

31

July

2012
Week 32 • Day 213 153

TUESDAY

Glucose Meter/Glucometers. ∴ A glucose meter is a

8.00

medical for determining the approximate concentration of glucose in the blood. It is a key element of home blood glucose monitoring by people with Diabetes mellitus or hypoglycemia.

9.00

10.00

11.00

12.00

1.00

2.00

3.00

4.00

5.00

Eve.

Notes

2012						
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2012						
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Regulation of Blood Sugar Level. ∴ Normal blood sugar level varies from 80-100 mg per 100 ml (fasting) to 100-120 mg per 100 ml (after meal). Large quantities of sugar are constantly entering the blood stream (absorption, glycogenolysis and gluconeogenesis) and are constantly being removed from it (glycogenesis, oxidation of sugar, synthesis of lipids etc).

In spite of those opposing forces, blood sugar level remains fairly constant within this limited range. This indicates that there must be a strong machinery for blood sugar regulation.

The mechanism involves the following factors:

1. Assimilation limits of glucose

When glucose is given by mouth up to 200 g, no sugar is found in the urine in the next 24 hours.

If more than 500g be given at a time, the subject develops nausea and the glucose is vomited out.

When given up to 300-500g, a large amount of water is osmotically drawn in and stomach becomes distended.

Rapid absorption causing a very high rise of blood sugar is prevented.

Blood sugar rises to some extent but

as a rule, does not go beyond the renal threshold. Yet, some subjects develop a little glycosuria.

Notes: Kidneys being unaccustomed to work under such high sugar pressure, fail to reabsorb glucose completely from the renal P.T.O

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September 2012						
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tubules and consequently, a small amount leaks out.

② Digestion of Starch.

- ⊙ It is a slow and long process.
- ⊙ Necessarily absorption becomes slow.
- ⊙ So that a sharp rise of blood sugar is prevented.

③ Rate of Absorption

- ⊙ It is believed that there is a max. limit of glucose absorption.
- ⊙ It is about 1.84 g per kg. pers. hour.
- ⊙ Whatever be the amount of sugar given, the rate of absorption does not go beyond it, hence blood sugar cannot have a sharp rise. It is interesting to note that utilisation of sugar by tissues has also nearly the same rate.

Notes

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August							2012	
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④ Role of Liver

This Organ takes place an important part in blood Sugar regulation. It help in two opposite ways i.e.

① When blood Sugar tends to rise,
Liver stores it as glycogen &
thus rise of blood sugar is checked.

② When B.S. tends fall,
Liver mobilises its
Glycogen store and
... speeds up the rate
of gluconeogenesis and thus
restores the level to normal.

* Both these (A & B) processes are under the control of Hormones.

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October 2012						
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•5) Role of Muscles

• Muscles also help in the same two ways as liver.

• When B.S. becomes low (hypoglycaemia) or, after severe muscular exercise, lactic acid is mobilised from the muscles, converted first into glycogen and then into glucose in the liver and discharged into the blood stream.

• Thus bloods sugar is revised. Through this "Cori Cycle" liver and muscle co-operate in maintaining blood sugar.

•6) Role of Endocrines

Endocrines are the chief regulators of blood sugar level. This processes are under the control of hormones. - to be described below :-

Notes

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(7) **Insulin** (A)

It is the strongest blood sugar-reducing factor.

By increasing glycogenesis.

By preventing gluconeogenesis.

By promoting glucose uptake in muscles and adipose tissue due to its influence on the cell permeability and phosphorylation process. & by stimulating glucose combustion.

(8) **Anterior pituitary** (B)

A member of anterior pituitary hormones increases blood sugar.

Growth hormone decrease peripheral utilization of glucose & the resulting hyperglycaemia

ACTH through adrenal cortex.

TSH through thyroid, increase blood sugar level.

stimulates the β -cells to over production of insulin and to exhaustion. Growth hormone also has lipolytic action.

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October 2012						
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Notes

TUESDAY

GH, ACTH and TSH have got opposing actions to that of insulin.

9
Posterior Pituitary

A large dose of Vasopressin and Oxytocin raise the blood sugar level temporarily.

For e.g. In rabbits, Vasopressin is more effective in raising the blood sugar level, whereas in dogs Oxytocin has greater hyperglycaemic effect.

10 Adrenal Cortex → Glucocorticoids work in the following ways :-

A Depress the peripheral utilisation of glucose due to retardation of phosphorylation.

15 Increase gluconeogenesis in the liver due to retarded amino acid incorporation into protein, thus making more gluconeogenic material available.

Notes

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August 2012						
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(11)

Epinephrine and nor-epinephrine.

Raises B.S in the following ways:

Stimulating glycogenolysis from liver.

Converting muscle glycogen into lactic acid, which, through Cori cycle, increases the blood sugar level. Epinephrine increases basal metabolic rate by 20%, and increases the oxidation of glucose in the tissues. Nor-Epinephrine

has similar effects, although to a much lesser degree.

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Notes

09

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THURSDAY

12

Thyroid

©

On continued administration
-the animals become resistant
to epinephrine and more
sensitive to insulin. Severity of
diabetes increases in hyper-
thyroidism.

9.00

Increase in the peripheral
utilisation and combustion
of glucose in the tissues.

11.00

13 Stimulation of glycogenolysis &
gluconeogenesis.

12.00

1.00

13 Glucagon

2.00

Glucagon increases B.S. due to glycogenolysis in liver &
gluconeogenesis.

3.00

4.00

Insulin tries to reduce blood sugar, whereas the other
glands try to raise it. The normal sugar level is the
optimum balance between these two opposite forces.

5.00

Eve.

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14 Role of Nervous System

(A) Stimulation of the right Vagus reduces B.S. level by

increasing insulin secretion.

(B) Stimulation of the sympathetic

increasing B.S. level by mobilising liver glycogen and by stimulating epinephrine secretion. Autonomic action is controlled by blood sugar level.

15 Role of Blood Sugar

Blood sugar regulates its own level.

Hypoglycaemia stimulates insulin secretion

by - (a) Directly acting on the β -cells.

(b) Stimulating the right Vagus.

(c) It also increases the rate of Oxidation of Sugar in the tissue independent of hormones & probably.

(d) Depresses the secretion of growth hormone.

In this way, the too raised blood sugar is brought down to normal.

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On the other hand, hypoglycaemia depresses

insulin secretion by -

- (A). Directly action on the pancreatic islet tissues.
- (B). Inhibiting the right Vagus.
- (C). It stimulates epinephrine secretion
- (d) that of the growth hormone.

In this way, the low S.L is raised to normal. In this way B.S.L. Controls itself.

(16) Role of kidneys.



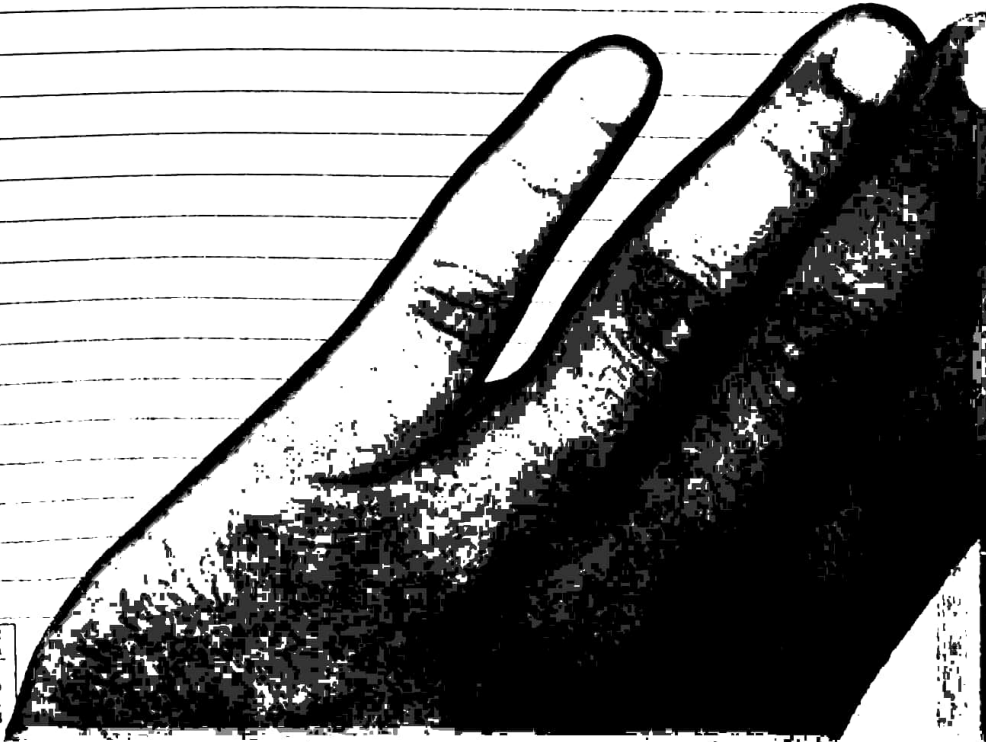
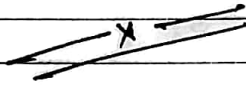
(16) Kidneys act as the last outposts. When B.S. goes above the renal threshold (180mg per 100ml), it leaks out through the kidneys. It is an obvious attempt on the part of the kidneys to check further rise of B.S.

Notes

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Cons: → From the above Considerations, ^{it} will be MONDAY
 seen that, glucose being the ready source of energy, the
 body has developed a very elaborate and an efficient
 machinery to control its supply, storage and utilisation.



September 2012							October 2012							
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29	30	31					29	30	31					