Is muscle typology in young talented track and field athletes a predictor for adult success?
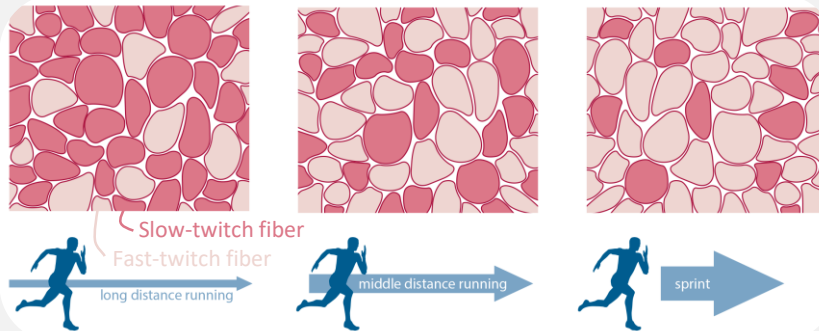
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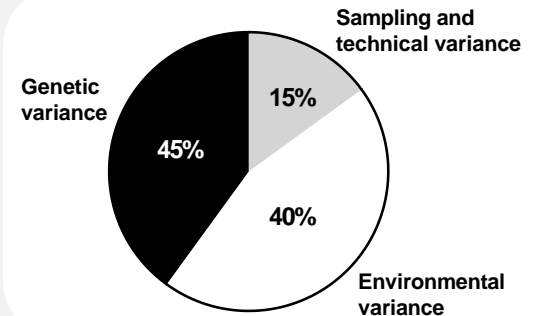## INTRODUCTION

In which discipline can I excel the most?

Elite long distance runners have a high proportion of slow muscle fibers, whereas elite sprinters possess a large share of fast muscle fibers

Slow-twitch fiber
Fast-twitch fiber
long distance running

middle distance running

sprint

Costill et al., 1976

Muscle typology is largely genetically determined

Sampling and technical variance

Genetic variance

15%

45%

40%

Environmental variance

Adapted from Simoneau & Bouchard, 1995

HYPOTHESIS

When young talented athletes practice a discipline that suits their muscle typology, they are more successful at the adult age.

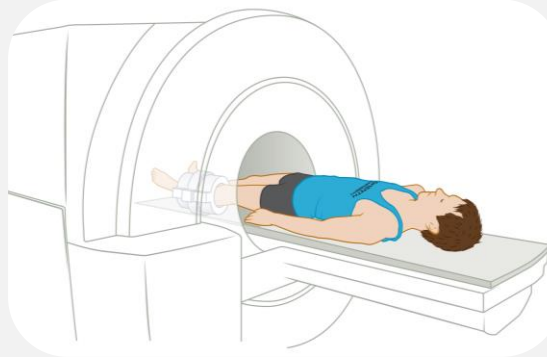# METHODS

Population

61 elite athletes
- IAAF-score > 1050

38 young athletes
- Topsportschool
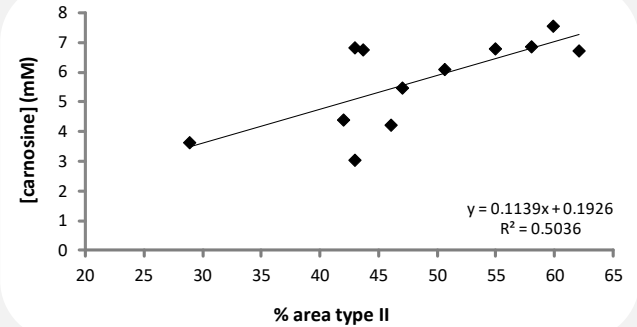- ♂ > 14 years
- ♀ > 12 years

Muscle typology estimation

Muscle carnosine content was measured in gastrocnemius via ¹H-MRS spectroscopy

3-T whole body MRI scanner (Siemens Trio)

Positive correlation between muscle carnosine concentration and %type II muscle fiber area
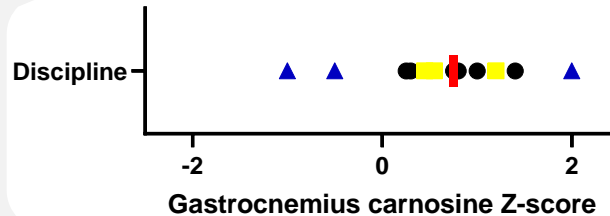
$y = 0.1139x + 0.1926$
$R^2 = 0.5036$

[carnosine] (mM) vs % area type II

Baguet et al., 2011

Carnosine expressed as Z-score based on reference population (163 men, 112 women)

-3 -2 -1 0 +1 +2 +3
MORE SLOW TYPOLOGY   Z-SCORE   MORE FAST TYPOLOGY

Matching muscle typology?

- ● Elite athlete
- I Mean Z-score elite
- ▆ Match
- ▲ Mismatch

Discipline

-2   0   2

Gastrocnemius carnosine Z-score

Performance tracking

The individual best performances were tracked for 10 years via standardized IAAF-scores
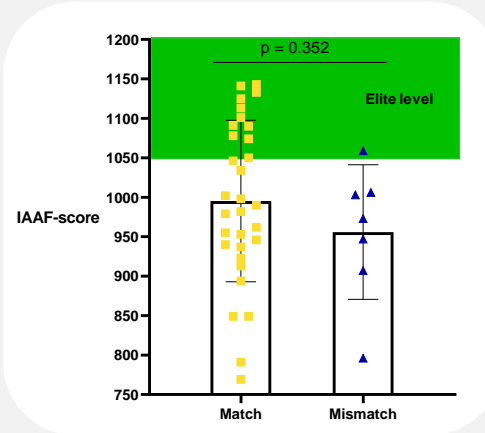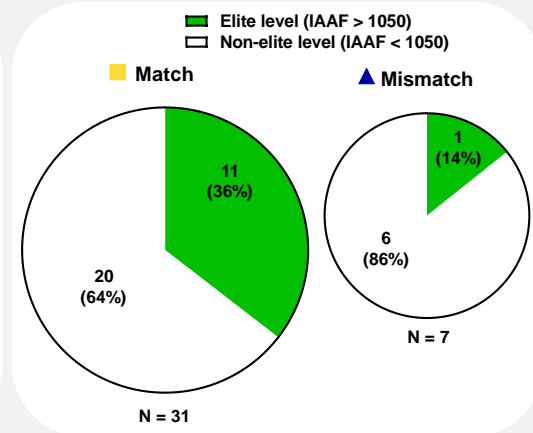
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IAAF Athletics

RESULTS

31 (82%) matches and 7 (18%) mismatches
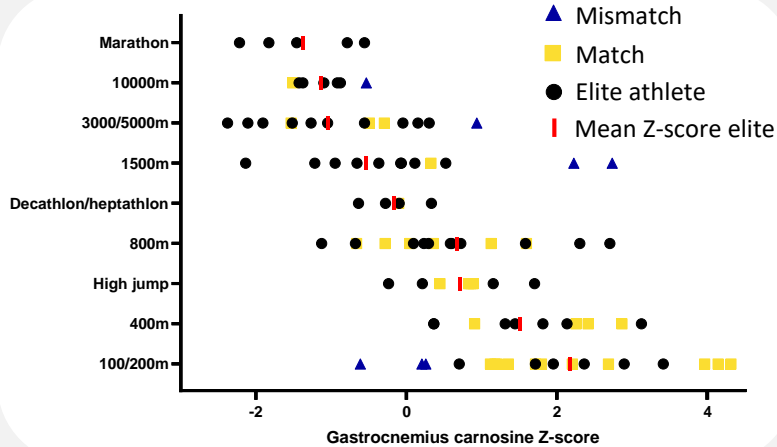
No significant difference in best IAAF-score between matches and mismatches

11/31 (36%) matches and 1/7 (14%) mismatches reached the elite level

CONCLUSION

When young talented track and field athletes possess a muscle typology that matches their discipline, they seem to reach the elite level more frequently.

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