


**King Saud University**  
 LECTURE 3  
 (9-10:30am, 25<sup>th</sup> September)

**Current Topics in Exercise and Sports Science Research**  
**Where are we heading to?**

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## Current Topics

- What are they?
- How can we find them?
- Why is it necessary to update the knowledge?
- Theory and “common sense” are not always unchanged

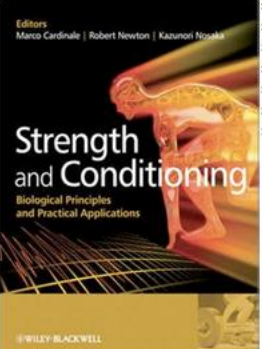
## Evolution of Science

- A common sense in 10 years ago may not be a common sense today
  - Static stretching
  - Protein intake after exercise
  - Muscle hypertrophy load
  - Exercise for cancer patients
  - Muscle length changes in isometric contraction
- New technology
  - MRI, TMS
  - Wireless
- Depth of understanding
  - Molecular techniques (e.g., signal trasduction)

## Sources of Information

- Books (Textbooks)?
- Journal articles?
- Peer-reviewed journal articles
- Conferences

## Are textbooks enough?

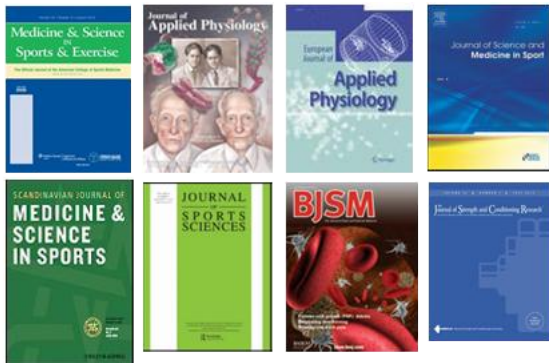


**2.6 Exercise-induced Muscle Damage and Delayed-onset Muscle Soreness**  
 2.6.1 Introduction.  
 2.6.2 Symptoms and markers of muscle damage.  
 2.6.3 Relationship between DOMS and other indicators.  
 2.6.4 Factors influencing the magnitude of muscle damage.  
 2.6.5 Muscle damage and training.  
 2.6.6 Conclusion.

## Journal Articles

- Which journal?
- Key words
- Key authors
- Check them regularly

## Some of the Journals



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## Some of the “Current Topics”

- Topics against “common sense”
- New techniques
- Health-related
- Mechanisms oriented
- Depends on individuals

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## Future Direction

- Research understanding phenomena
- New theory
- Using a new technique
- Nobody has done
- Interesting
- Practical application
- Useful

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## What will be studied more?

- Brain
- Exercise in children
- Exercise for diseases
- Individual differences
- Exercise in extreme environment
- Molecular mechanisms
- Multidisciplinary approach

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## Can sports science make a champion?

- Yes / No
- Why do you think so?
- What is an example?

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## FACTS

- Countries that have been producing “champions” are not necessarily “top” in sports science research
  - e.g. Spain, China, Russia, South Korea
- Countries that are considered to be advanced in sports science produce “champions”
  - e.g. USA, Denmark, Australia, Finland

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## Is sports science necessary?

- Yes / No
- Why do you think so?
- What is a problem?

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## Does sports science enhance sports performance?

- Yes
- Most of “effective” performance enhancing interventions are banned
- Looking for an “effective” intervention that has not been banned, or that cannot be detected

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## My Opinions / Views

- Sports science can help producing “good athletes” but they may not be necessarily “champions”
- Sports science can help making a “champion” but it is not the only reason
- Sports science can provide “basic” information for making better “athletes”

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## FACTS

- It is difficult to use “elite athletes” for research
- Data from “elite athletes” are rare
- There is a gap to predict performance of “elite athletes” from the data obtained from “sub-elite athletes” but the data are still useful

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## “Slussy Ice” Study

Ice Slurry Ingestion  
Increases Core  
Temperature Capacity and  
Running Time in the Heat

Siegel R, Mate J, Brealey M,  
Watson G, Nosaka K,  
Laursen, P  
*Med Sci Sports Exerc* 42:717–  
725, 2010.



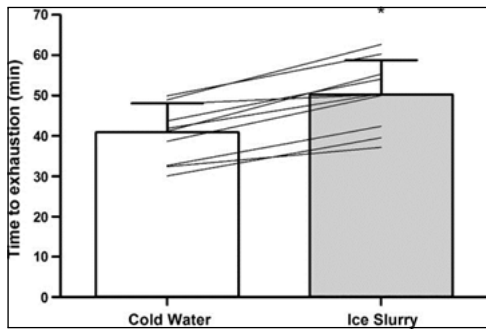
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## Study Design

- 10 men
- Comparison between 7.5g/kg of ice slurry (-1° C) and cold water (4° C) ingestion
- Ingestion prior to “running to exhaustion” at first ventilatory threshold in a hot environment (34° C, 55%)

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## Main Result



TTE was 10% longer with Ice Slurry than Cold Water

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## Effects of Compression Garment



Run faster? Run longer?  
Stronger?  
Enhance recovery?

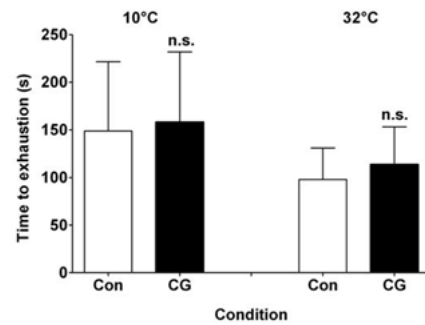
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## CG Study

- Effect of lower body compression garments (CG) on running performance in the heat – Adverse effect by insulation
- 10 male recreational runners ( $29.0 \pm 10.0$  y,  $VO_2\text{max}: 58.7 \pm 2.7 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ )
- 20-min running at first ventilatory threshold followed by a run to exhaustion at  $VO_2\text{max}$  velocity
- Four conditions:  $10^\circ \text{C}$  with CG,  $10^\circ \text{C}$  without CG,  $32^\circ \text{C}$  with CG, and  $32^\circ \text{C}$  without CG (randomised, counterbalanced order)

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## Main Result



7 out of 10 subjects had longer TTE

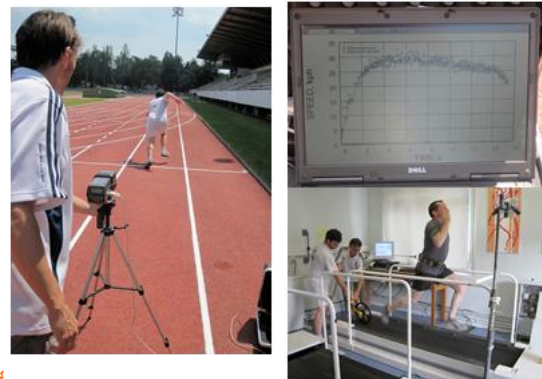
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## Neuromuscular Fatigue Study



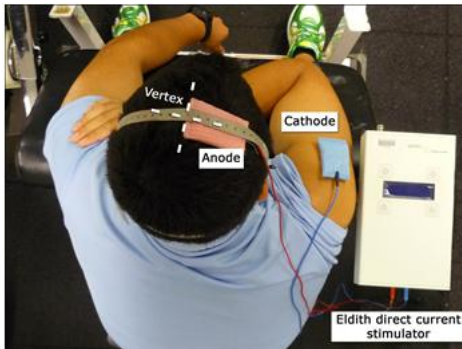
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## Sprint Study



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## Brain Stimulation Study



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## Exercise is Medicine

“Indeed, with the possible exception of diet modification, we know of no single intervention with greater promise than **physical exercise to reduce the risk of virtually all chronic diseases simultaneously**”

Booth et al. J Appl Physiol. 2000.

“There is no pharmacological intervention that holds a greater promise of improving health and promoting independence in the elderly than does **exercise**”

Evans & Campbell. J Nutr. 1993.

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## Medical Effects of Exercise

- Obesity
- Cardiovascular Disease
- Cancer (e.g. prostate, breast, colon)
- Anxiety and Depression
- Type 2 Diabetes
- Alzheimer’s Disease
- Hypertension
- Sarcopenia

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## Guidelines for Healthy Adults under Age 65 Basic recommendations from ACSM

Do **moderately intense cardio** 30 minutes a day,  
5 days a week

or

Do **vigorously intense cardio** 20 minutes a day,  
3 days a week

and

Do 8 to 10 **strength-training exercises**, 8 to 12 repetitions of each exercise twice a week

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ACSM Position Stand: Haskell et al. Med Sci Sports Exerc. 2007.

## Guidelines for healthy adults over age 65 (or adults 50-64 with chronic conditions, such as arthritis)

Do **moderately intense aerobic exercise** 30 min a day,  
5 days a week

or

Do **vigorously intense aerobic exercise** 20 min a day,  
3 days a week

and

Do 8 to 10 **strength-training exercises**, 10-15 repetitions of each exercise 2 to 3 times per week

and

If you are at risk of falling, perform **balance exercises**

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ACSM Position Stand: Nelson et al. Med Sci Sports Exerc. 2007.

## However ...



**My Week**  
Mon – Fri  
7:30 – 19:30  
No exercise!  
Weekend  
Tennis  
(2-3 hours)  
More food



Body weight  
68 → 80 kg  
↓ muscles  
↑ LDL, TG  
Fatty liver  
Laziness

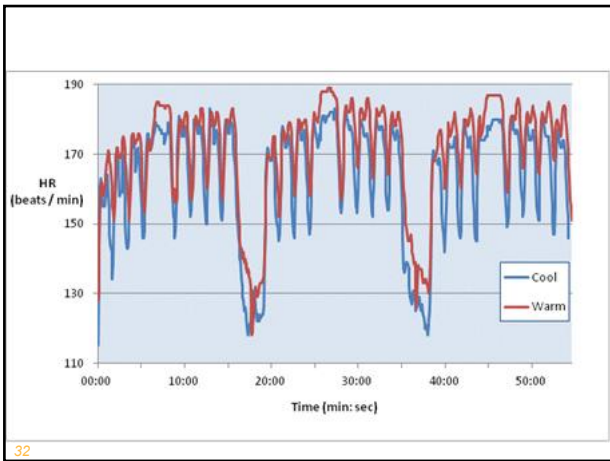
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# What Kind of Exercise?

Effective, Efficient, Enjoyable

Anthropological, Social, Psychological, Behavioral, Cultural, Physiological, and Many Other Approaches

# Soccer Study



# Plasticity

Muscle fibres (myofibrils, mitochondria) and associated structures (motoneurons, capillaries) adapt to **stimuli**

- Contractile activity (endurance exercise, electrical stimulation, denervation)
- Loading conditions (resistance training, microgravity)
- Substrate supply (nutritional interventions)
- Environmental factors (e.g., hypoxia)

# What are you studying?

# What do you want to study?

## SUMMARY

- Check peer-reviewed journals regularly to update “current topics”
- Think what we should do and can do for the future
- Contribute to the body of knowledge by doing research
- It is never late to start something new – Be active and creative

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