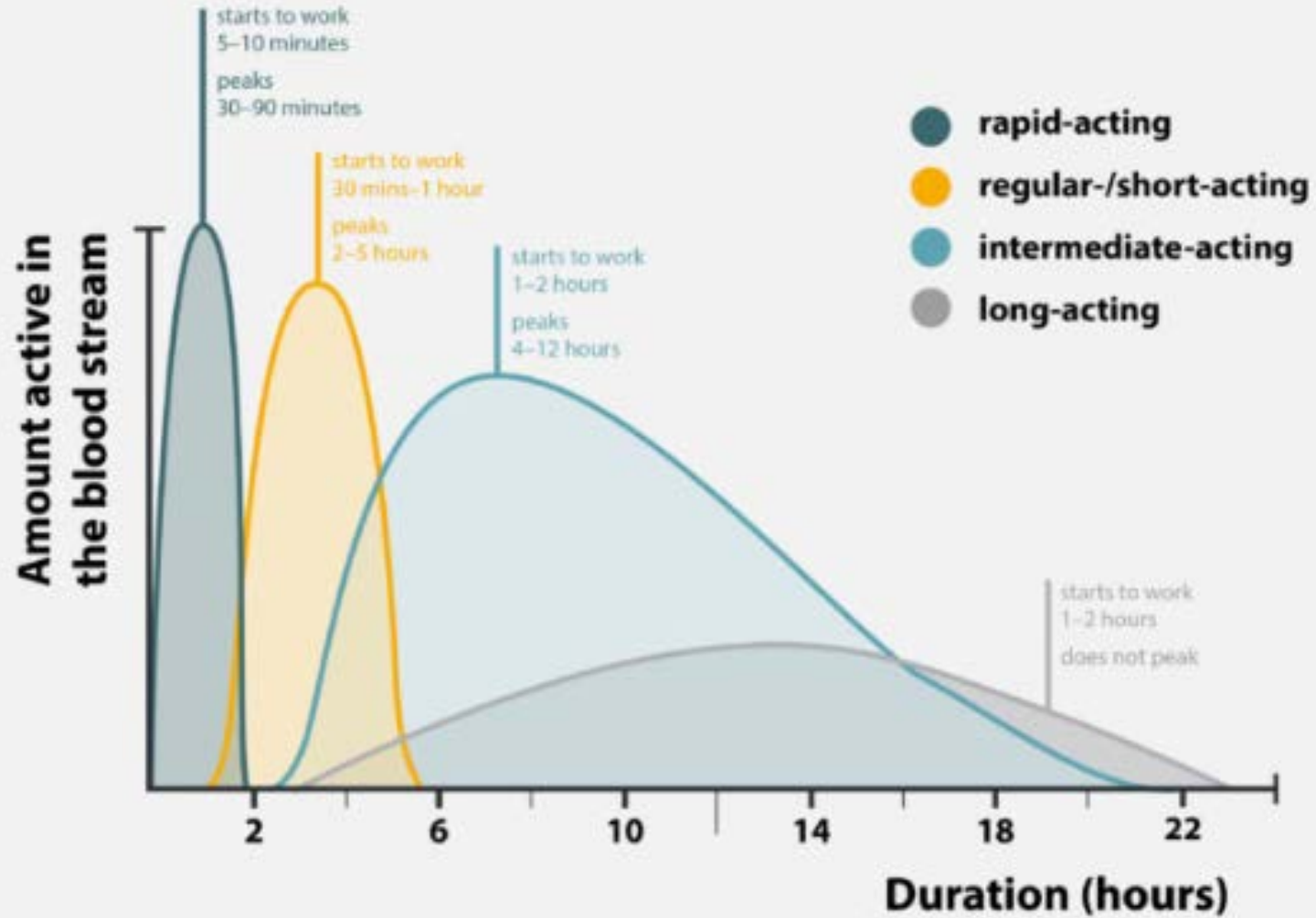
Insulin Efficacy

- Insulin is the most effective means of lowering the blood glucose in persons with Diabetes Mellitus.
- True for Type 1 Diabetes Mellitus where there is a complete absence of insulin secretion and Type 2 Diabetes Mellitus where there is diminished insulin secretion and/or insulin resistance.
- Insulin is also used to treat Gestational Diabetes Mellitus.

Insulin Initiation

- **Persons with Type 1 Diabetes Mellitus typically require insulin initiation with multiple daily doses(basal-bolus insulin therapy) – a once daily injection with long-acting basal insulin and meal- time boluses with a rapid acting insulin.**
- **The preferred method of insulin administration in type 2 Diabetes Mellitus is usually begun by adding a long-acting basal insulin to oral agents and/or a GLP-1 agonist. If desired post prandial targets aren't being met, then a rapid acting insulin can be added at meal times.**

Types of Insulin



Insulin Algorithm Type 1 Diabetes Mellitus

BASAL (MDI)

One of:

- **First choice:** Gla-300, subcutaneous injection once daily **or** degludec, subcutaneous injection once daily* **or**
- **Second choice:** Detemir, subcutaneous injection once or twice daily as appropriate **or** Gla-100, subcutaneous injection once daily* **or**
- **Third choice:** NPH, subcutaneous injection twice daily

and

PRANDIAL (MDI)

One of:

- **First choice:** Lispro, **or** aspart, **or** glulisine, subcutaneous injection premeal
- **Second choice:** Faster-acting aspart, subcutaneous injection premeal[†]
- **Third choice:** Regular human insulin, subcutaneous injection 2–3 times daily

or

PRANDIAL (CSII)[‡]

- Faster-acting aspart (first choice) **or** lispro, aspart, **or** glulisine (second choice) **or** regular human insulin (third choice)

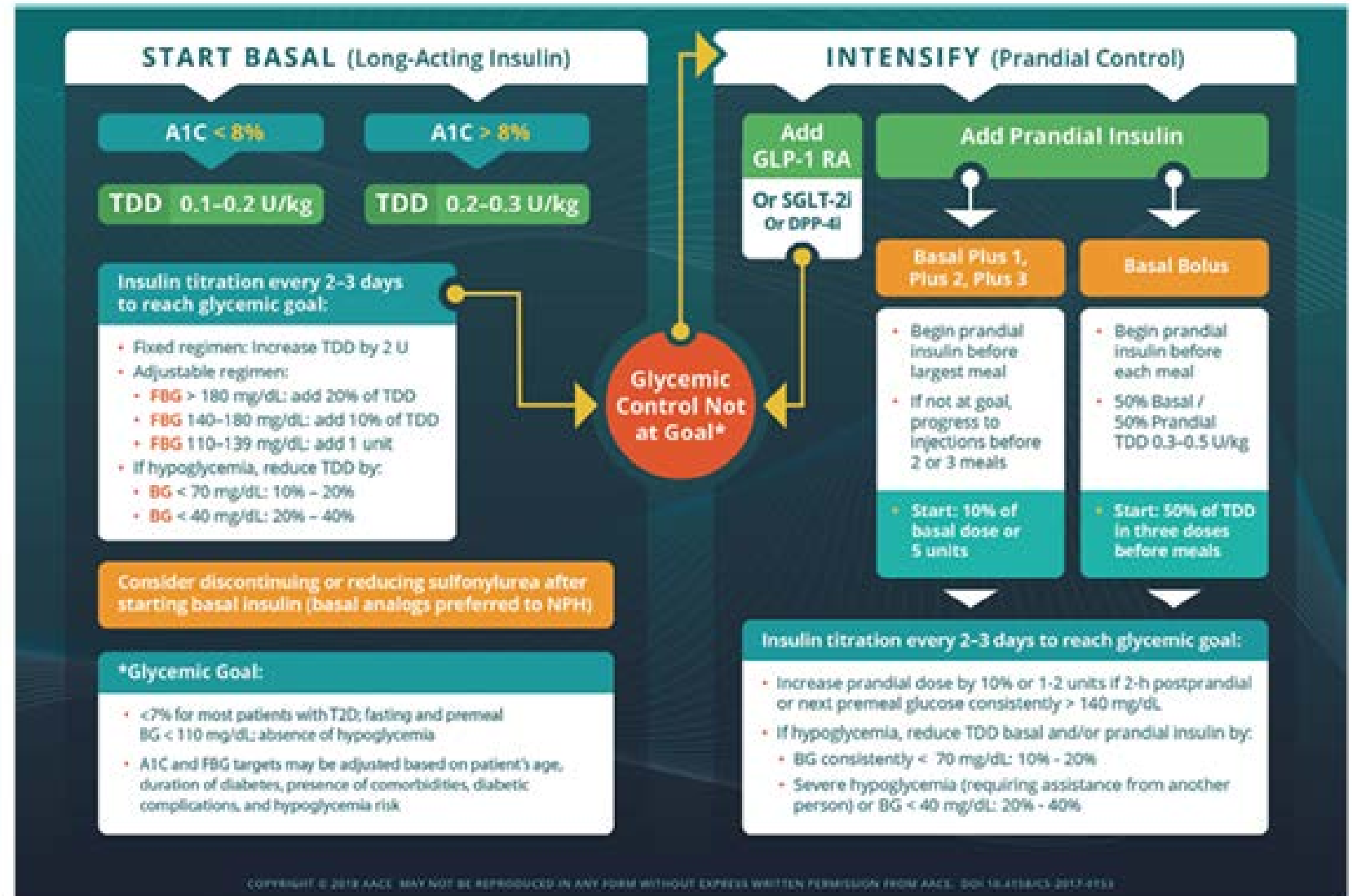
Dosing

- Starting dose 0.4–1.0 units/kg/day
- Divided total insulin
 - Basal insulin (40%–60%)
 - Bolus insulin (40%–60%)
- Correction dose (according to the individualized insulin correction factor) may be added to the bolus insulin on the basis of the premeal blood glucose level
 - Bolus dose is determined by carbohydrate content, planned exercise, and blood glucose level
 - In general, 1 unit of rapid-acting insulin will dispose of 12–15 g of carbohydrate
- Dose adjustments are required for exercise and illness

Algorithm for Adding/Intensifying Insulin



Insulin Algorithm Type 2 Diabetes Mellitus



Basal insulins

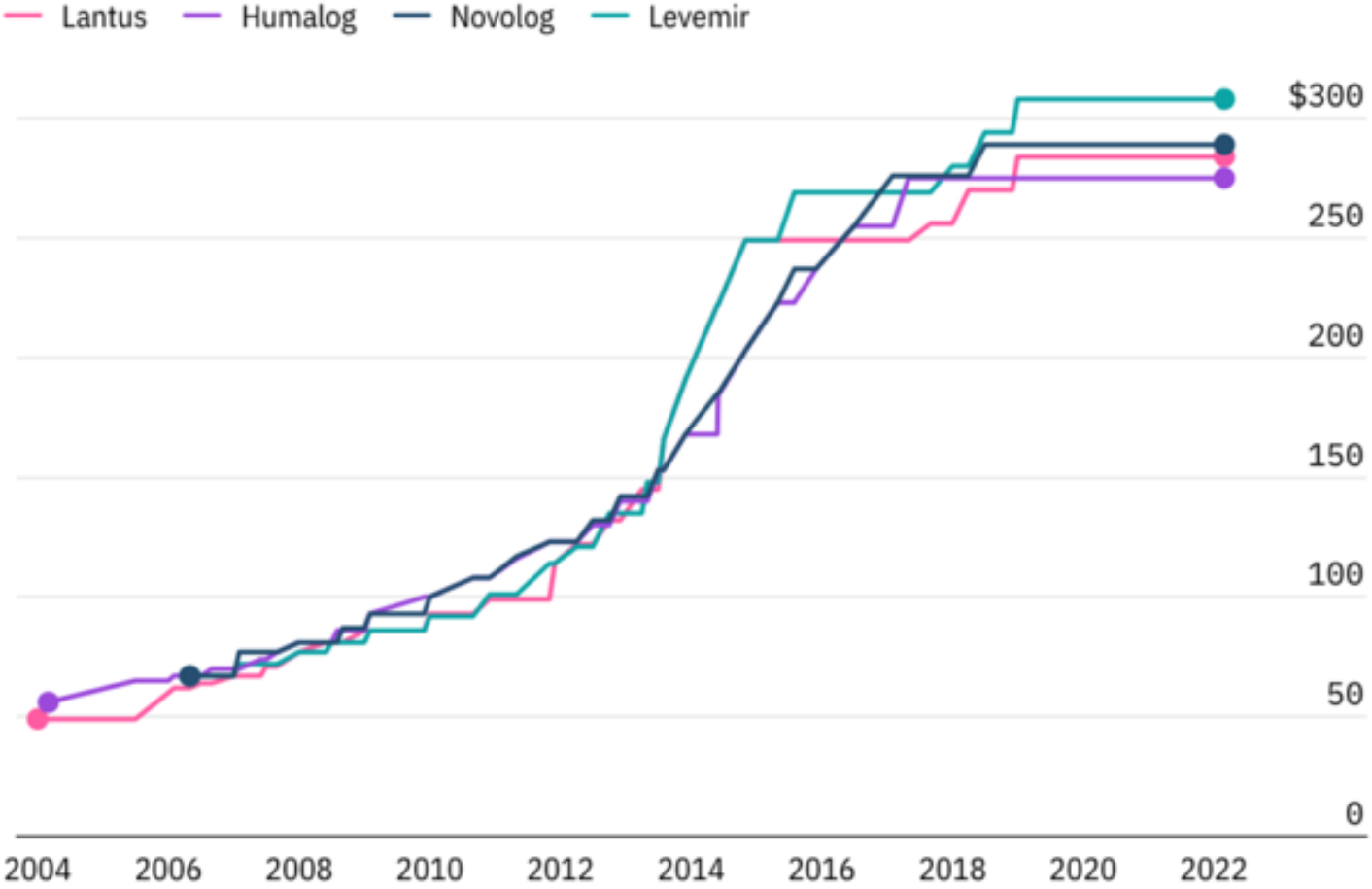
Type of Insulin (Trade Names)	Supplier	Appearance	Begins Working	Peak Activity	All gone
LONG ACTING					
LANTUS[®] (insulin glargine U-100)	Sanofi	Clear	4–6 hours	No pronounced peak	Up to 24 hours (depends on injected dose)
Toujeo[®] (insulin glargine U-300)	Sanofi	Clear	4–6 hours	No pronounced peak	Up to 24 hours (depends on injected dose)
Basaglar[®] (insulin glargine U-100)	Eli Lilly	Clear	4–6 hours	No pronounced peak	Up to 24 hours (depends on injected dose)
SEMGLEE[™] (insulin glargine U100)	Viartis	Clear	4–6 hours	No pronounced peak	Up to 24 hours (depends on injected dose)
Levemir[®] (insulin detemir)	Novo Nordisk	Clear	1–2 hours	2 - 12 hours (mild, varies by dose)	Up to 24 hours (depends on injected dose)
Tresiba (insulin degludec U-100 or U-200)	Novo Nordisk	Clear	1–2 hours	About 12 hours	42+ hours

Bolus Insulins

Type of Insulin (Trade Names)	Supplier	Appearance	Begins Working	Peak Activity	All gone
RAPID ACTING					
Afrezza (Regular insulin)	MannKind	Inhaled	12 minutes	30–45 minutes	2 hours
Lyumjev® (insulin lispro)	Eli Lilly	Clear	15–17 minutes	57 minutes	4.6-7.3 hours
Fiasp® (insulin aspart)	Novo Nordisk	Clear	16–20 minutes	90–120 minutes	5–6 hours
NovoLog® / NovoRapid® (insulin aspart)	Novo Nordisk	Clear	15–20 minutes	60–180 minutes	3–5 hours
Apidra® (insulin glulisine)	Sanofi	Clear	15–20 minutes	60–120 minutes	4–5 hours
Humalog® (insulin lispro)	Eli Lilly	Clear	20–45 minutes	60–120 minutes	4–5 hours
Admelog® (insulin lispro)	Sanofi	Clear	20–45 minutes	45–150 minutes	3.5–4.75 hours

Analog insulin prices have steadily risen in US

Manufacturer price for 1000 IU insulin vial, sorted by year



Source: GlobalData Price Intelligence Database

PHARMACEUTICAL TECHNOLOGY