

Physiology

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- ◆ (Both E34 / door 208)
- ◆ Wednesdays 12.00–13.40
- ◆ Seminar room E34/225 (Laboratory room 130)

Course 2

- ◆ Compulsory attendance at the lectures (up to 2 excused absences),
- ◆ active participation during the lectures,
- ◆ mid-term (March/April) and final test (May 2022).

Recomm

- ◆ BERNACIKOVÁ, Martina. *Physiology*. Brno: Masarykova univerzita, 2012. ISBN 978-80-210-5844-6,
- ◆ MCARDLE, William D., Frank I. KATCH & Victor L. KATCH. *Exercise physiology: energy, nutrition, and human performance*. 6th ed. Philadelphia: Lippincott Williams & Wilkins, 2007. xxi, 1068 p. ISBN 9780781749909,
- ◆ *Sport and exercise physiology testing guidelines: the British Association of sport and exercise sciences guide*. Edited by Edward M. Winter. 1st ed. London: Routledge, 2007. 364 p. ISBN 9780415361415,
- ◆ WILMORE, Jack H., David L. COSTILL & W. Larry KENNEY. *Physiology of sport and exercise*. 4th ed. Champaign, Ill.: Human Kinetics, 2008. xvii, 574 p. ISBN 9780736055833,
- ◆ MCARDLE, William D., Frank I. KATCH & Victor L. KATCH. *Essentials of exercise physiology*. Fifth edition. Philadelphia: Sage, 2016. xx, 702 p. ISBN 9781496309099.

1. Introductory seminar
2. Anthropometry (body height, weight, skinfolds) + Somatotype
3. Skeletal muscle + Nervous system
4. Metabolism + Energy + Basal metabolism
5. Cardiovascular system + Blood pressure + Heart rate
6. Respiratory system + Spirometry
7. **Mid-term test** + Cardiovascular and respirational adaptations
8. Thermoregulation
9. Endocrine glands and their hormones
10. Anaerobic and Aerobic ability (W170, Wingate test)
11. Ventilatory threshold (Conconi test)
12. Spiroergometry (aerobic capacity, maximum oxygen uptake)
13. Reserve lecture (protocols revision, extra topic)
14. **Final test**

Some re

- ◆ Practical character of the most lectures – please come in aware, representative and comfortable state and clothing
 - ◆ Anthropometry, stress tests, et cetera
- ◆ The last 3 lectures are physically demanding (yet fun), get yourselves ready



AN INTRODUCTION TO EXERCISE AND SPORT PHYSIOLOGY



Learning

- ◆ Learn to differentiate exercise physiology and sport physiology.
- ◆ Note the differences between acute responses to exercise and chronic adaptations to training.

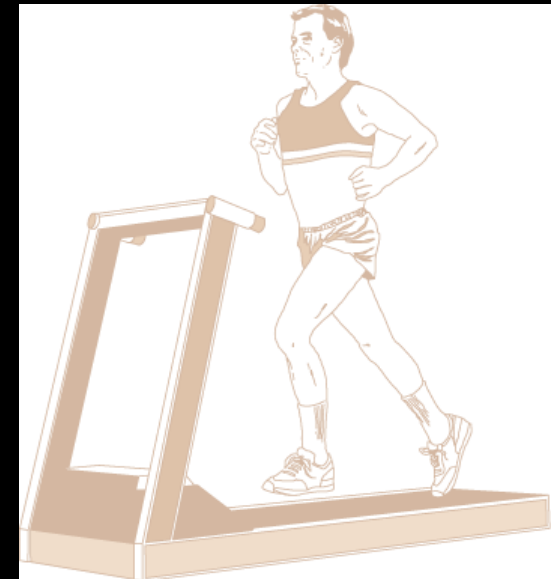
Learning

- ◆ Learn what factors affect the body's acute response to exercise.
- ◆ Understand the six basic principles of training.
- ◆ Learn whether cross-sectional studies or longitudinal studies are more accurate.

Exercise Physiology vs Sport Physiology

Exercise physiology studies how the body's structures and functions are altered when exposed to acute and chronic bouts of exercise.

Sport physiology applies exercise physiology concepts to an athlete's training and performance.



Acute Responses vs Chronic Adaptations

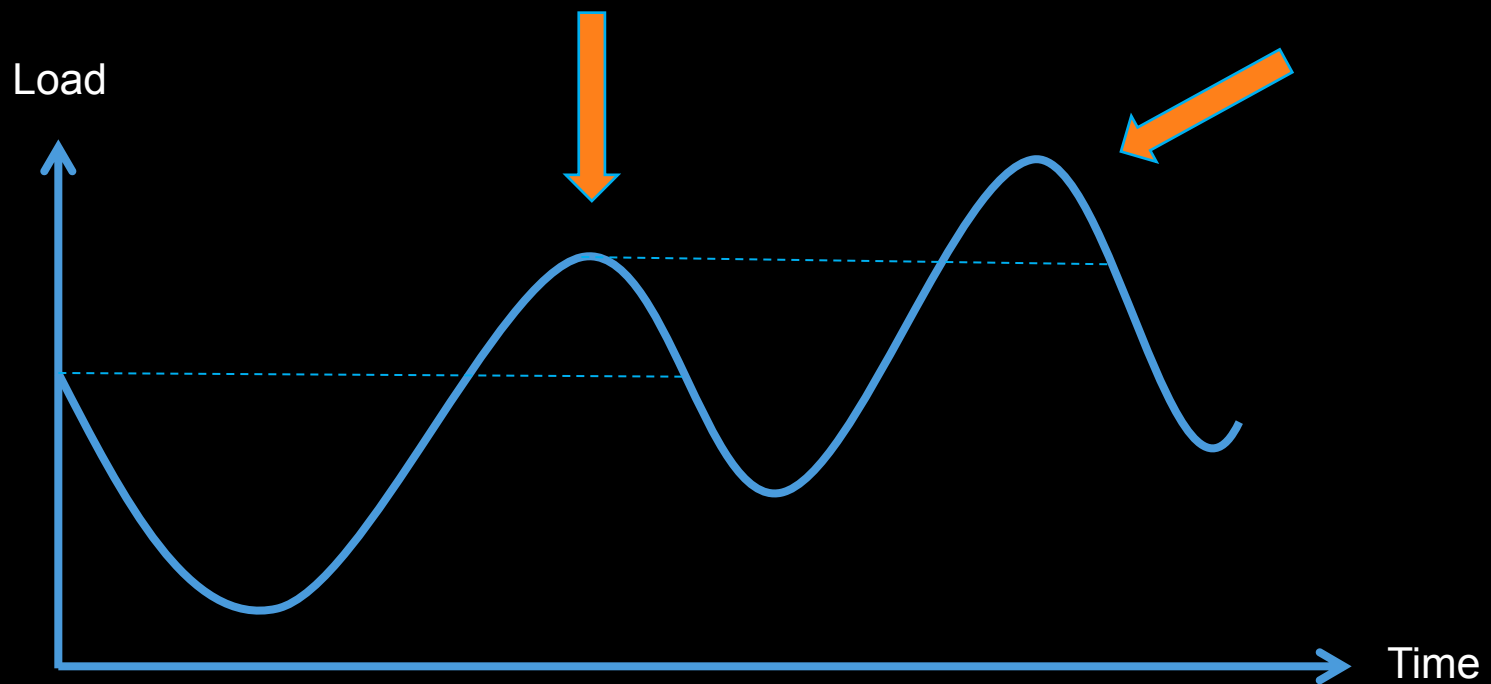
Acute responses to training involve how the body responds to one bout of exercise.

Chronic physiological adaptations to training mark how the body responds over time to the stress of repeated exercise bouts.



Supercompensation

- Process of increasing the energetic potential after load
- Optimal period for addition of another training load



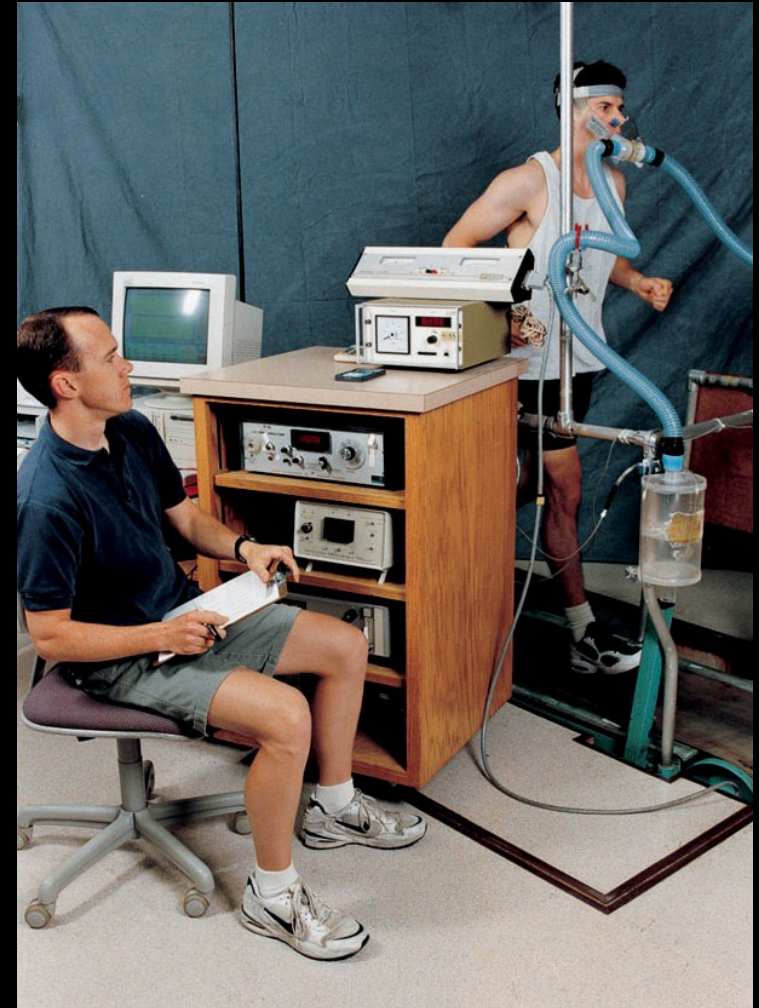
Cycle Ergometer

- ◆ Makes it easier to assess blood pressure and collect blood because upper body is relatively immobile
- ◆ Results are not greatly affected by body weight or changes in body weight



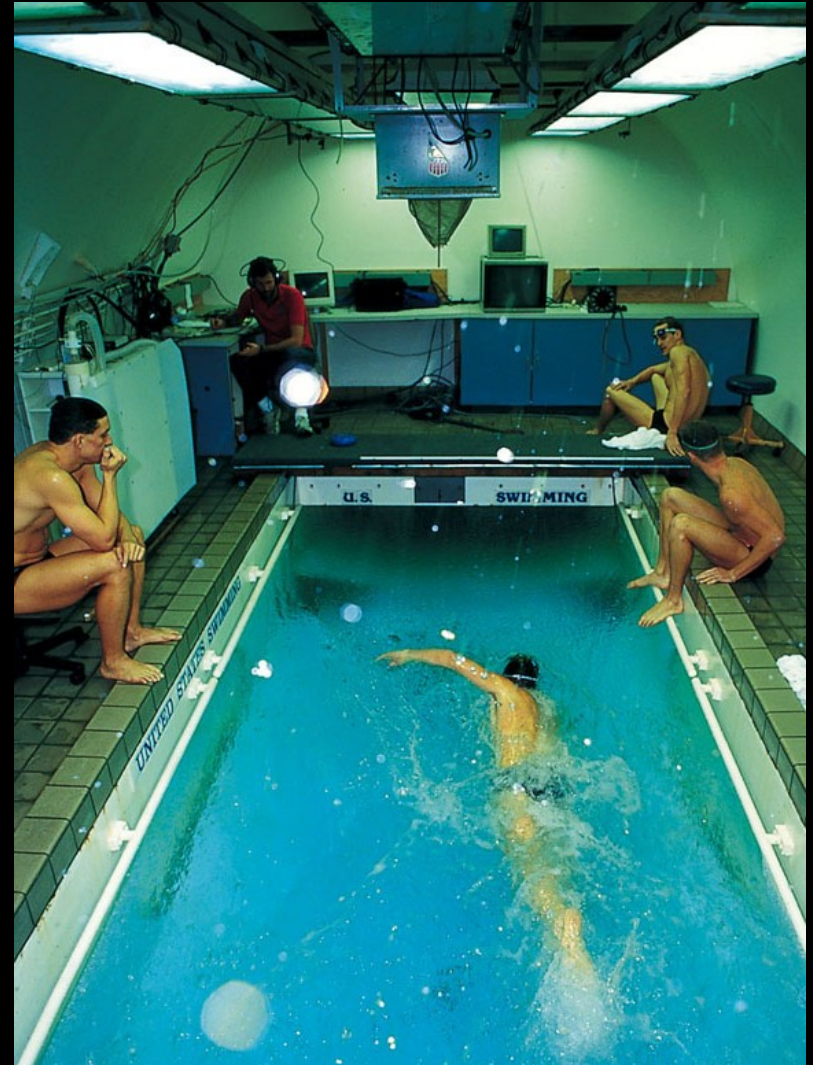
Treadmill

- ◆ Results in generally higher maximal physiological values—heart rate, ventilation, and oxygen uptake—than cycle ergometer



Swimming Flume

- ◆ Allows swimmers to closely simulate their natural swimming strokes while researchers collect data



Key Points

Measuring of Acute Response to Exercise

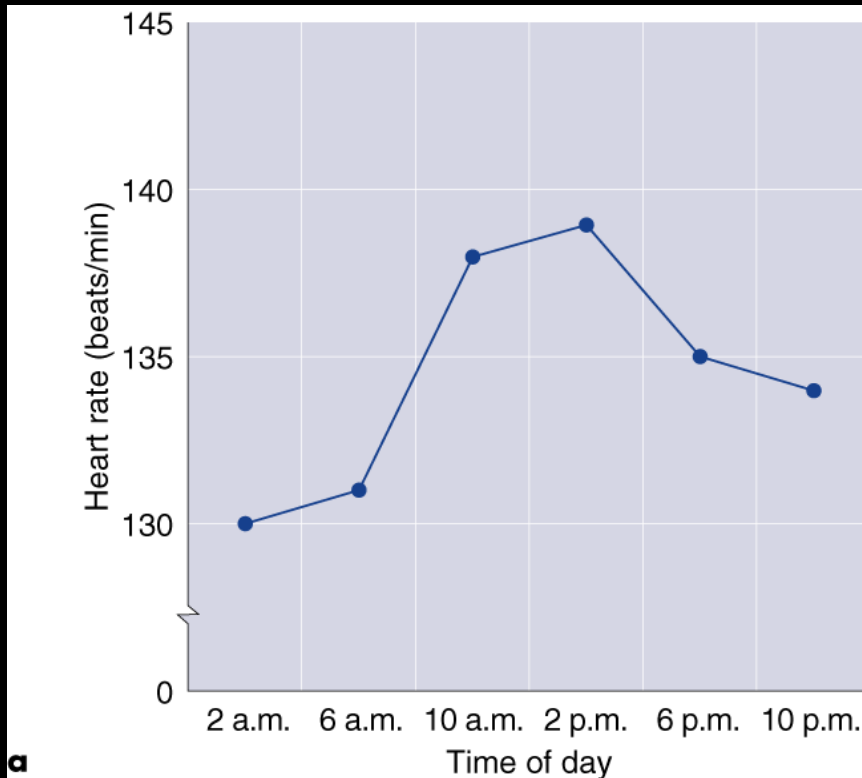
- ◆ Control environmental factors such as temperature, humidity, light, and noise.
- ◆ Account for diurnal cycles, menstrual cycles, and sleep patterns.
- ◆ Use ergometers to measure physical work in standardized conditions.
- ◆ Match the mode of testing to the type of activity the subject usually performs.

An Example of Diurnal Variations in Heart Rate at Rest and During Exercise

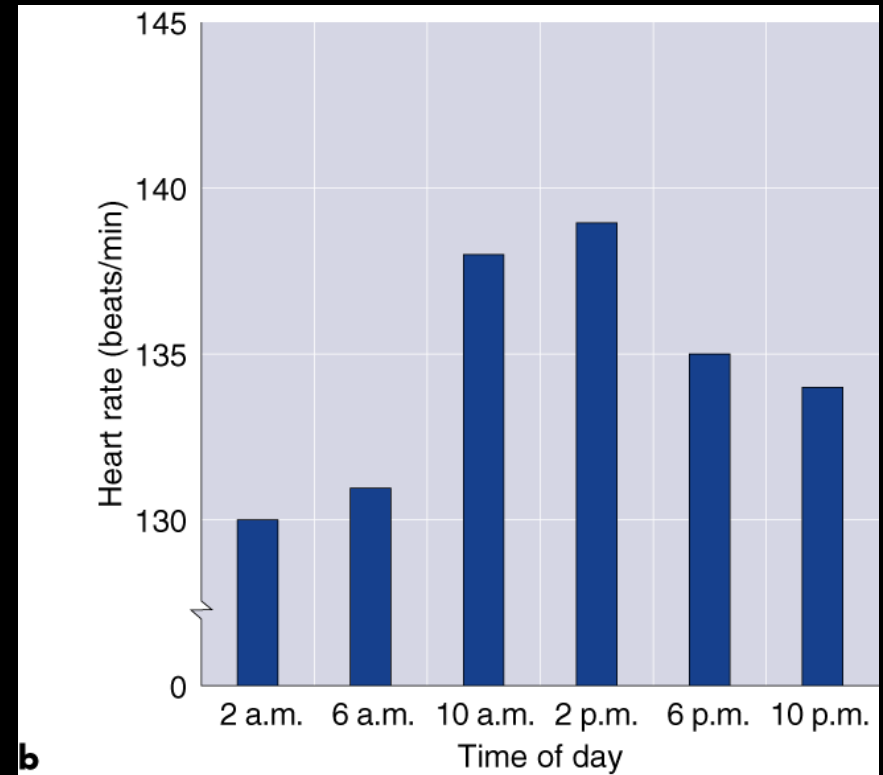
Condition	Time of day					
	2 a.m.	6 a.m.	10 a.m.	2 p.m.	6 p.m.	10 p.m.
Resting	65	69	73	74	72	69
Light exercise	100	103	109	109	105	104
Moderate exercise	130	131	138	139	135	134
Maximal exercise	175	176	177	178	181	181
Recovery 3 min	118	122	129	128	128	125

Data from Reilly and Brooks (1990).

READING AND INTERPRETING CHARTS

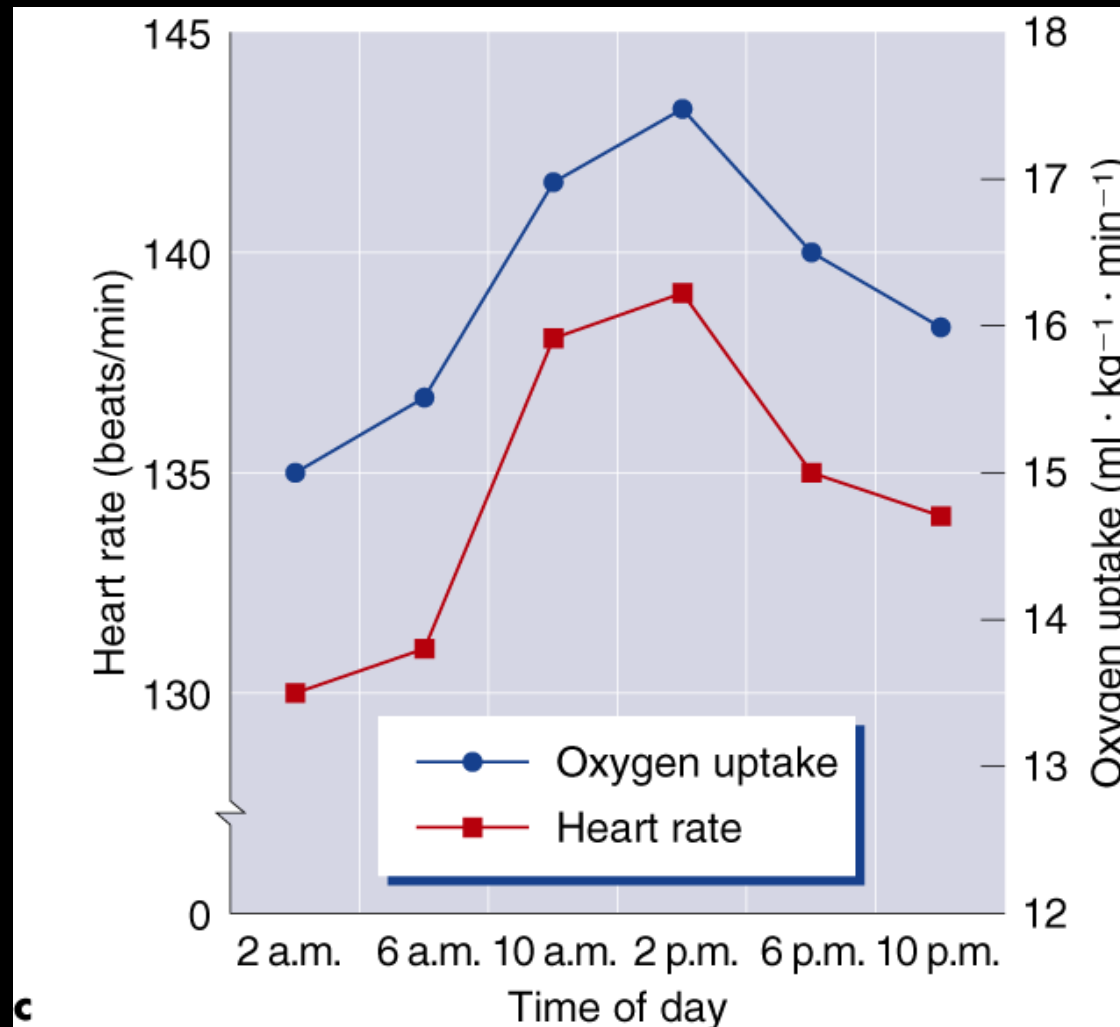


Line chart



Bar chart

READING AND INTERPRETING CHARTS



Key Points

Longitudinal vs Cross-sectional Research

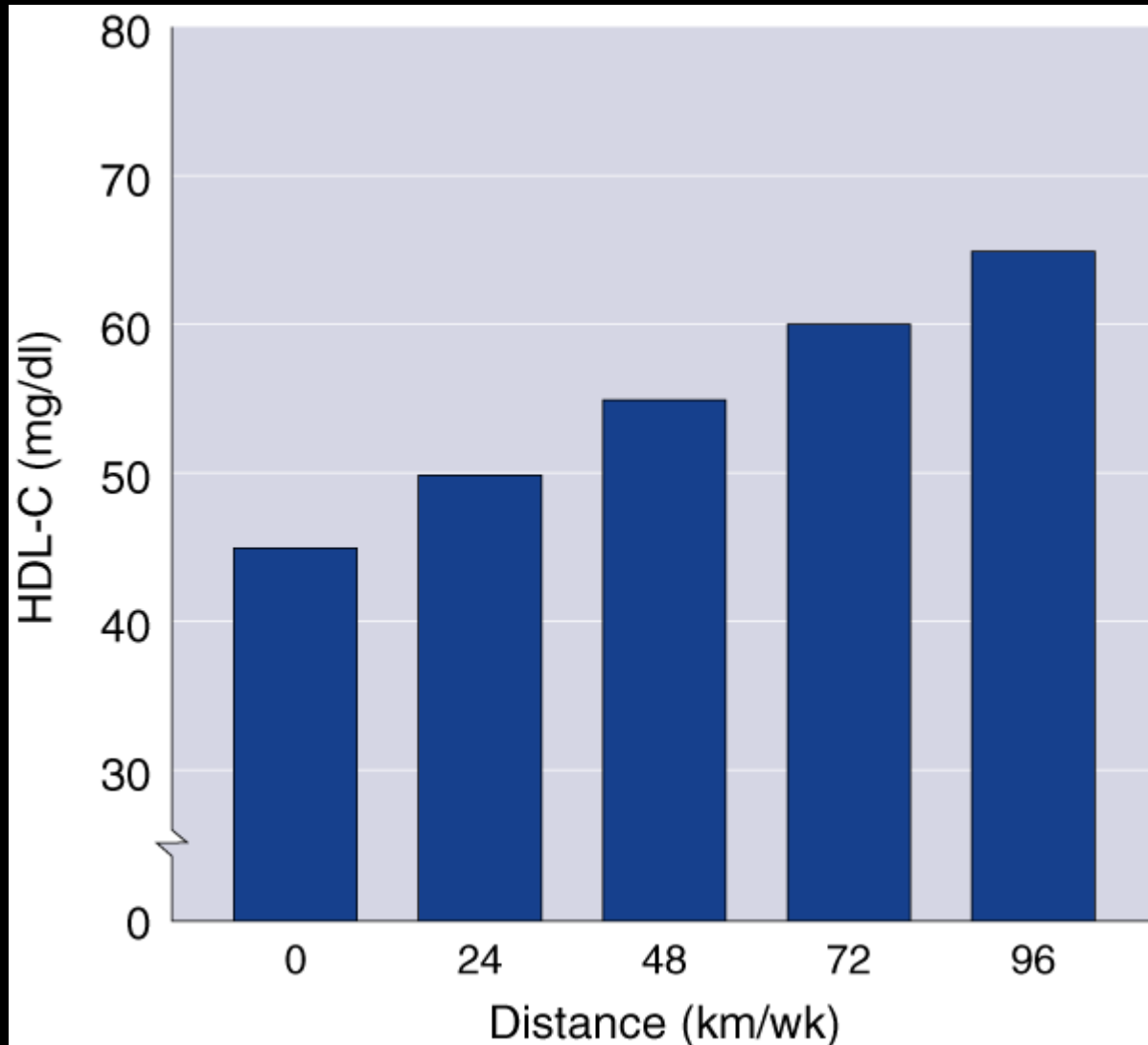
- ◆ Longitudinal research tests the same subjects and compares results over time.
- ◆ Cross-sectional research collects data from a diverse population and compares the data for each group in that population.
- ◆ Longitudinal studies are often more accurate than cross-sectional studies, but they can't always be done.

Key Points

Laboratory vs Field Research

- ◆ Laboratory research allows investigators to carefully control variables and use accurate equipment.
- ◆ Field research allows for less control of variables and equipment, but participant's activities are often more natural.

CROSS-SECTIONAL RESEARCH



LONGITUDINAL RESEARCH

