

Book 4

Edition 2024 | English

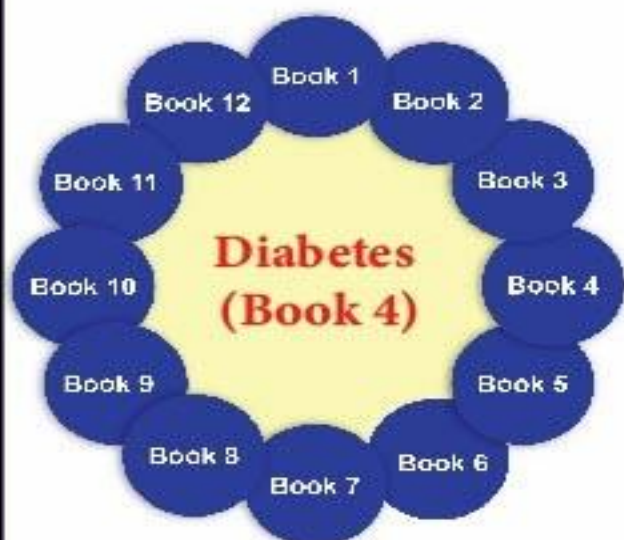


NEXT STEP LIVING LONGER BOOKS

Diabetes - Book 4

**NON- SULFONYLUREAS/
MEGLITINIDES DEVRIVATIVES
(Insulin Releasing Medicines)**

IN 2021 : No reason for kidneys to fail!!
Before 1921 : Yes, You would have died.
(year of Nobel Prize for Insulin)



Author:

(Prof.)Dr.S. Om Goel, MD/DM (USA)

From family of doctors

from AIIMS, MAMC & Delhi University

MD medicine, USA

DM/Fellowship, USA



TABLE OF CONTENT

Chapter 1

- 1 Non-Sulfonylureas/Meglitinides Derivatives (Insulin Releasing Medicines)

Chapter 2

- 2 Role of Glinides in Diabetes Management

Chapter 3

- 3 Repaglinide (Trade name: Prandin/Novonorm)

Chapter 4

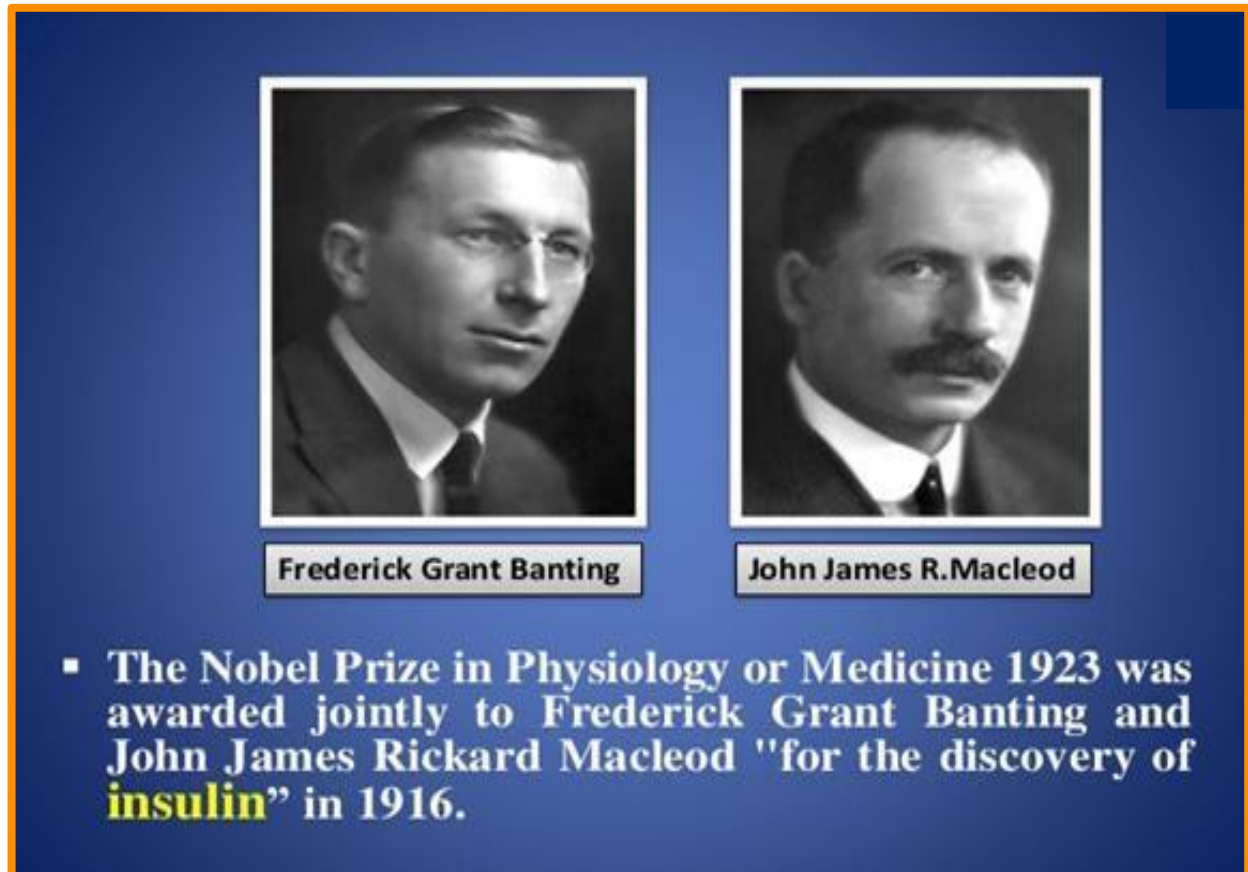
- 4 Nateglinide (Trade Name: Starlix/Glinate)

Chapter 5

- 5 Mitiglinide (Trade Name: Glufast)

Chapter 1

Introduction



Chap1Fig1

Insulin was discovered in 1921 leading to a nobel prize. In 2021 we have 12 groups of medicines for medicine diabetes.

Think About It!

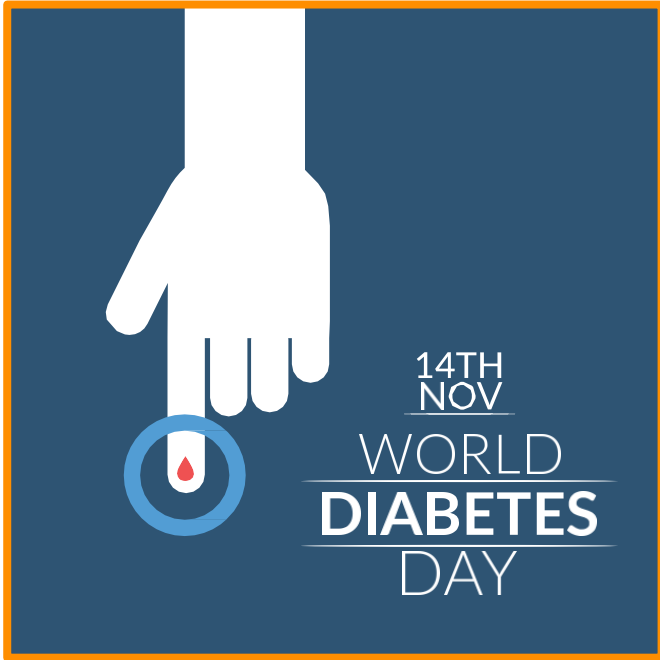
Before 1921

Every child who was born with Type 1 diabetes or lack of insulin would eventually die.

The discovery of insulin or should we say the discovery of insulin as a medicine has changed the history of diabetes and its treatment.

In 2021

We can now have a healthy life with functioning kidneys till very end!!

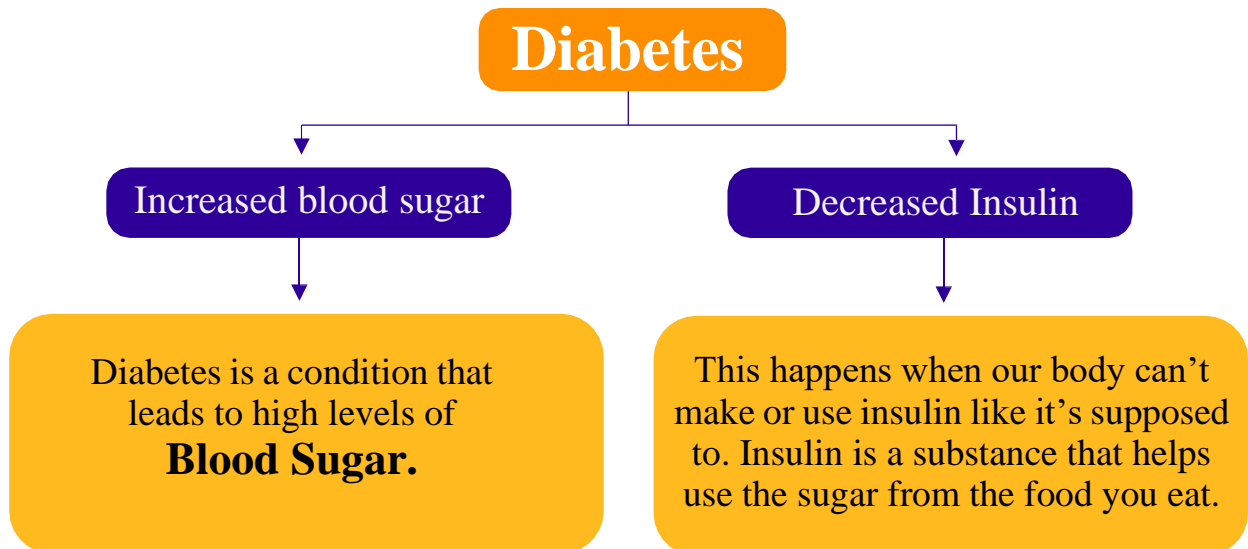


But yes, we have 12 to 13 different groups of medicines for high blood sugar.

The golden principle of the medicinal treatment of diabetes is that we start with one medication early in the course of treatment of diabetes.

We keep adding medicines as needed to control our blood sugar (along with diet & exercise)

Chap1Fig1



Chapter 2

The Golden Principle in Management of high blood sugar (Diabetes)

The golden principle of the medical treatment of diabetes is that Once we have high blood sugar (Diabetes) – exercise and diet management are needed life-long.

Together diet, exercise and medications – all will help!!

Risk of taking medications are minimal as compared to the benefits that we receive from these medicines!

1. We start with one medication early in the course of treatment of diabetes

Start with one medication

2. Targets for blood sugar control is decided by physician.

Decide Targets

3. Usual target is HbA1c < 7

HbA1c < 7

4. As youngish we are more, we want to keep blood sugar is close to 100mg

Blood sugar close to 100mg

Continued

The golden principle of the medical treatment of diabetes is that Once we have high blood sugar (Diabetes) – exercise and diet management are needed life-long.

5. Today in 2021 are several groups of excellent medicines are available:

a) which can bring down our blood sugar by different mechanisms of action.

b) As a golden rule, what we should start with one medicine if our blood sugar is not extremely high.

c) And as time goes on.
We can add a second medicine.

Start with one medicine, if blood sugar is not very high

Start with one medicine, Add a second medicine, if needed And add a third medicine, if necessary

d) Or we can even add a third medicine which works by a different mechanism.

Chapter 3

Diet and exercise are an integral part of high blood sugar management!

[Diet and exercise are an integral part of high blood sugar management!]

Purpose of medical management and medicines for diabetes is:

- To manage our blood sugar



Chap3Fig1

- As close to 100mg as possible



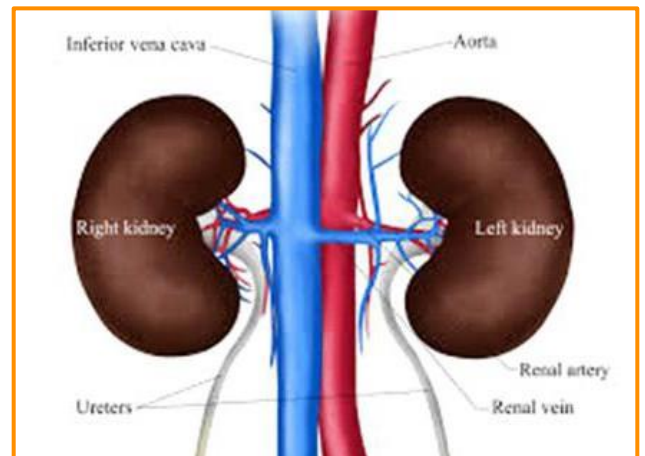
Chap3Fig2

- And HbA1c < 7

HbA1c

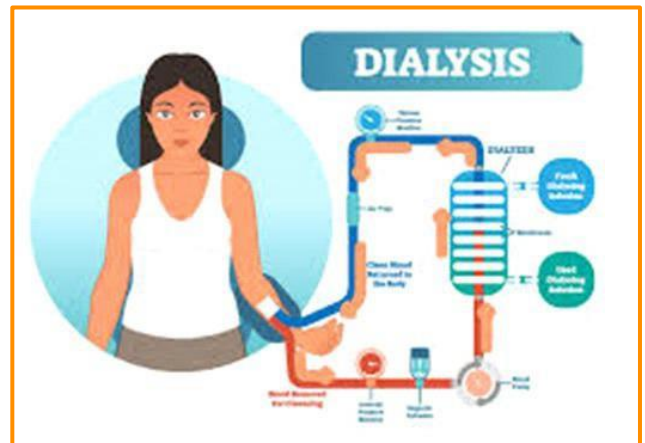
Chap3Fig3

- To prevent kidney failure



Chap3Fig4

- And no dialysis



Chap3Fig5

- No heart attack (Diabetes is literally one of the reasons)



Chap3Fig7

- **No blindness (Diabetes is one of the reasons)**



Chap3Fig8

- **No amputation of leg (Diabetes is one of the reasons)**



Chap3Fig9

Chapter 4

Yes, Diabetes management can really reduce complications

If we manage diabetes from day one or even before we have actual diabetes (called prediabetes),
Complication are dramatically delayed by



Is it true?

✓ Really Yes! it is True

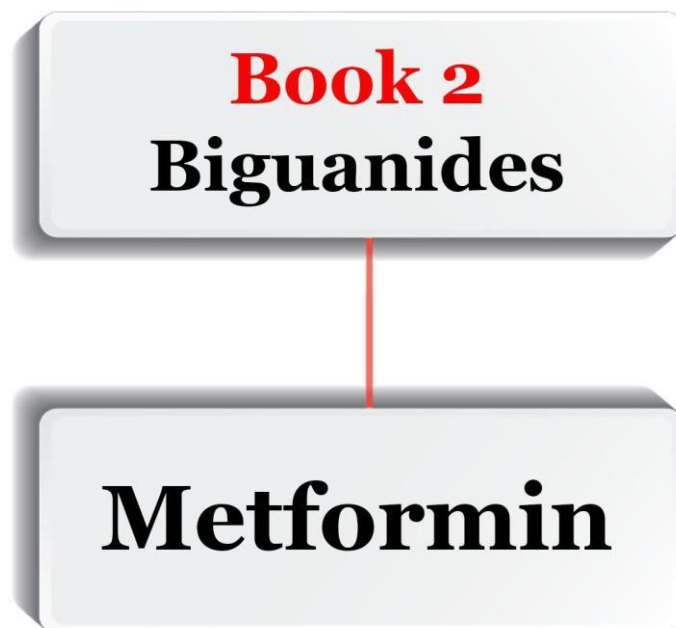
Chapter 5

Today in 2020/2021 we have excellent medicines available

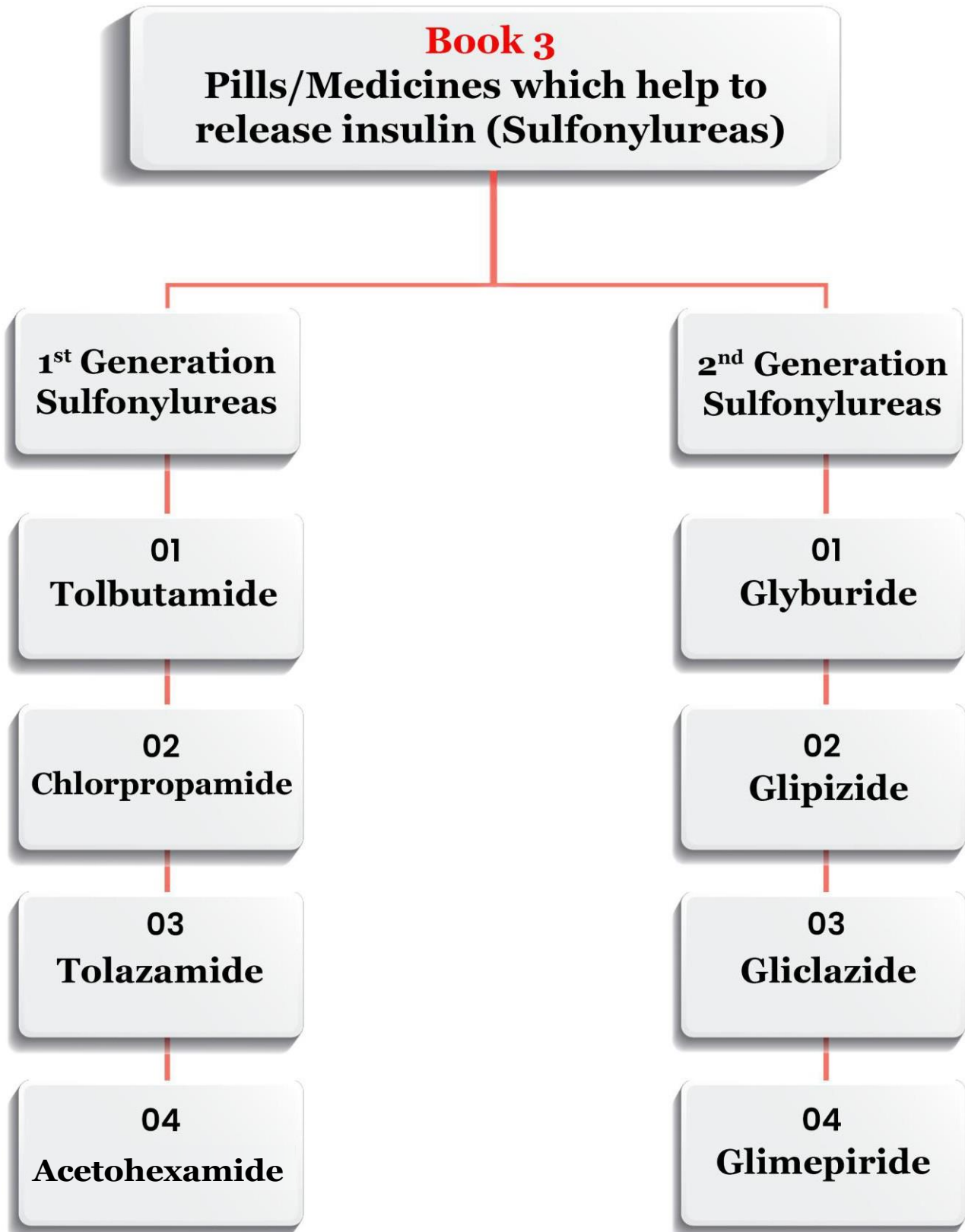
There are a number of medicines available in the market today for the treatment of Diabetes.
The main groups which these medicines belong to are:

Book-2 Biguanides

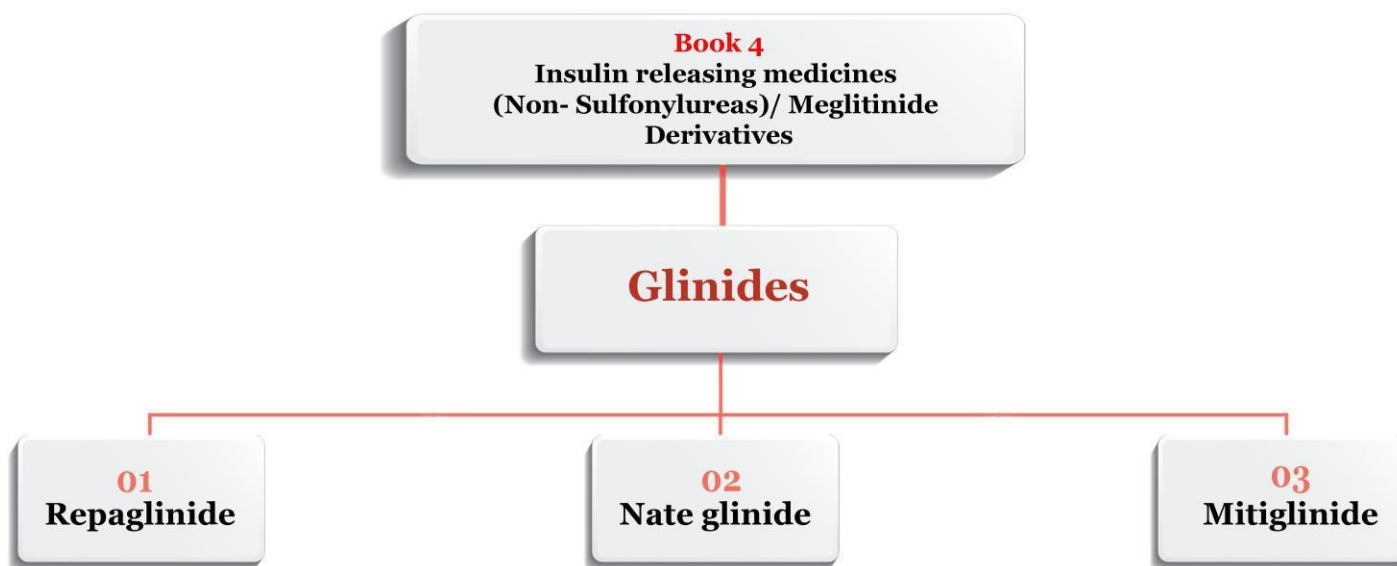
Metformin: The most famous and most used medicine and 1st medicine to start the treatment of diabetes.



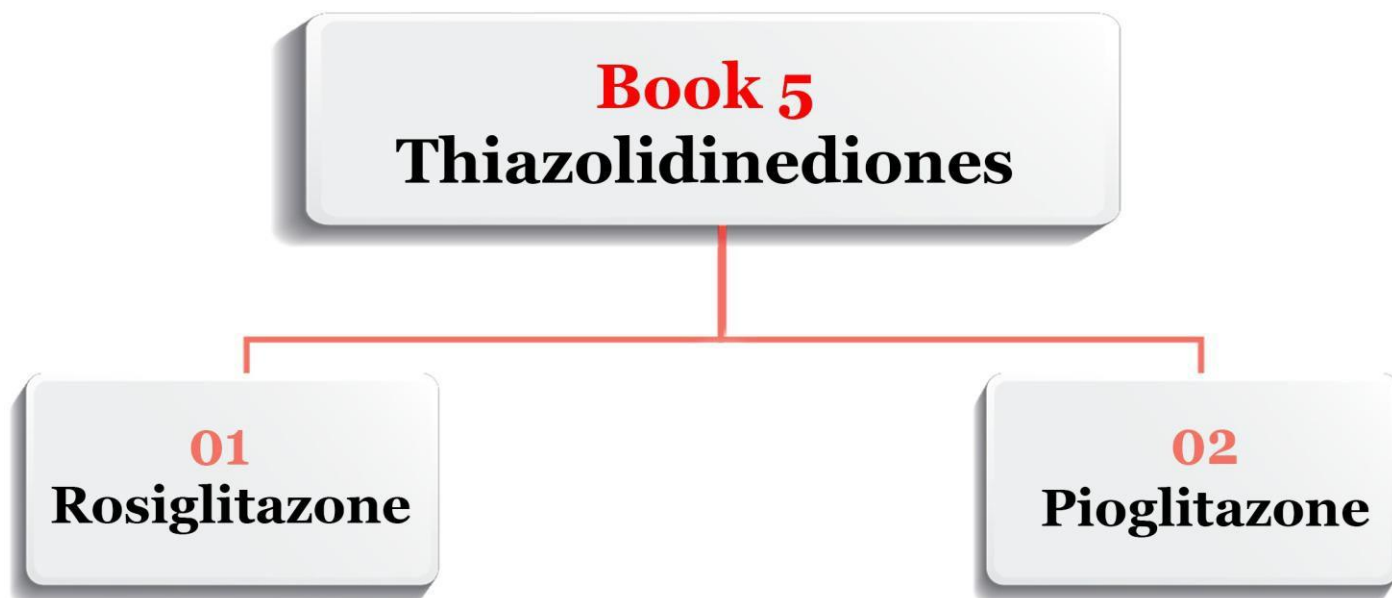
Book-3 Pills/Medicines which help to insulin (Sulfonylureas)



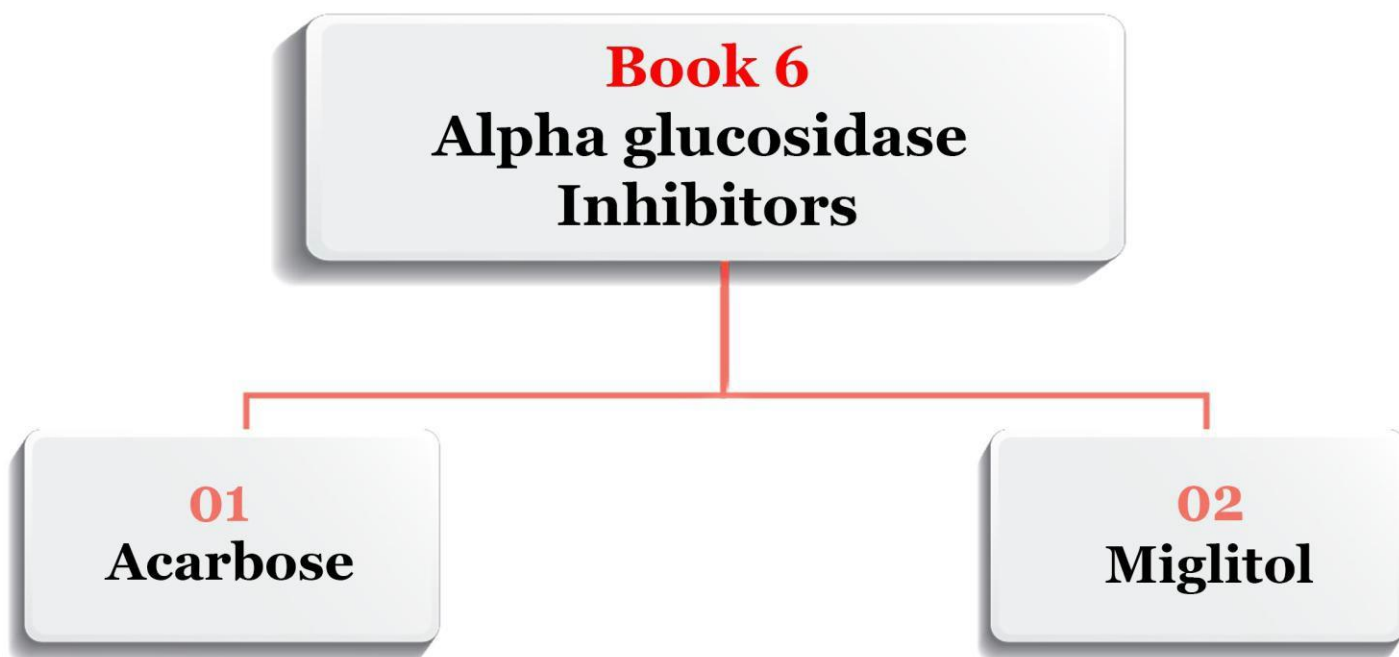
Book-4 Insulin releasing medicines (Non- Sulfonylureas)



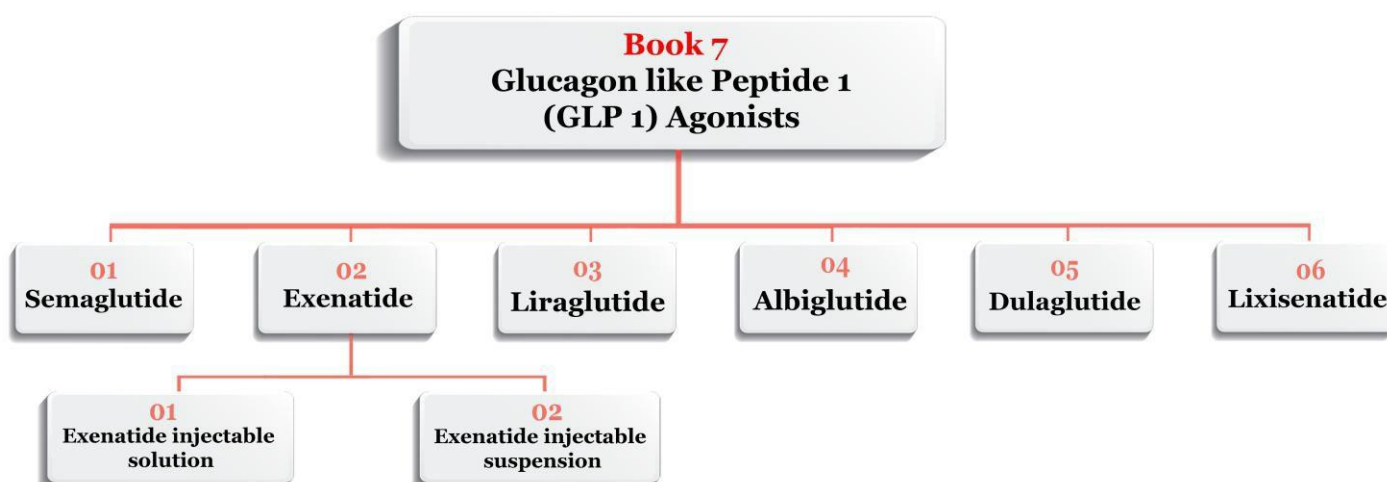
Book-5 Thiazolidinediones



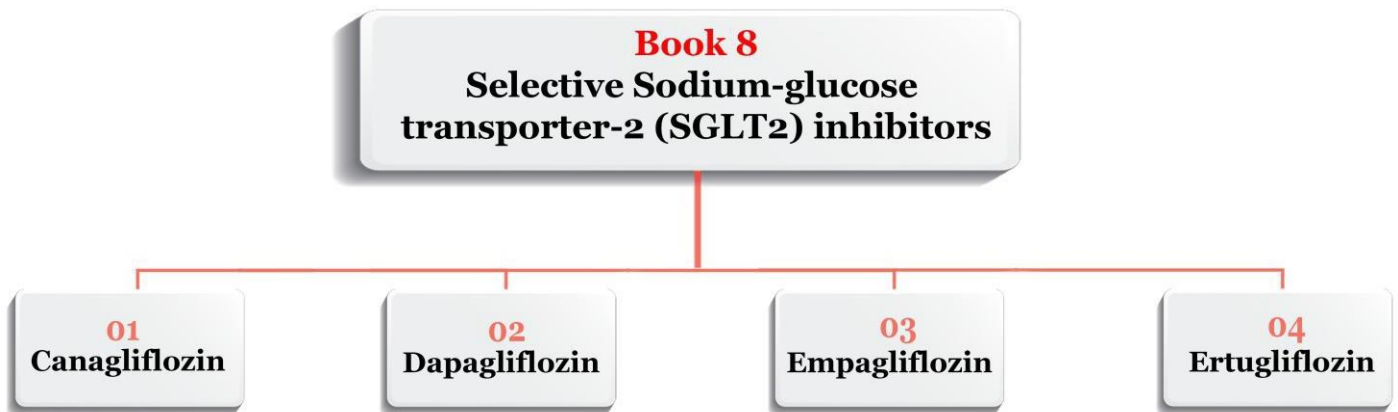
Book-6 Alpha glucosidase Inhibitors



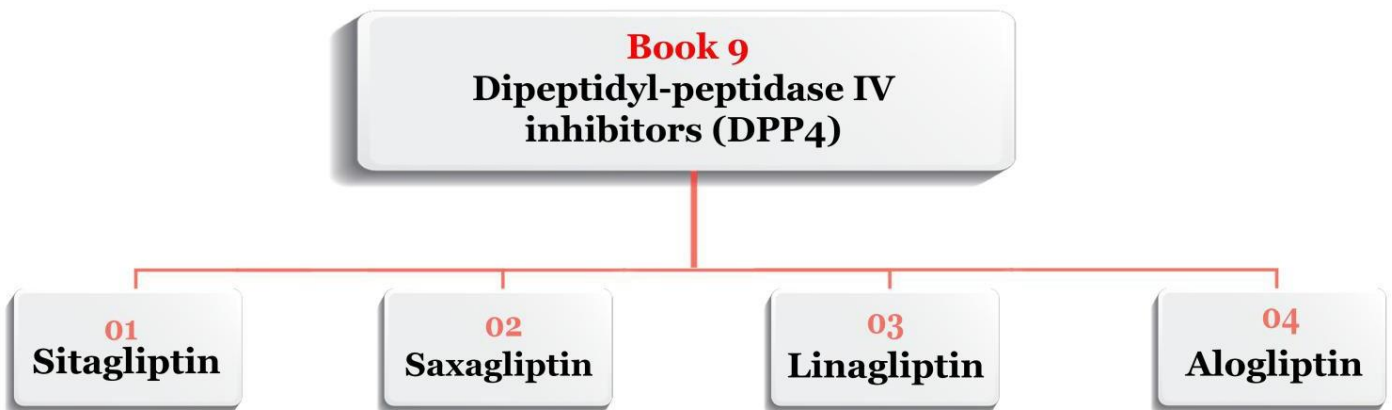
Book-7 Glucagon like Peptide 1 (GLP 1) Agonists



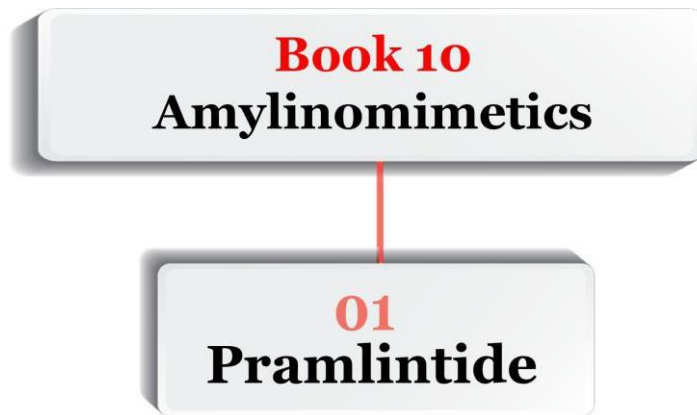
Book-8 Selective Sodium-glucose transporter-2 (SGLT2) inhibitors



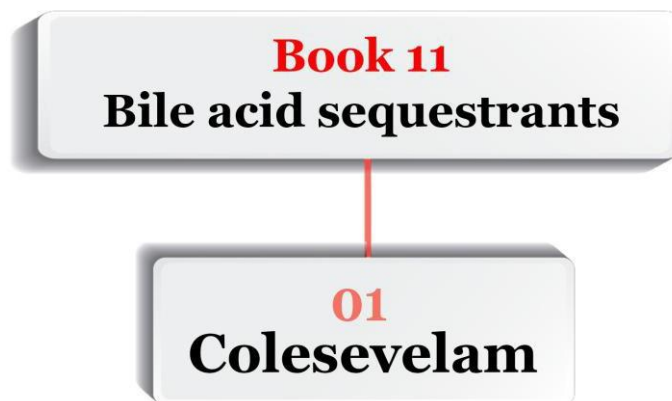
Book-9 Dipeptidyl-peptidase IV inhibitors (DPP4)



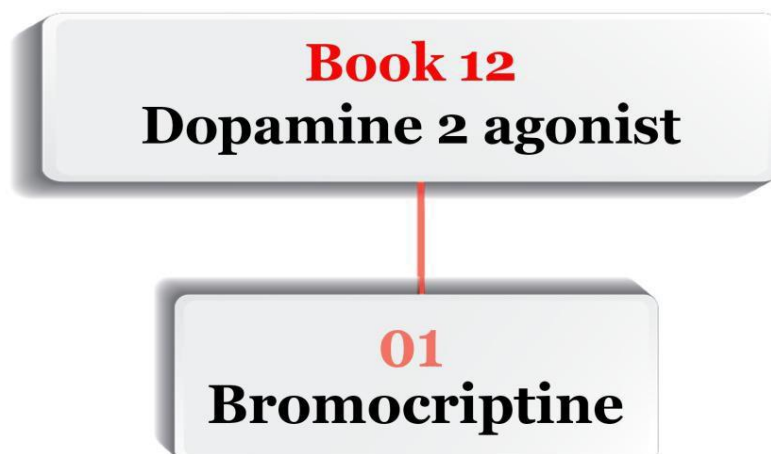
Book-10 Amylinomimetic group



Book-11 Bile acid sequestrants



Book-12 Dopamine 2 agonist



Chapter 6

There are dramatic advances in treatment of diabetes today in 2021

Think About It!

We are **NOT** perfect; we don't need to be. But we **CANNOT** quit trying either.

Every high sugar management prescription always includes:

1. *Medicine(s),*
2. *Diet, and*
3. *Exercise*

Without these, it is impossible to achieve our targets.

In our medical world, medicines can be given by

**By mouth/oral
medication**

or

**By Injection below
our skin
(very easy to learn)**



Chap6Fig1



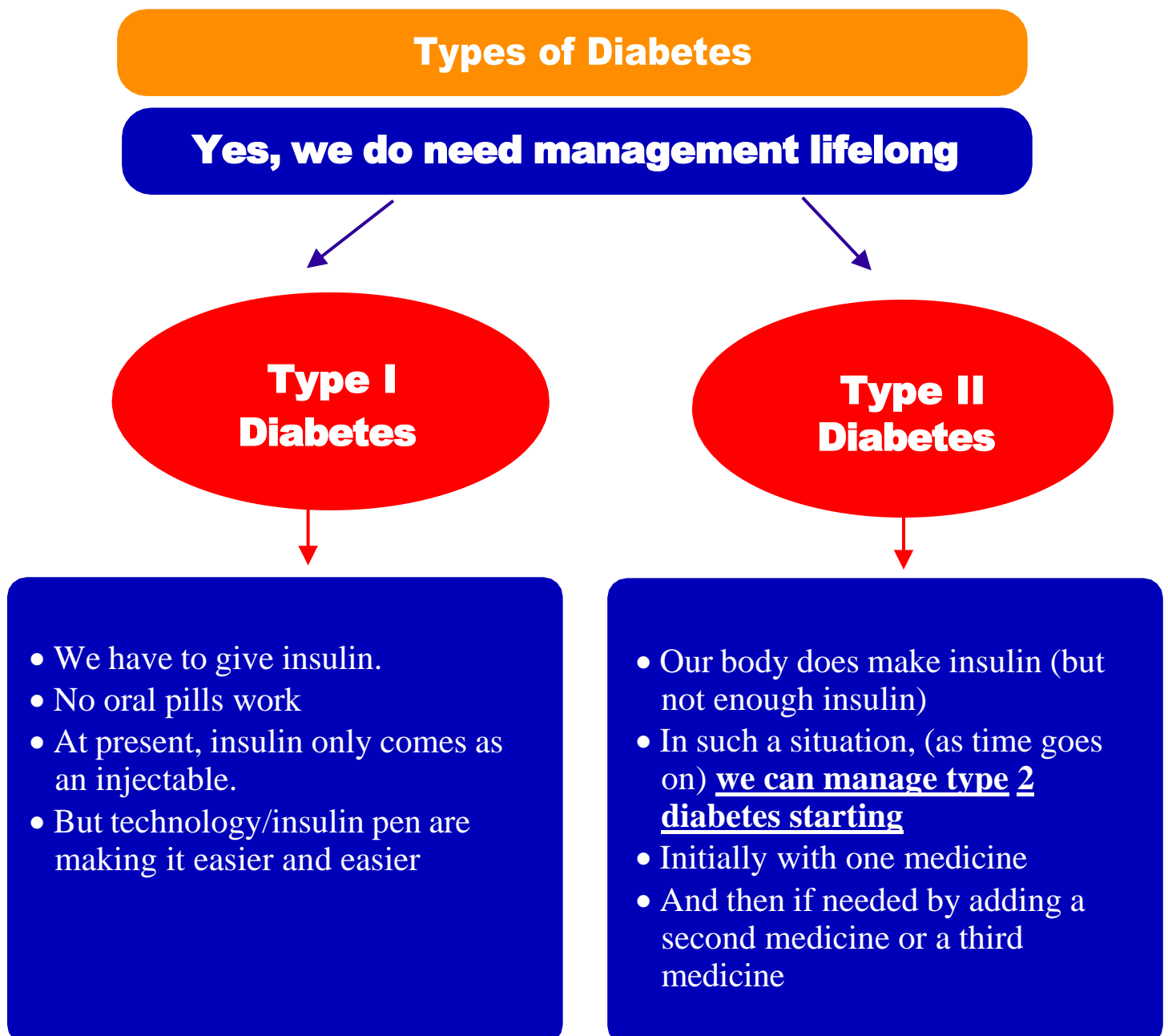
Chap6Fig2

Chapter 7

Type 1 vs Type 2 Diabetes

Think About It!

We were always scared of needles and injection needs some degree of training so that it does not lead to any infection on the injected place. We have to follow the sterile techniques that do not lead to any infection of the injection sites.



Chapter 8

How do we decide less dose or more dose of medicines

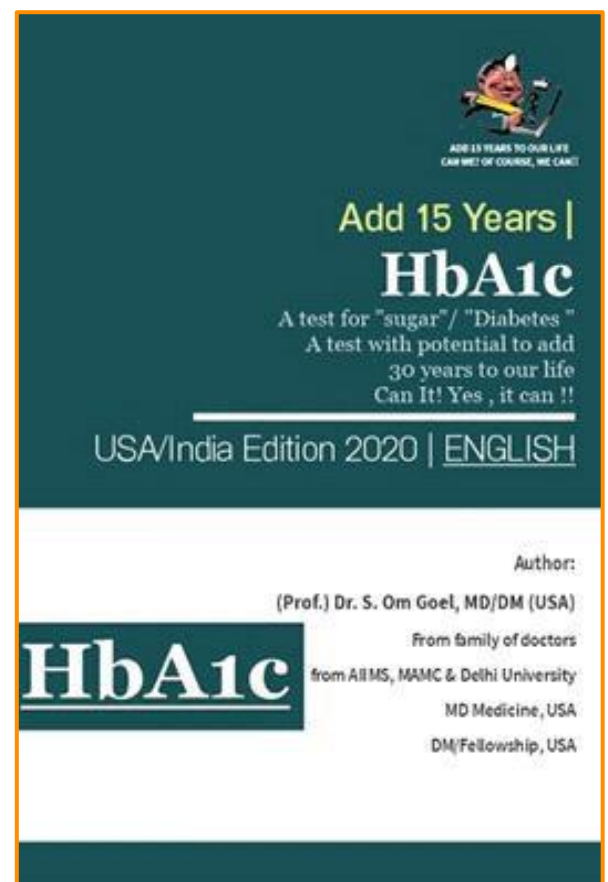
Think About It!

Our blood sugar changes all day based on

- *Our meals,*
- *Level of activity etc.*
- *HbA1c remains stable over three months.*

How do we decide less dose or more dose or combination of medicines?

I. We actually use HbA1c as our guideline for the treatment of diabetes.



Chap8Fig1

II. We set up a target for HbA1c in diabetic management and we want that the HbA1c always remains 7 or less than 7.

HbA1c < 7

III. If we met our target, we can lower the dose.

Start with one medicine, if blood sugar is not very high

IV. If our HbA1c is high, then we can give the increased dose or add a 2nd pill or add even a 3rd pill.

Start with one medicine, Add a second medicine, if needed And add a third medicine, if necessary

Chapter 9

Early diagnosis and early treatment: an absolute necessity in 2021

Think About It!

Every mom knows how her baby will start walking around in 1 year of age.

Every physician knows how to diagnose diabetes (called Prediabetes) year before you have any “symptoms”.

Actually, if we can diagnose Diabetes, even before it happens to us (called as Prediabetes), we can really delay complications as mentioned and it will be a very wise thing to do.

Most important thing we have to understand is that if medicines are taken early in the diagnosis of high blood sugar/diabetes then it can delay complications related to diabetes by





ADD 15 YEARS TO OUR LIFE CAN
WE? OF COURSE, WE CAN!!

Diabetes - Book 4

NON- SULFONYLUREAS/ MEGLITINIDES DEVRIVATIVES (Insulin Releasing Medicines)

IN 2021: No reason for kidneys to fail!!

Before 1921: Yes, You would have died.
(year of Nobel Prize for Insulin)

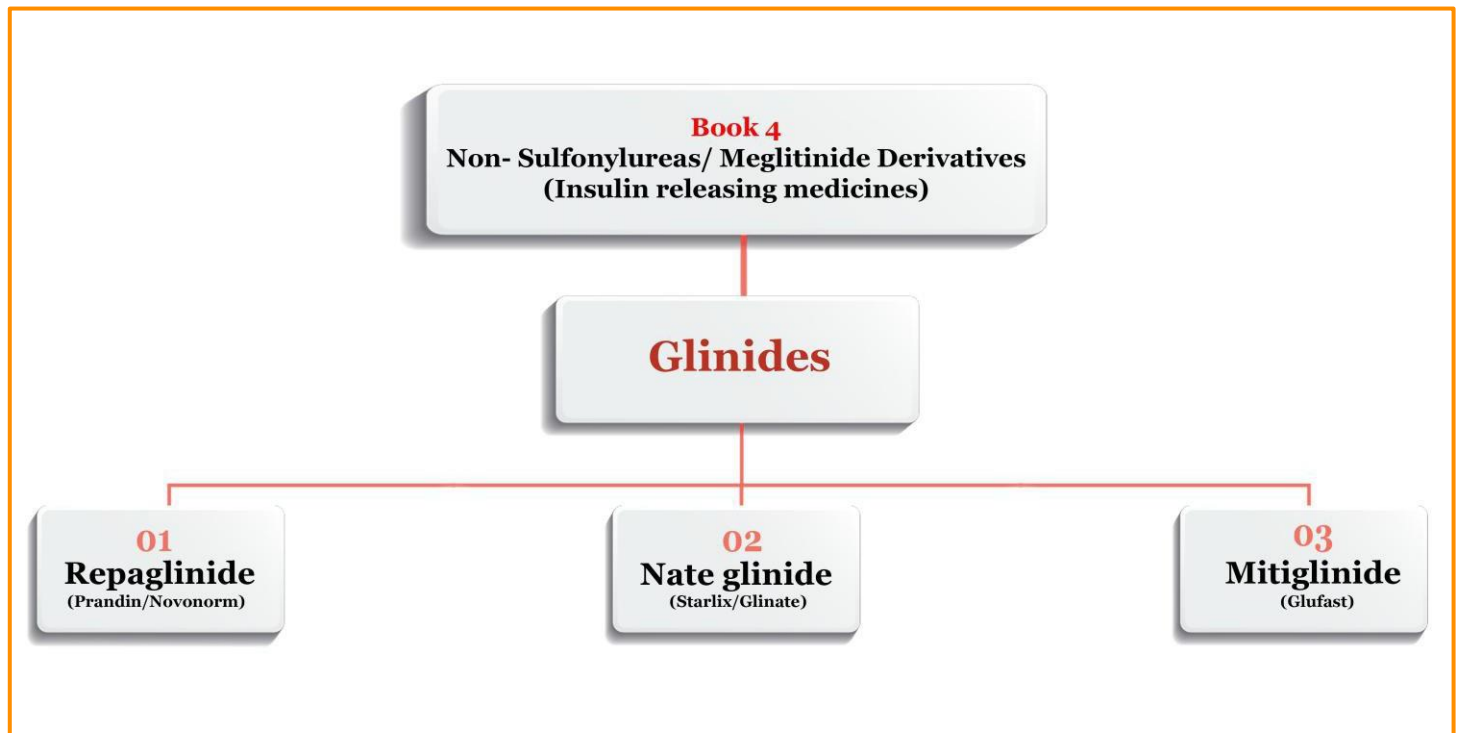
Chapter 1

Farxiga – A New Medicine to Improve Blood Sugar Control

Meglitinides are insulin releasing medicines.

We also call them Non- Sulfonylureas.

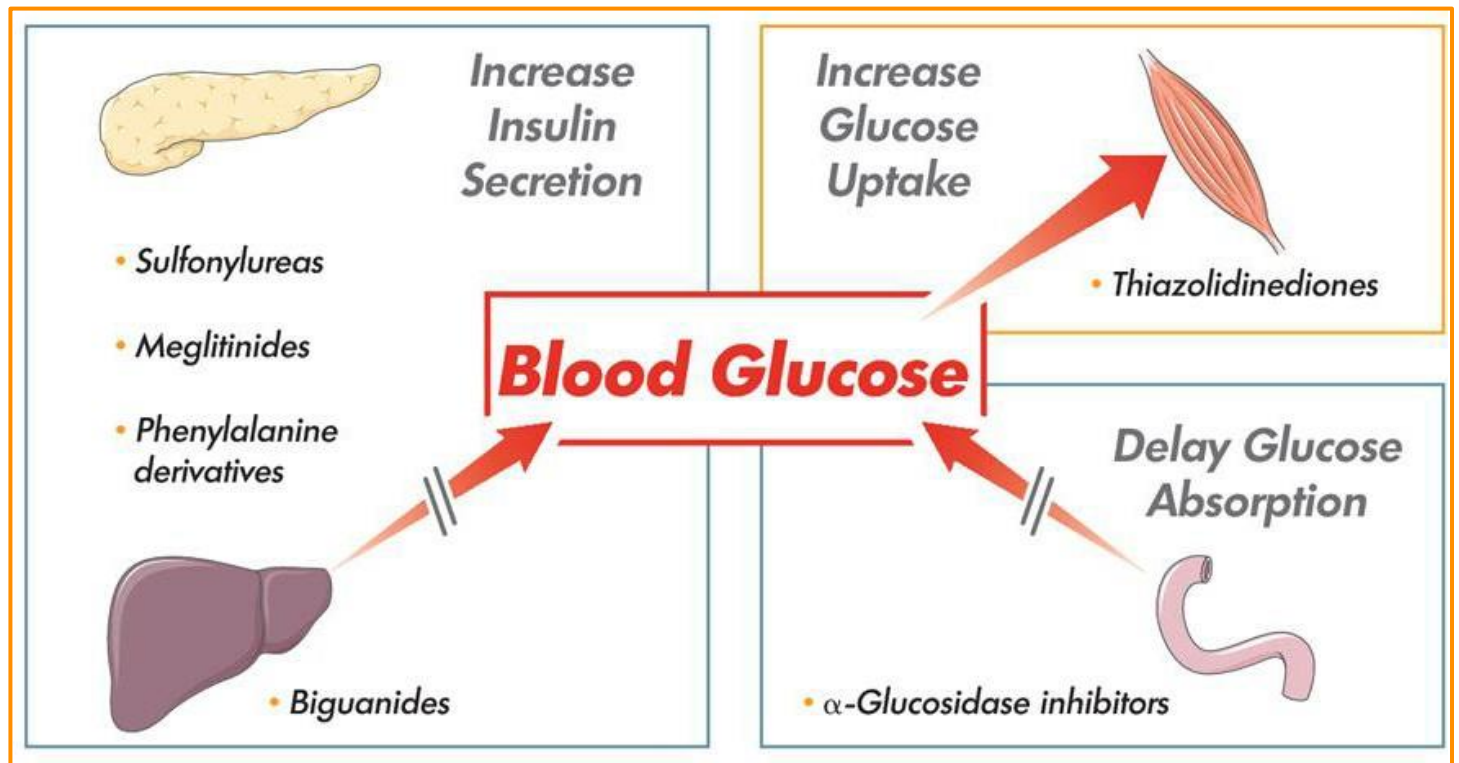
Non-Sulfonylureas/Meglitinides Derivatives



Meglitinide

is used to treat

non-insulin dependent Diabetes Mellitus i.e., **Type-2 Diabetes**



Chap1Fig1

These medicines have same trade names all over the world – as patent is still effective.

Chapter 2

Role of Glinides in Diabetes Management

Glinides are:

- Glinides are Glucose lowering medicines



Chap2Fig1

**Glucose lowering
medicines**

- These are Short-acting medicines



Chap2Fig2

Short-acting medicines

Glinides are:

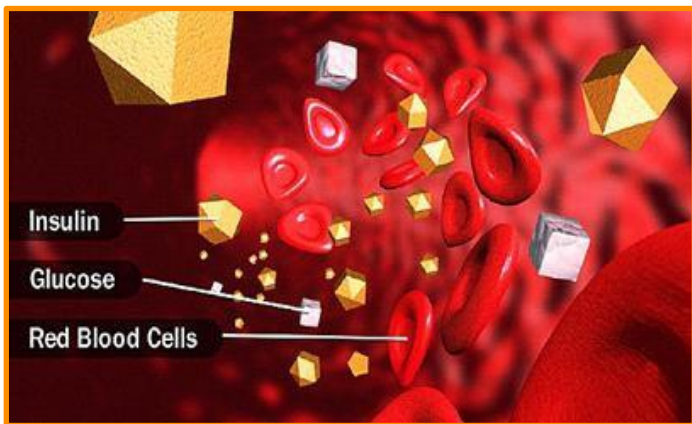
- They must be taken three times a day with meal.



Chap2Fig3

**Taken three times
a day**

- They act by releasing insulin



Chap2Fig4

**Act by releasing
insulin**

Glinides are:

- They release insulin, and insulin leads to weight gain



Chap2Fig5

**Insulin leads
to weight gain**

- They are particularly taken with meals as blood sugar goes high right after we eat.



Chap2Fig6

**Should be taken with meals
to lower increased blood
sugar after meals**

Glinides are:

- We cannot miss our meal if we take Glinides.
If we miss our meal it will lower our blood sugar.



Chap2Fig7

**Cannot miss our meal as
blood sugar will go below
normal**

- Glinides can be used as a single medicine for treatment of diabetes



Chap2Fig8

**Can be used as single
medicine for treatment of
diabetes**

Glinides are:

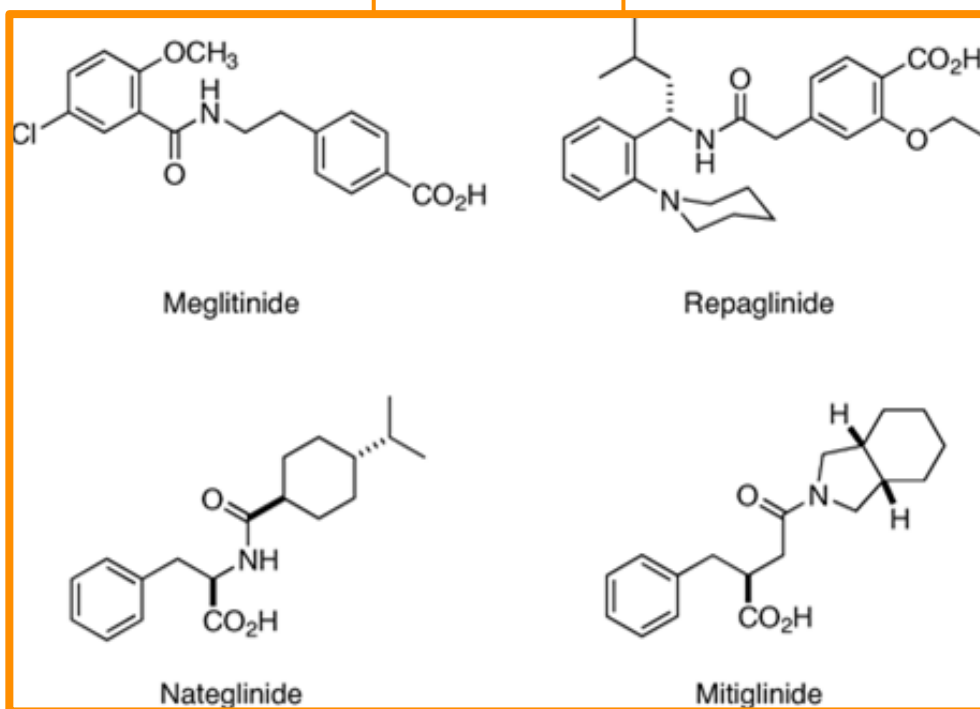
- Glinides can also be combined with Metformin as 2nd medicine for treatment of diabetes.



Chap2Fig9

Can also be combined with Metformin as 2nd medicine

Glinides



Chap2Fig10

Chapter 3

Repaglinide

(Trade name: Prandin/Novonorm)

Prandin/Novonorm FDA Approval History

FDA Approved: Yes (First approved Dec 12, 1997)

Brand name: Prandin (Is it discontinued? please check)

Generic name: Repaglinide

Dosage form: Tablets

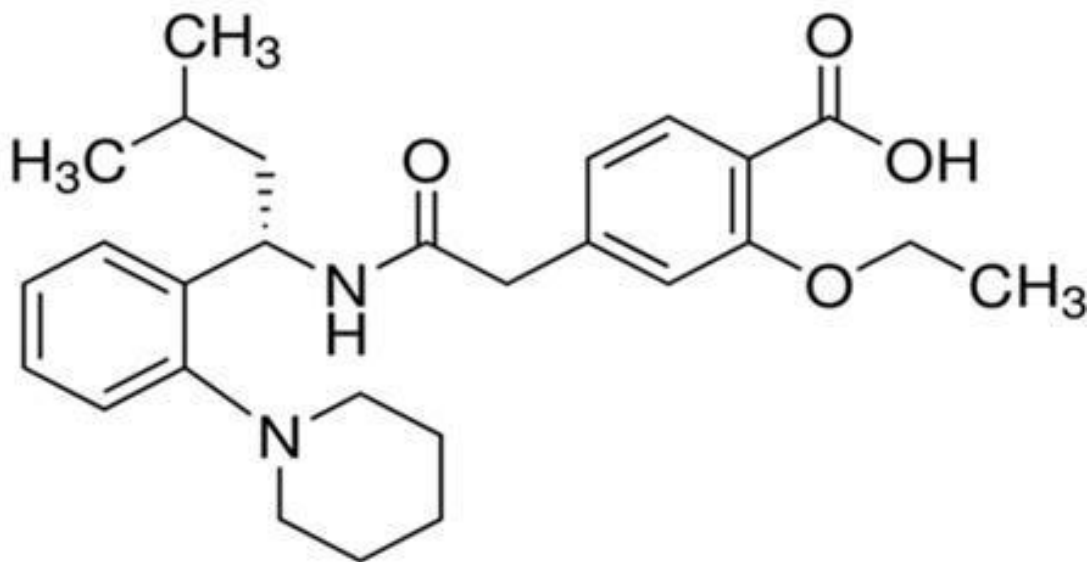
Company: GEMINI LABS LLC

Treatment for: Diabetes - Type 2

Repaglinide

Prandin/Novonorm

Molecular structure of Repaglinide



Chap3Fig1

Repaglinide (Trade Name: Prandin/Novonorm) is the first medicine that we discuss in the Glinide group, used for treatment of **Type-2 Diabetes**.

(I) Repaglinide (Prandin/Novonorm) is used to treat high blood sugar levels in patients with **Type-2 Diabetes**.

Used to treat high blood sugar in Type-2 Diabetes

(II) It works by causing the pancreas to release more insulin into the patient's blood stream.

Pancreas releases more insulin into the patient's blood stream

(III) Along with diet and exercise, this medicine can help lower blood sugar effectively.

Helps lower blood sugar along with diet & exercise

(IV) It can also be added to Metformin as 2nd medicine.

Can also be added to Metformin as 2nd medicine

Can Repaglinide be used alone as a single medication for treatment of diabetes?

Yes, it can be!



Chap3Fig2

What we need to know about Repaglinide (Trade Names-Prandin/Novonorm):

- Either it can be used alone



Chap3Fig3

Can be used alone

- Or it can also be added to Metformin as 2nd medicine



Chap3Fig4

**Can be added to Metformin
as 2nd medicine**

- And maximum dose we can use is 16mg per day



Chap3Fig5

Maximum dose = 16mg

- Repaglinide can be given:
 - ★ 2 times a day or
 - ★ 3 times a day or
 - ★ 4 times a day



Chap3Fig6

Can be given:

- 2 times a day or
- 3 times a day or
- 4 times a day

- It can be increased every week up to 4mg with each meal.



Chap3Fig7

**Can be increased up to 4mg
every week with meals**

- It is based on your meal patterns.



Chap3Fig8

**Doses are based on
meal patterns**

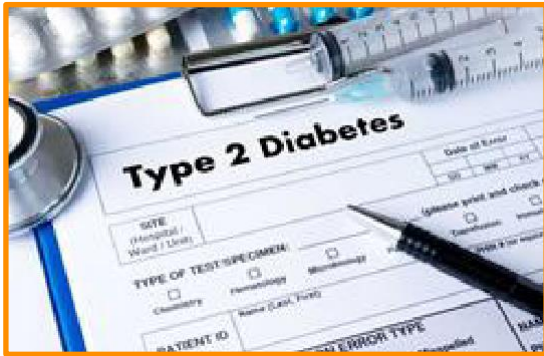
- If a meal is missed, please miss the next dose.



Chap3Fig9

If you miss a meal, avoid the next dose of medicine

- These medicines are more effective than SP-I



Chap3Fig10

More effective than SP-I

- They are also generally more expensive.



Chap3Fig11

Generally, more expensive

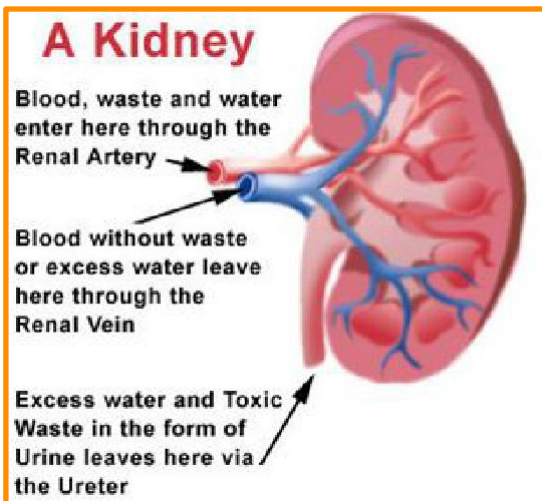
- It is a preferred medicine.



Chap3Fig12

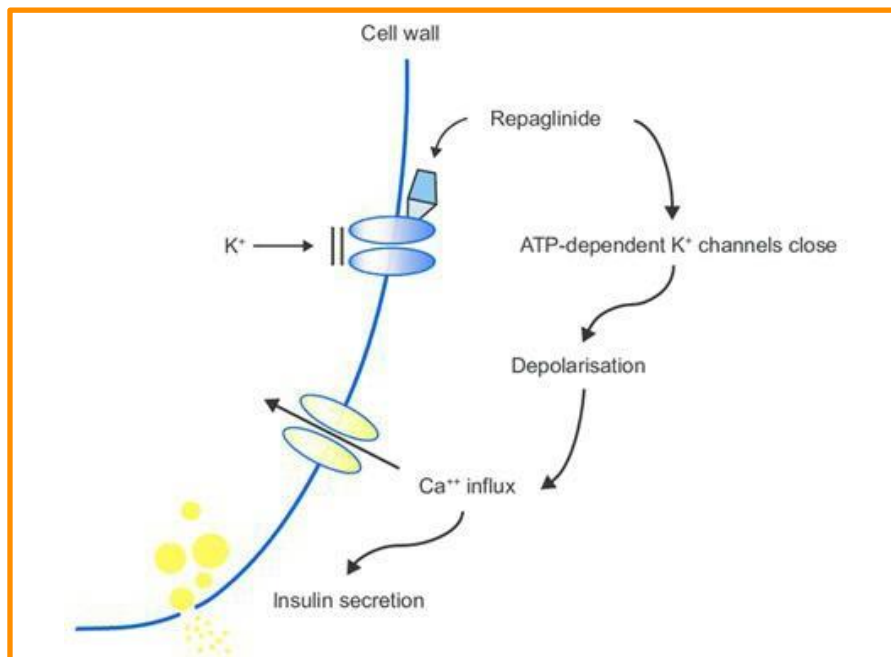
A preferred medicine

- It is especially useful if we have decreased kidney function.



Chap3Fig13

Useful if we have decreased kidney function



Chap3Fig14

Trade Name - Dose - Cost in USA - Cost in India

REPAGLINIDE

(PRANDIN/NOVONORM)

Please always combine any blood sugar medicine with diet and exercise.

All medicines continue life-long

Generic Name & Trade Name	About Repaglinide	Cost of Repaglinide for one month (in USA)	Cost of Repaglinide for one month (in India)
Generic Name: Repaglinide (available as 0.5mg, 1mg and 2mg tablets) Trade Name: Prandin (USA) (available as 0.5mg, 1mg and 2mg tablets) Novonorm (India)	<ul style="list-style-type: none"> ■ Usual dose: 0.5mg thrice daily before each meal ■ Can be increased to 1-2 mg before each meal ■ Maximum dose= 16 mg per day ■ Can be added to Metformin as 2nd medicine ■ As a Golden Rule - before starting any medicine, liver functions and kidney functions should be screened. 	<p>Dose = 0.5 mg thrice <u>a day</u></p> <p>1-month consumption = 90 tablets of 0.5mg</p> <p>Cost = \$ 25 for <u>0.5 mg</u> 90 tablets</p> <p>* All costs are meant for a rough estimate of one-month expense.</p>	<p>Dose = 0.5 mg thrice <u>a day</u></p> <p>1-month consumption = 90 tablets of 0.5mg</p> <p>Cost = Rs.800 for <u>0.5 mg</u> 90 tablets</p> <p>* All costs are meant for a rough estimate of one-month expense</p>

Chapter 4

Nateglinide (Trade Name: Starlix/Glinat)

Starlix/Glinat FDA Approval History

FDA Approved: Yes (Dec 22, 2000)

Brand name: Starlix

Generic name: Nateglinide

Dosage form: Tablets

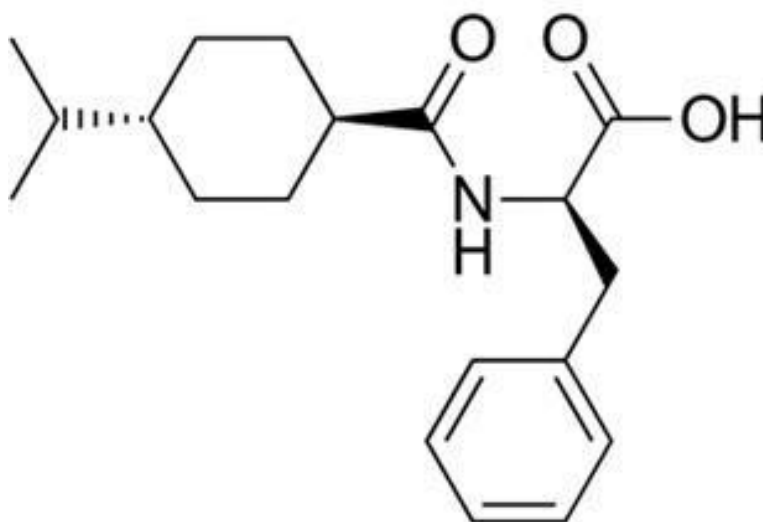
Company: [Novartis Pharmaceuticals Corporation](#)

Treatment for: [Diabetes - Type 2,](#)

Nateglinide

Starlix/Glinat

Molecular Structure of Nateglinide



Chap4Fig1

Nateglinide (Trade Name: Starlix/Glinat) is the medicine in the Glinide group, used for treatment of **Type-2 Diabetes**.

(I) Nateglinide (Starlix/Glinat) is used to treat high blood sugar levels in patients with Type-2 Diabetes.

Used to treat high blood sugar in Type-2 Diabetes

(II) Nateglinide is used alone or with other medications to control high blood sugar.

Can be used alone or with other medications

(III) Along with diet and exercise, this medicine can help lower blood sugar effectively.

Helps lower blood sugar along with diet & exercise

(IV) It is especially useful if we have decreased kidney function.

Useful if we have decreased kidney function

Nateglinide

Do not take a dose of medication if you are skipping that meal.



Chap4Fig2

What we need to know about Nateglinide (Trade Names - (Starlix/Glinat):

- Nateglinide can be used alone.



Chap4Fig3

Can be used alone

- Or it can also be used with other medications



Chap4Fig4

**Can be used with
other medications**

- And maximum dose we can use is 60 mg thrice a day.



Chap4Fig5

**Maximum dose =
60 mg thrice a day**

- It can be increased to 120 mg thrice a day before meals



Chap4Fig6

Can be increased 120 mg thrice a day before meals

- It is based on your meal patterns



Chap4Fig7

Doses are based on meal patterns

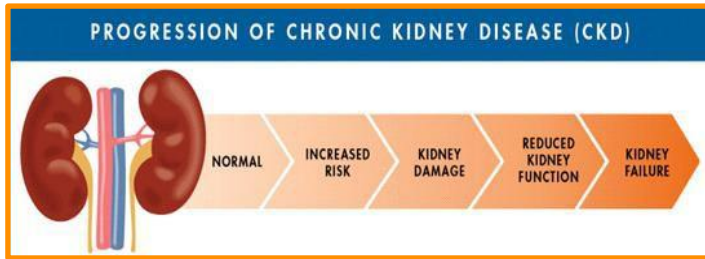
- If a meal is missed, please avoid the next dose



Chap4Fig8

If you miss a meal, avoid the next dose of medicine

- It is especially useful if we have decreased kidney function



Chap4Fig9

Useful if we have decreased kidney function

Trade Name - Dose - Cost in USA - Cost in India

NATEGLINIDE

(TRADE NAME: STARLIX/GLINATE)

Please always combine any blood sugar medicine with diet and exercise.

All medicines continue life-long

Generic Name & Trade Name	About Nateglinide	Cost of Nateglinide for one month (in USA)	Cost of Nateglinide for one month (in India)
<p>Generic Name:</p> <p>Nateglinide (available as 0.5mg, 1mg and 2mg tablets)</p> <p>Trade Name:</p> <p>Starlix (USA) (available as 60 mg and 120 mg tablets)</p> <p>Glinat (India) (available as 60 mg and 120 mg tablets)</p>	<p>■ Usual dose: Start with 60 mg thrice a day before meals</p> <p>■ Can be increased 120 mg thrice a day before each meal</p> <p>■ Maximum dose= 360 mg per day</p> <p>■ As a Golden Rule - before starting any medicine, liver functions and kidney functions should be screened</p>	<p>Dose= 60 mg thrice <u>a day</u></p> <p>1-month consumption = 180 tablets of 60mg</p> <p>Cost= \$55 for 180 tablets of 60mg</p> <p>*All costs are meant for a rough estimate of one-month expense.</p>	<p>Dose = 60 mg thrice <u>a day</u></p> <p>1-month consumption = 180 tablets of 60mg</p> <p>Cost = Rs.600 for 180 tablets of 60mg</p> <p>*All costs are meant for a rough estimate of one-month expense</p>

Chapter 5

Mitiglinide

(Trade Name: Glufast)

Glufast Approval History

FDA Approved: Obtained approval in Feb 2006; Launched on Oct 1, 2006

Brand name: Glufast (Available only in Japan and Korea)

Generic name: Mitiglinide

Dosage form: Tablets

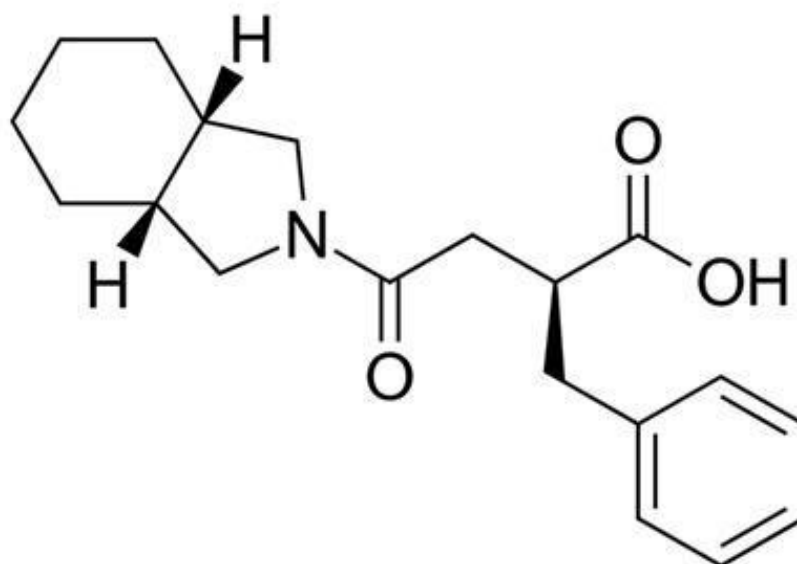
Company: [Kissei Pharmaceutical Co., Ltd.](#)

Treatment for: [Diabetes - Type 2](#)

Mitiglinide

Glufast

Molecular Structure of Mitiglinide



Chap5Fig1

Mitiglinide (Trade Name: Glufast) is the medicine in the Glinide group, used for treatment of **Type-2 Diabetes**.

(I) Mitiglinide (Glufast) is a blood glucose lowering medicine.

It's a blood glucose lowering medicine

(II) It works by increasing the secretion of insulin in the body.

Increases the secretion of insulin in the body

(III) Along with diet and exercise, this medicine can help lower blood sugar effectively.

Helps lower blood sugar along with diet & exercise

Glufast

It is a rapid-acting insulin secretion stimulating agent.

It improves levels of HbA1c, an indicator of average blood glucose levels.



Chap5Fig2

Mitiglinide (Glufast)

- Initial: 5 mg 3 times daily with meals
- Maximum dose: 20 mg 3 times daily

What we need to know about Mitiglinide (Trade Name – Glufast)

- Mitiglinide is one of the glinides and mechanism of its action is similar.



Chap5Fig3

**Mechanism is similar to
other Glinides**

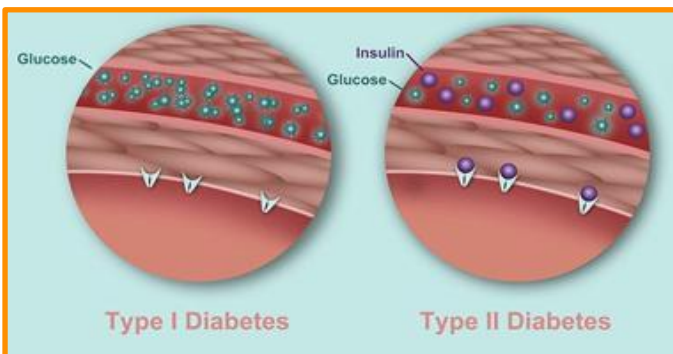
- It is NOT available in USA; It is available in Japan & Korea.



Chap5Fig4

**NOT available in USA;
available in Japan & Korea**

- Mitiglinide is a drug for the treatment of Type-2 Diabetes.



Chap5Fig5

**Used for treatment of
Type-2 Diabetes**

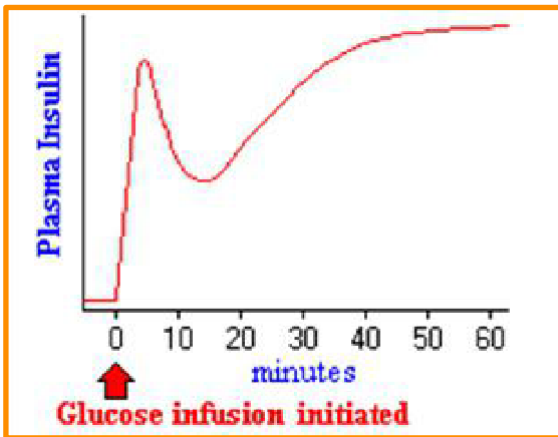
- It contains **5 mg or 10 mg of Mitiglinide calcium hydrate.**



Chap5Fig6

Contains 5 mg or 10 mg of Mitiglinide calcium hydrate

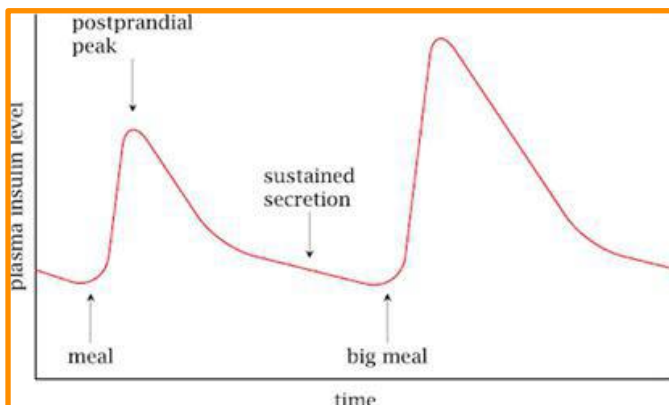
- It brings **insulin secretion closer to its natural patterns.**



Chap5Fig7

Brings insulin secretion closer to its natural patterns

- it improves **postprandial hyperglycemia.**



Chap5Fig8

Improves postprandial hyperglycemia

Trade Name - Dose - Cost in USA - Cost in India

MITIGLINIDE

(TRADE NAME: GLUFAST)

Please always combine any blood sugar medicine with diet and exercise.

All medicines continue life-long

Generic Name & Trade Name	About Mitiglinide	Cost of Mitiglinide for one month (in Japan)	Cost of Mitiglinide for one month (in Korea)
Generic Name: <hr/> Mitiglinide	Usual dose: 5 mg 3 times daily just with each meal	Dose= 5 mg 3 times <u>daily</u> with meals 1-month consumption = 90 tablets	Dose= 5 mg 3 times <u>daily</u> with meals 1-month consumption = 90 tablets
Trade Name: <hr/> Not available in USA Not available in India Glufast (Japan & Korea)	Maximum Dose: 20mg 3 times daily As a Golden Rule - before starting any medicine, liver functions and kidney functions should be screened.	Cost = Yen 30.80 per <u>tablet</u> Cost for 1 month = Yen 900 (a)proximately \$25-27 for 90 tablets *All costs are meant for a rough estimate of one-month expense.	Cost = Korean Won <u>300 per tablet</u> Cost for 1 month = Approximately \$3000 dollars for 90 tablets *All costs are meant for a rough estimate of one-month expense