Proceeding

Development in exercise science-performances-drugs: a typical scenario

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Genetics and performance (Figure 1)

Active functions have allowed humans to specialize in specific processes based on relative use and activity (Evolution).

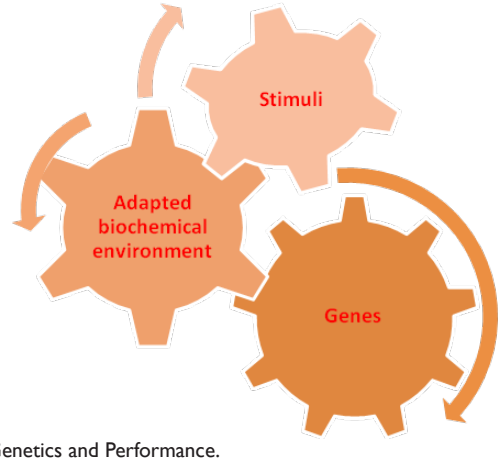


Figure 1 Genetics and Performance.

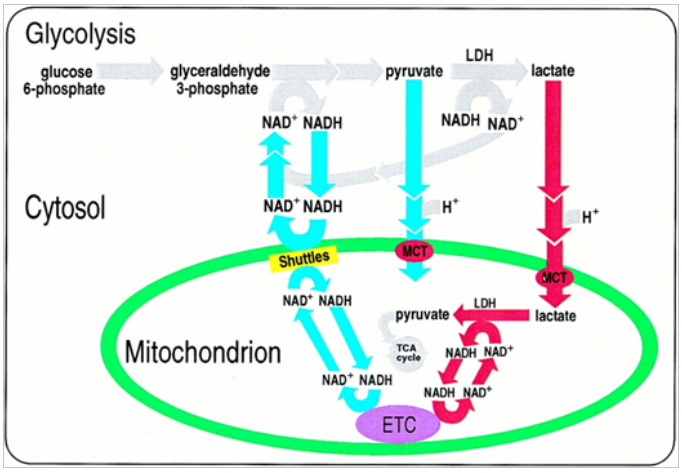
Exercise endocrinology frontiers- possible areas of super performances and areas of doping

a. Postponement of fatigue (both anaerobic and aerobic)[1]

b. Deriving higher strength and power

c. Pain tolerance

Postponement of fatigue: what science says about elite athletes? (Figure 2)(Figure 3)



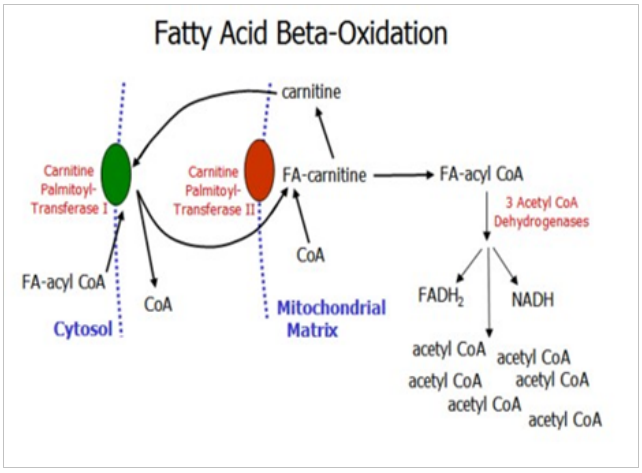


Figure 2 & 3 Postponement of fatigue: what science says about elite athletes?

What is essential biologically for endurance?

Phosphagens reserves	Erythropoietin quality (EPO) :Hypoxia inducible factor genes (HIF)
Muscle and liver glycogen	Sufficient angiogenesis:VEGF gene
Lactate transporters	Mitochondrial enzymes (CPT, Co-enzyme Q10): peroxisome proliferators-activated receptors α (PPAR genes), Nuclear respiratory factor gene etc.
Bi-carbonate Buffer system	

What is essential biologically for strength and power??

a. Muscle fiber quality, more specifically the quality of actin and myosin filaments (ACTN3 gene) [2–4]

b. Phosphagen system enzymes (creatine kinase isoenzyme gene)

c. Muscle tendon collagen type (COL1A1gene)

d. Anabolic hormones like GH, Testo etc..

e. Neuro-plasticity for higher output stimulation

What is needed for pain tolerance???

I. BDNF signaling system for better endorphins and enkephalins (BDNF gene)[5]

II. Larger neuronal pain gateways

What exercise endocrinology says? (Figure 4)

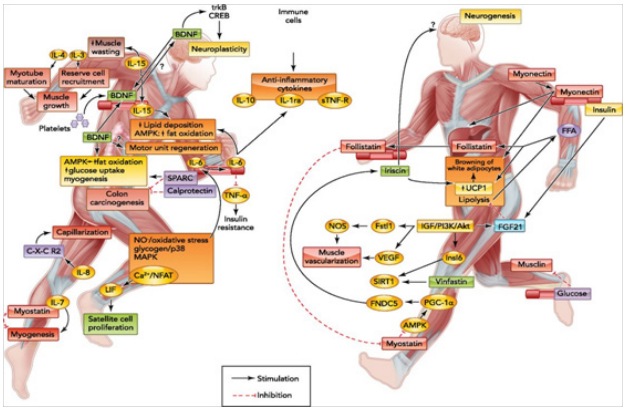


Figure 4 What exercise endocrinology says?

Genetically endowed races

West African Race	East African Race
Nigeria, Niger, Ghana etc and migrated from there to Jamaica etc.	Ethiopia, Kenya, Eritrea etc and migrated from there to other places
Sprinter genes	Endurance running genes
	Kalenjin tribe of Kenya

Gene doping

By inserting gene or factor of gene promoter

1. Frequently used or abundantly used form[6]
2. Inserting myokines or cytokine substances to magnify gene activity
3. Directly consuming the chemical factors that are responsible for activation(Allegation on Mo farah) Some protocols are there to detect.

By suppressing the gene or deleting the gene

1. Difficult to detect[7]
2. But very dangerous for health leading to cancer etc.
3. Example Testo/Epitesto ratio in excretion (*UGT2B17* gene absence)

Case of Kalenjin runners of Kenya

1. It is identified that these are genetically endowed (all means: physiologically and physically too)[8]
2. All these years produced more than forty world record holders in running.
3. Suddenly they are blamed of doping, especially of EPO factor which is genetic to them.

Scandals of doping

A. BALCO Scandal

B. Russian doping scandal

C. Kenya money scandal

Take home message

We need to take serious note of the connection of dirty triad (money, politics and drugs) and try to give respect to true sportspersons than respecting those who are world beaters with drug tainted history.

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Conflict of interest

Author declares there is no conflict of interest in publishing the article.

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