The influence of travel, marathon running and compression socks on blood clot risk

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INTRODUCTION

- Venous thromboembolisms (VTE) in athletes is a serious condition
  - Career or life-threatening ramifications (i.e. death)

Serena Williams
Pulmonary Embolism
Missed 12 months of Tennis

Kamila Skolimowska (26)
Olympic Gold Medal (Sydney)
Pulmonary Embolism

- Several cases of travel & exercise-related VTE in athletes have been reported (Eichner, 2009, Tao, 2010 & Reynolds, 2013)

INTRODUCTION

- Haemostasis is the physiological response in the prevention of excessive bleeding and clotting
  - Constantly active at low levels

- Individually ,  &  may increase the risk of thrombosis (Schreijer, 2006, Prisco, 1998)
  - Transient ↑ in coagulation activation

-  travel: hypoxia, prolonged sitting & dehydration (Kupchak, 2018)

- Endurance  : microtrauma to vessel wall, dehydration, injury & inflammation (Hull & Harris, 2013, Anderson, 2003)

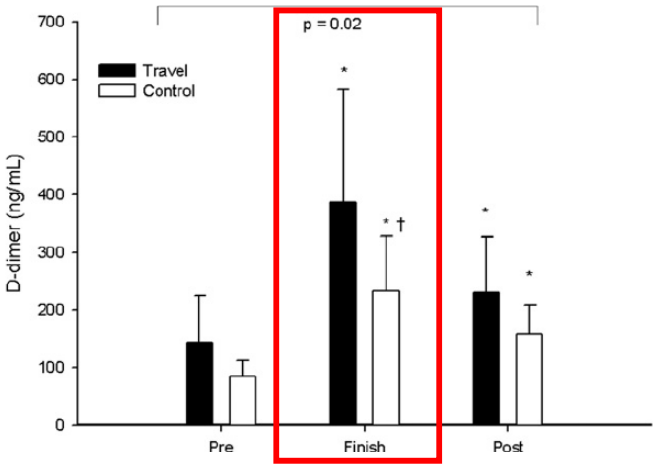
TRAVEL, EXERCISE AND VTE

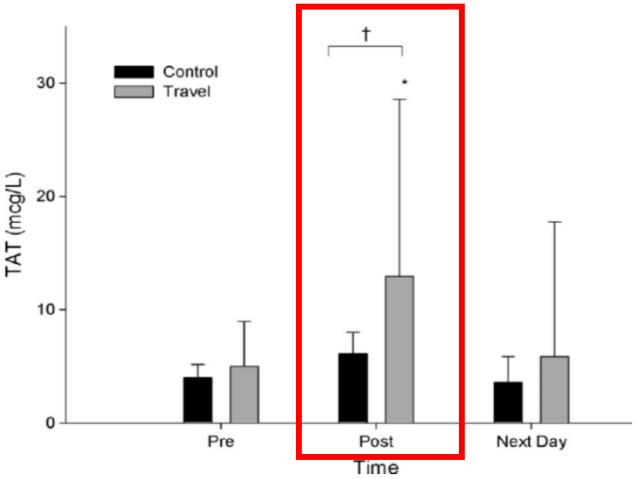
- Combining air travel & exercise may cause a coagulation-fibrinolytic imbalance, ↑ thrombotic risk (Kupchak, 2018)

- ~85% of air-travel thrombosis victims are endurance athletes
  - ↓ resting blood flow rate (low HR and BP), atrial fibrillation

- Parker 2011
  - Coagulation was ↑ ***after*** a marathon in runners who flew > 4 h ***prior*** to the race

p<0.05

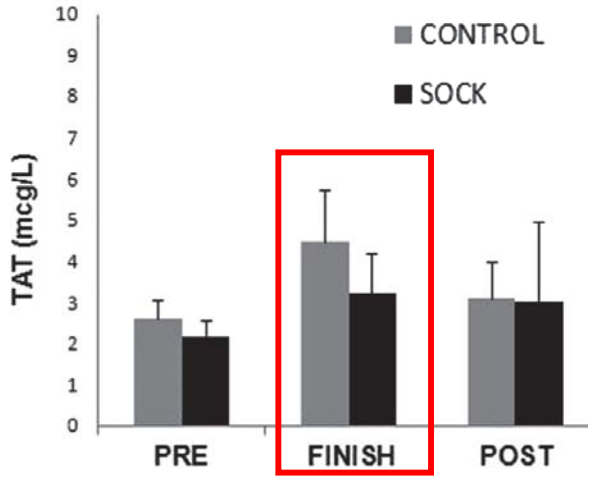




- Can VTE potential be reduced when travelling & exercising?

COMPRESSION SOCKS

- Compression socks are widely used within clinical settings
- Demonstrated to maintain coagulation & fibrinolytic balance
  - ↓ DVT
- Zaleski et al. (2015)
  - ↓ TAT in the SOCK group vs. CONTROL group following a marathon
  - D-dimer= no difference
- Similar findings by Taylor et al. (2017) in female marathon runners



Will a combination of travel, marathon running and compression socks ↓ VTE risk?

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STUDY AIMS

Blood 2018

1. Examine the effect of pre-marathon travel (domestic versus international) on haemostatic markers (Tissue Factor (TF), Tissue Factor Pathway Inhibitor (TFPI), Thrombin Anti-thrombin Complex (TAT) and D-Dimer)

2. Examine the influence of compression socks on coagulation activation following a marathon

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METHODS

Blood 2018

DOM: n=42

INT: n=25

Gold Coast, Queensland, Australia

SOCK
DOM: n=19
INT: n=15

CONTROL
DOM: n=23
INT: n=10

24 h **Pre-marathon**

Marathon (42.2km)

Immediately **Post-marathon**

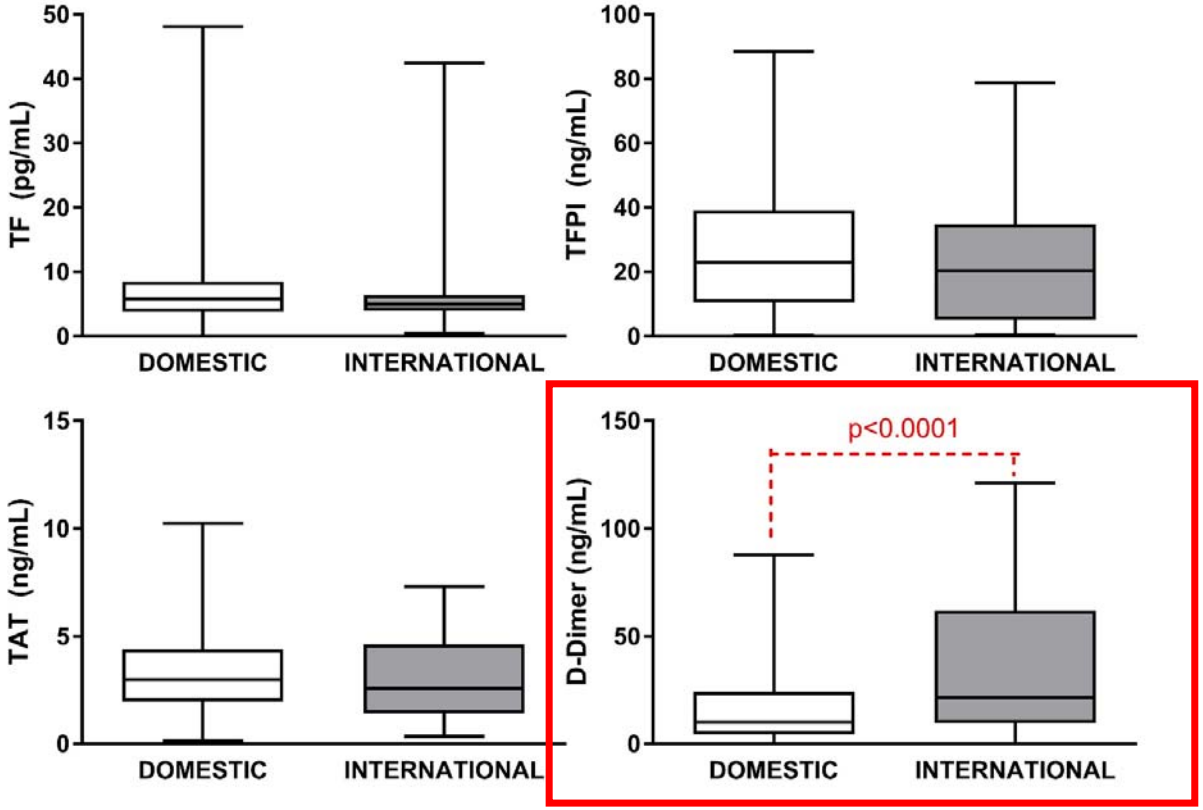
Pre- and Post-marathon blood samples were collected and analysed for TF, TFPI, TAT and D-Dimer via ELISA

RESULTS

Table 1. Mean (± SD) participant demographics and overall marathon finish time

Variable	DOMESTIC	INTERNATIONAL	*P value*
Age (years)	43.6 ± 11.5	46.4 ± 9.7	0.319
Body mass (kg)	70.0 ± 17.2	71.9 ± 10.6	0.335
Height (cm)	171.9 ± 10.0	173.2 ± 6.5	0.445
Marathon Finish Time (h:min)	4:29 ± 1:17	4:27 ± 1:16	0.106

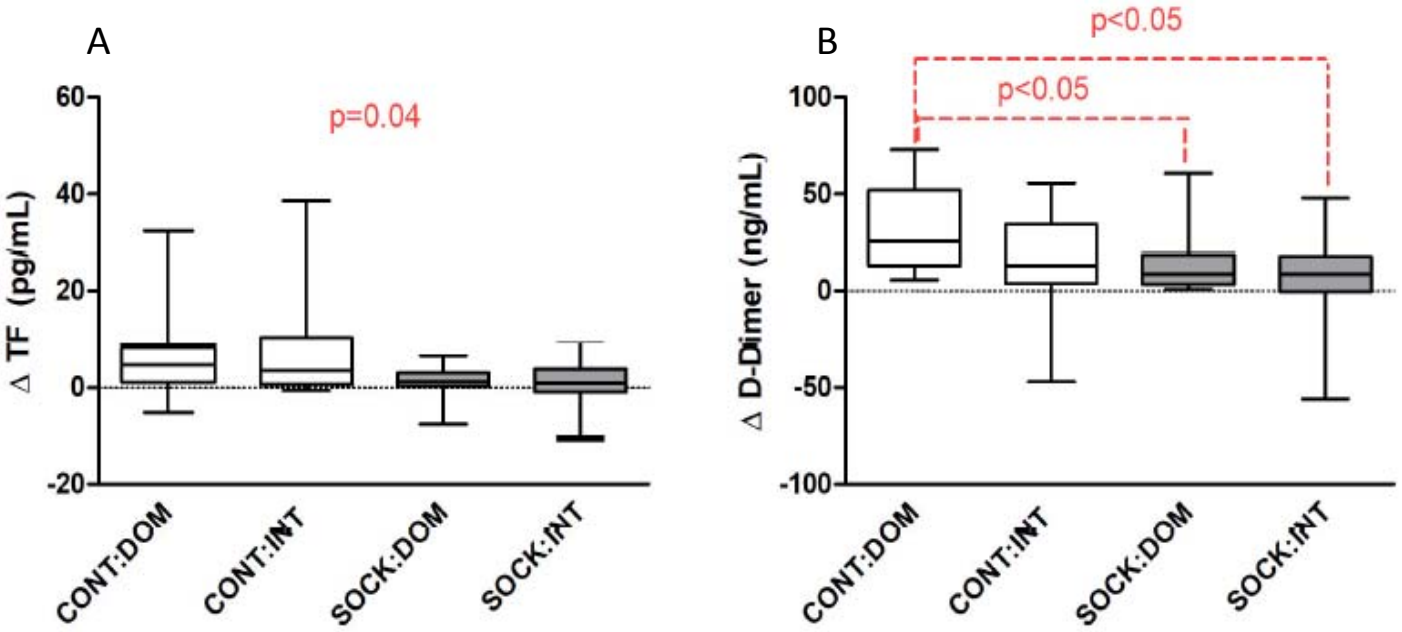
RESULTS



- Pre-exercise D-Dimer was > in INT vs DOM travellers

Figure 1. Median (± range) for TF, TFPI, TAT and D-Dimer collected pre-marathon and compared between Domestic and International marathon runners

RESULTS



- Main effect for Δ for TF & D-Dimer
- Δ D-Dimer > in CONT:DOM group when compared to SOCK:DOM & SOCK:INT

Figure 2. Median (± range) for Δ of change (PRE-POST) A) TF and B) D-Dimer between CONT:DOM, CONT:INT, SOCK:DOM and SOCK:INT groups

DISCUSSION & CONCLUSION

- Greater pre-exercise coagulation activation was observed in runners travelling internationally versus domestically (**Figure 1**)
  - Transient ↑ in coagulation activation
  - Travel >4 h

- When worn during a marathon run, compression socks were shown to ↓ the magnitude of change in D-Dimer (**Figure 2**)
  - Zaleski (2015) & Taylor (2017): ↓ TAT
  - 1st time observed

- Compression socks have the potential to *reduce overall haemostatic activation* and blood clot risk when worn during a marathon, regardless of prior travel undertaken

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Blood 2018

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THANK YOU

Blood 2018











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