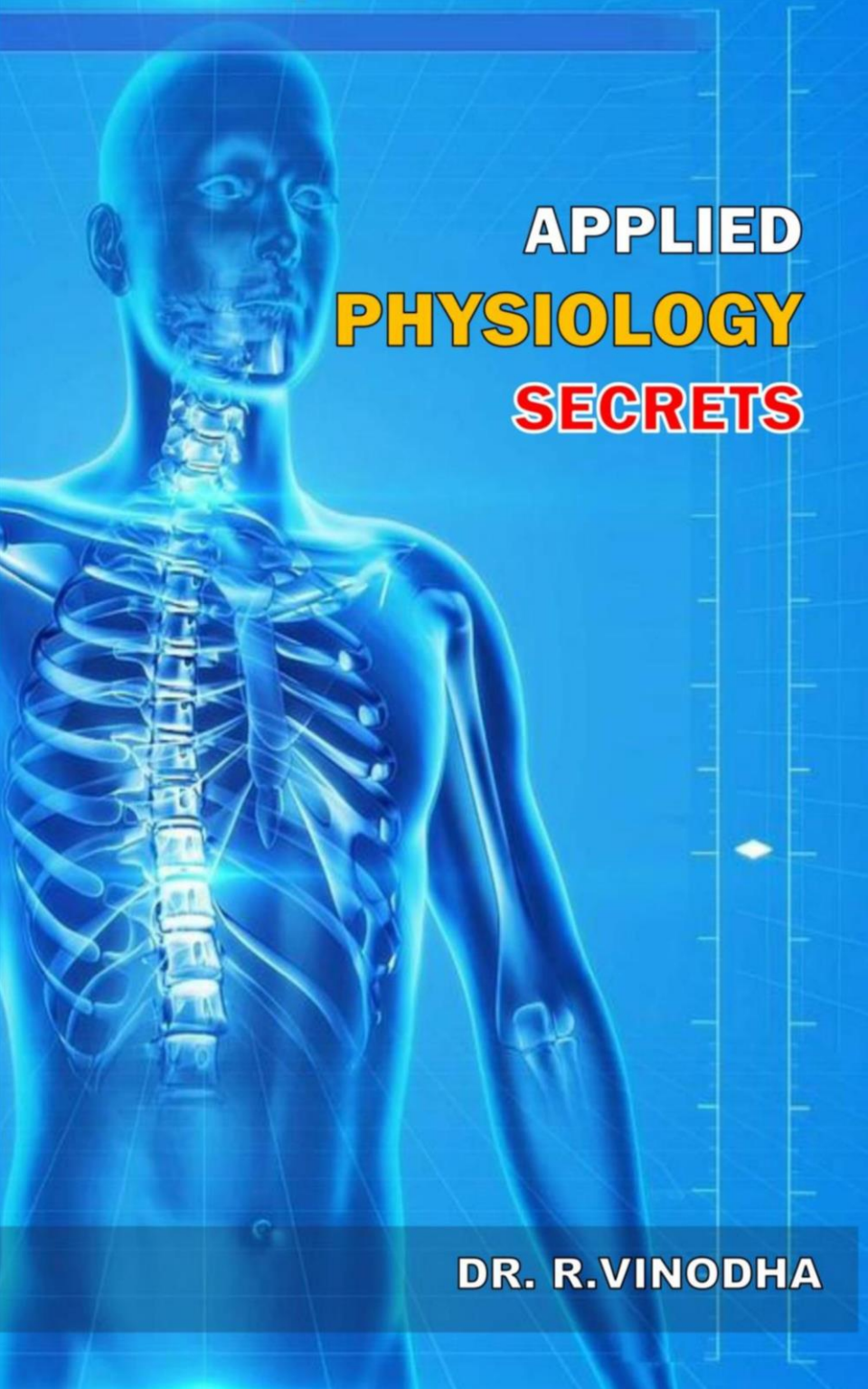

APPLIED PHYSIOLOGY SECRETS

DR. R.VINODHA

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ABOUT THE BOOK

- This book has been designed for medical students to think critically and intellectually to enhance their knowledge.
- Questions in the form of short notes, reasoning out, comments and controversies.
- Ideal for self assessment, M.D. Physiology postgraduates, PG basic science and M.B.B.S examination.
- Covers even difficult concepts in Physiology. Some questions also include clinical perspective concepts.

ABOUT THE AUTHOR

Dr. R. Vinodha is professor & HOD of Physiology at Thanjavur medical college,Thanjavur.

She graduated M.B.B.S from Thanjavur medical college in 1987 and completed M.D. (physiology) in 1993 at Madras medical college, Chennai. She has been teaching Physiology for the last about 20 years.

She has published papers in national and international journals. She guides and encourages students through e-learning by publishing many articles and MCQs in her online web portal www.drvinodha.blogspot.com. She was a senate member of T.N Dr. M. G. R. Medical University from 2011 to 2014.

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DEDICATED TO

My grandmother (in memoriam),
P.Govindammal

My parents,
A.Ramayyan & R.Sakuntala
My students

CONTENTS

1. What is Allostasis?

It is the process of achieving homeostasis through hormonal or nervous system.

2. What is Lyonisation?

Genes on one of the X chromosomes in somatic cells of female becomes inactive in early embryonic life. This is called Lyonisation & it is present only in somatic cells of females not in germ cells and also not in males. (Lyonisation – X inactivation is an epigenetic event) Subsequent daughter cells will have the same X inactivation. So in fully developed fetus, some group of cells will have one of the X chromosomes inactivated, other group of cells will have other X chromosomes inactivated (Not uniform). All the cells in females are not functionally identical.

3. What are Stem cells?

They are unspecialised cells & have two defining properties.

a) Ability to differentiate into other cells.
b) Capable of self-regeneration.

4. What are the types of stem cells?

Totipotent	-	e.g. Zygote
Pluripotent	-	Cultured human embryonic stem cell
Multi potent	-	Hemopoietic stem cell
Oligo potent	-	Myeloid precursor
Quadripotent	-	Mesenchymal Progenitor cell
Tripotent	-	Glial Restricted precursor
Bipotent	-	Murine fetal liver
Unipotent	-	Mast cell precursor
Nullipotent	-	Terminally differentiated cell - eg. RBC.

5. Name the Embryonic stem cell marker (ESC)

a) Oct-3 or Oct3/4-Transcription factor

b) SSEA-Stage specific embryonic antigen.

6. Sweet tooth in the exercising muscle – Comment.

Muscle cells insert more glucose carriers in their plasma membrane in response to exercise. During exercise the rate of glucose transport into exercising muscle increases. Usage of glucose & other nutrients also increases. Glucose uptake by cells is accomplished by glucose carrier in the plasma membrane.

7. What is the normal Adipose tissue blood flow (ATBF)?

In fasting 3ml/100mg/tissue/mt.Fasting, exercise, stress, β adrenergic stimulation increases Adipose tissue blood flow (ATBF).

8. What is Junk DNA?

A Portion of DNA sequence of a Chromosome or a genome that do not encode protein sequences. It is also called non coding DNA. Much of this DNA has no biological function.

9. What is micro gravity/Near-Zero gravity?

Micro gravity/ near-Zero gravity environment is present in space that can affect the body in 3 major ways.

a) There are changes in the circulatory system.
b) There is a shift in body fluids towards head
c) There is a reduction in weight bearing forces in the body.

Physiological effects of space flight – space sickness, disorientation, migration of fluids to upper body, muscle atrophy, bone deterioration, lengthening of spine, backache etc...

10. What is staleness?

Staleness means over training. It occurs in 10 – 20% of athletes. Two clinical forms have been described.

a) The most common form is Parasympathetic form – (Addisonoid for adrenal insufficiency patterns) characterised by Predominance of vagal activity during rest & exercise.
b) The less common form is Sympathetic form (basedowian for thyroid hyper function pattern) characterised by increased sympathetic activity during rest, hyper excitability, restlessness & impaired exercise performance.

11. What is the formula for calculating serum anion Gap?

$(Na^{+} + K^{+}) - (Cl^{-} + Hco^{3-})$.The normal value is 6-12 mmol/lt.

12. Why do mitochondrial diseases cause myopathy?

Muscles derive energy via oxidative phosphorylation. A mutation in mitochondrial DNA impairs oxidative phosphorylation.

13. Reasoning out: single gene traits obey All or None law.

Single gene traits are discrete or qualitative and providing All or None phenotype (Normal vs. affected) whereas multiple genes that regulate height, skin colour results in continuously varying phenotype. (Skin colour is controlled by 8 genes).

ABOUT THE AUTHOR


(Dr. R. Vinodha)

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