Human Performance Laboratories (Australia)

UNIVERSITY OF WOLLONGONG AUSTRALIA

UOW: Reflections on DST engagement: A team approach

Nigel Taylor, Herb Groeller, Greg Peoples, John Sampson,
Catriona Burdon, Peter McLennan, Theresa Larkin, Teresa Treweek

Centre for Human and Applied Physiology
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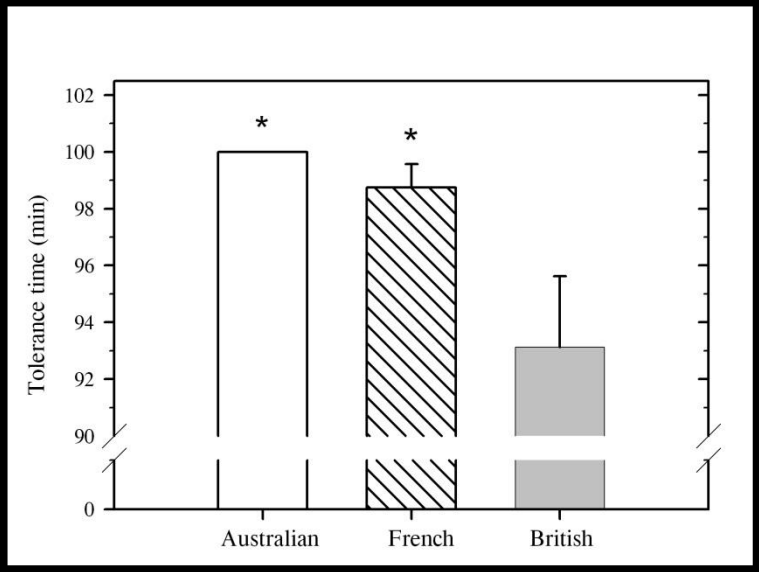
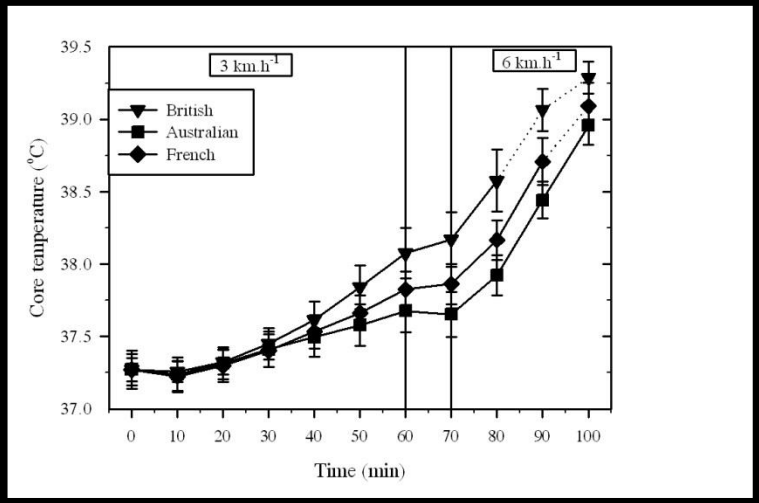
Human performance themes of engagement with DST

- Thermal
- Physical employment standards
- Carrying load
- Training adaptation and injury

Thermal

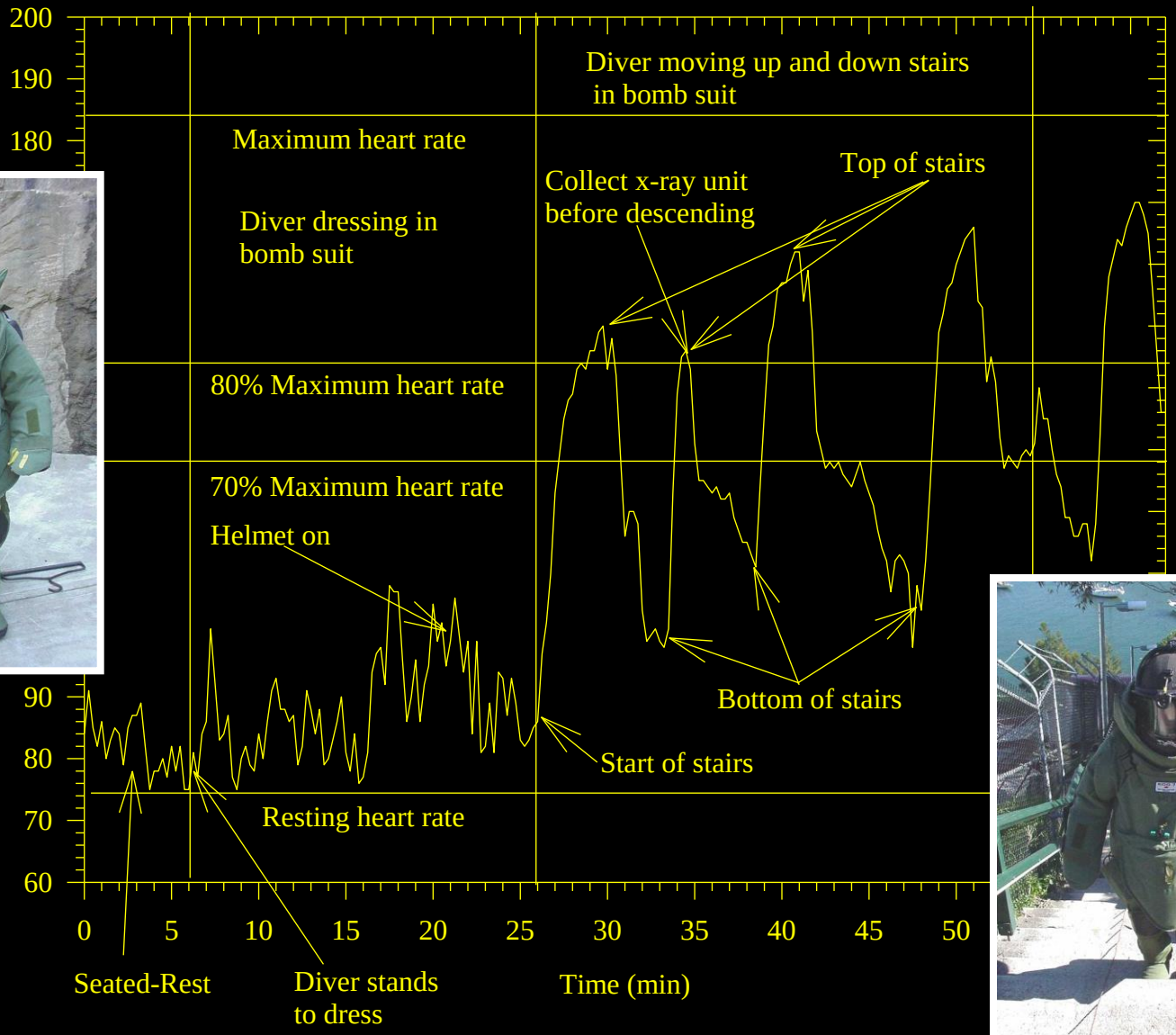

Australian
French
British


Tolerance time (min)
102
100
98
96
94
92
90
0
*
*
Australian
French
British


Core temperature (°C)
39.5
39.0
38.5
38.0
37.5
37.0
3 km.h-1
6 km.h-1
British
Australian
French
0
10
20
30
40
50
60
70
80
90
100
Time (min)

There is no benefit of wearing a torso undergarment whilst working hard in protective clothing in the heat.

Physical employment standards


200
190
180
90
80
70
60
0
5
10
15
20
25
30
35
40
45
50
Diver moving up and down stairs in bomb suit
Maximum heart rate
Diver dressing in bomb suit
Collect x-ray unit before descending
Top of stairs
80% Maximum heart rate
70% Maximum heart rate
Helmet on
Bottom of stairs
Start of stairs
Resting heart rate
Seated-Rest
Diver stands to dress
Time (min)

ROYAL AUSTRALIAN NAVY
MINIMUM PHYSICAL FITNESS STANDARDS

MALE

Component/Age	Age Less than 35	Age 35 to 44	Age 45 to 54	Age 55 and over
Flexed arm hang (seconds)	25	20	15	10
OR				
Push - ups (number)	25	20	6	6
Sit ups (number)	25	20	15	10
2.4 km run/walk (min/seconds)	13'00"	15'00"	17'00"	19'00"
5 km walk (min/seconds)	42'00"	44'00"	46'00"	48'00"
500 m swim (min/seconds)	12'30"	13'30"	14'30"	15'30"
Beep Test	7.4	6.10	6.4	5.9
Max VO2	37 per cent	36.4 per cent	34.3 per cent	32.9 per cent

FEMALE

Component/Age	Age Less than 35	Age 35 to 44	Age 45 to 54	Age 55 and over
Flexed arm hang (seconds)	25	20	15	10
OR				
Push - ups (number)	10	7	3	3
Sit ups (number)	25	20	15	10
2.4 km run/walk (min/seconds)	15'00"	17'00"	19'00"	21'00"
5 km walk (min/seconds)	43'00"	45'00"	47'00"	49'00"
500 m swim (min/seconds)	13'30"	14'30"	15'30"	16'30"
Beep Test	6.9	6.2	5.4	5.0
Max VO2	36 per cent	33.6 per cent	31 per cent	30 per cent


MEDIA MONITORS
Age
Wednesday 9/9/2009
Page: 3
Section: General News
Region: Melbourne Circulation: 197,600
Type: Capital City Daily
Size: 156.46 sq.cms.
Published: MTWTFS-
Science could lead women to the front
By BRENDAN NICHOLSON
DEFENCE CORRESPONDENT
MEDIA MONITORS
Australian
Wednesday 9/9/2009
Page: 1
Section: General News
Region: Australia Circulation: 138,765
Type: National
Size: 298.15 sq.cms.
Published: MTWTF-
Brief: DSTO
Push for women on front line
MEDIA MONITORS
Age
Wednesday 9/9/2009
Page: 7
Section: Edition Changes - Metro General News
Region: Melbourne Circulation: 197,600
Type: Capital City Daily
Size: 85.42 sq.cms.
Published: MTWTFS-
Brief: DSTO
Defence scientists may lead women to the front
By BRENDAN NICHOLSON
MEDIA MONITORS
Sydney Morning Herald
Wednesday 9/9/2009
Page: 7
Section: Edition Changes - 3rd Edition
Region: Sydney Circulation: 212,700
Type: Capital City Daily
Size: 190.10 sq.cms.
Published: MTWTFS-
Brief: DSTO
Defence scientists to work out suitable jobs for women
Brendan Nicholson
Defence Correspondent
Female forces ... women may be called to the front line of combat
Studies may see women face combat
By EMMA SHAW
A NEW research centre at the University of Wollongong will help set physical benchmarks for soldiers and develop a set of recruitment criteria that actively ignores gender.
It means women, at present ineligible for 2 per cent of defence force roles, could potentially serve in all frontline combat units.
The university will receive $1.6 million from the Army to establish a National Centre of Excellence in Physical Employment Standards, known as the Centre for Human and Applied Physiology.
Based in the School of Health Sciences, it will also have researchers working at the Defence Science and Technology Organisation.
Defence Personnel Minister Greg Combet said it was important future recruits were appraised on performance alone, adding there was a belief women were less physically capable.
"Rather than do that on the basis of assertion and assumption, what the government is doing ... is developing a set of objective criteria in the form of physical employment standards that could be applied in the future," he said.
Funds: Researchers Herb Groeller (back left), Greg Peoples, Marc Brown and Nigel Taylor (front). Picture: KIRK GILMOUR






Carrying load

Eur J Appl Physiol (2012) 112:2913–2921
DOI 10.1007/s00421-011-2267-7

ORIGINAL ARTICLE

A fractionation of the physiological burden of the personal protective equipment worn by firefighters

Nigel A. S. Taylor · Michael C. Lewis · Sean R. Notley · Gregory E. Peoples

Maximal aerobic power (mL/kg/min)

No effects of load or chest wall restriction

Work tolerance

Severely reduced by load carriage

Maximal aerobic power (mL/kg/min)

Effects of mass are evident by 35kg mass

Work tolerance

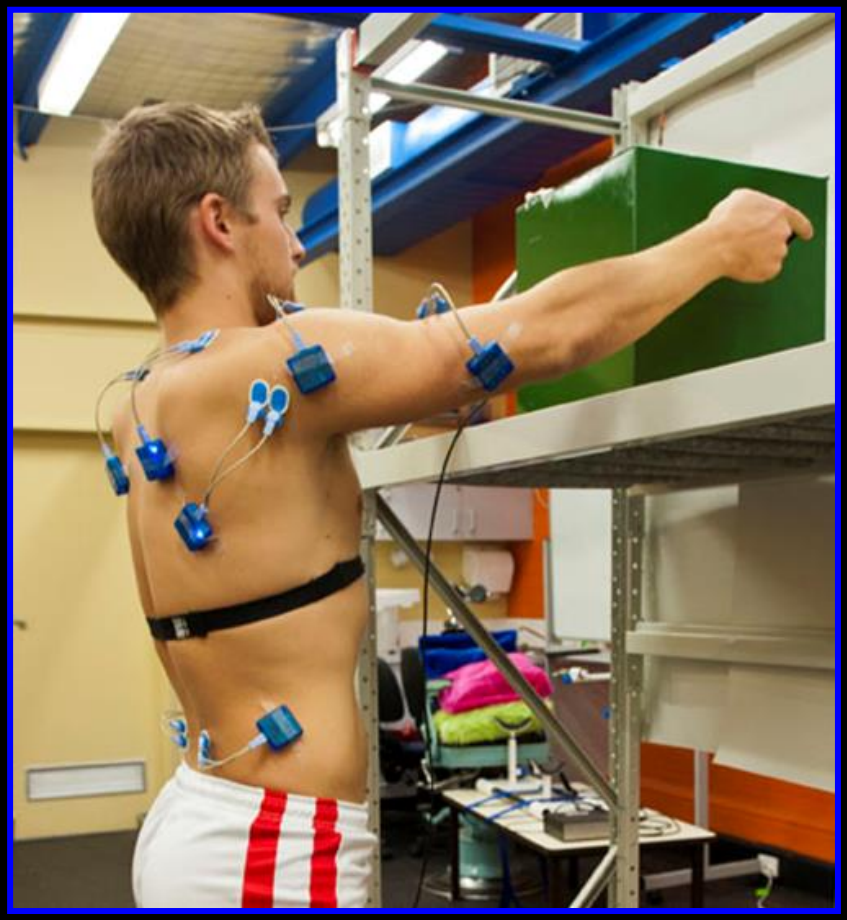
Dose response ~ 5% reduction per 10kg

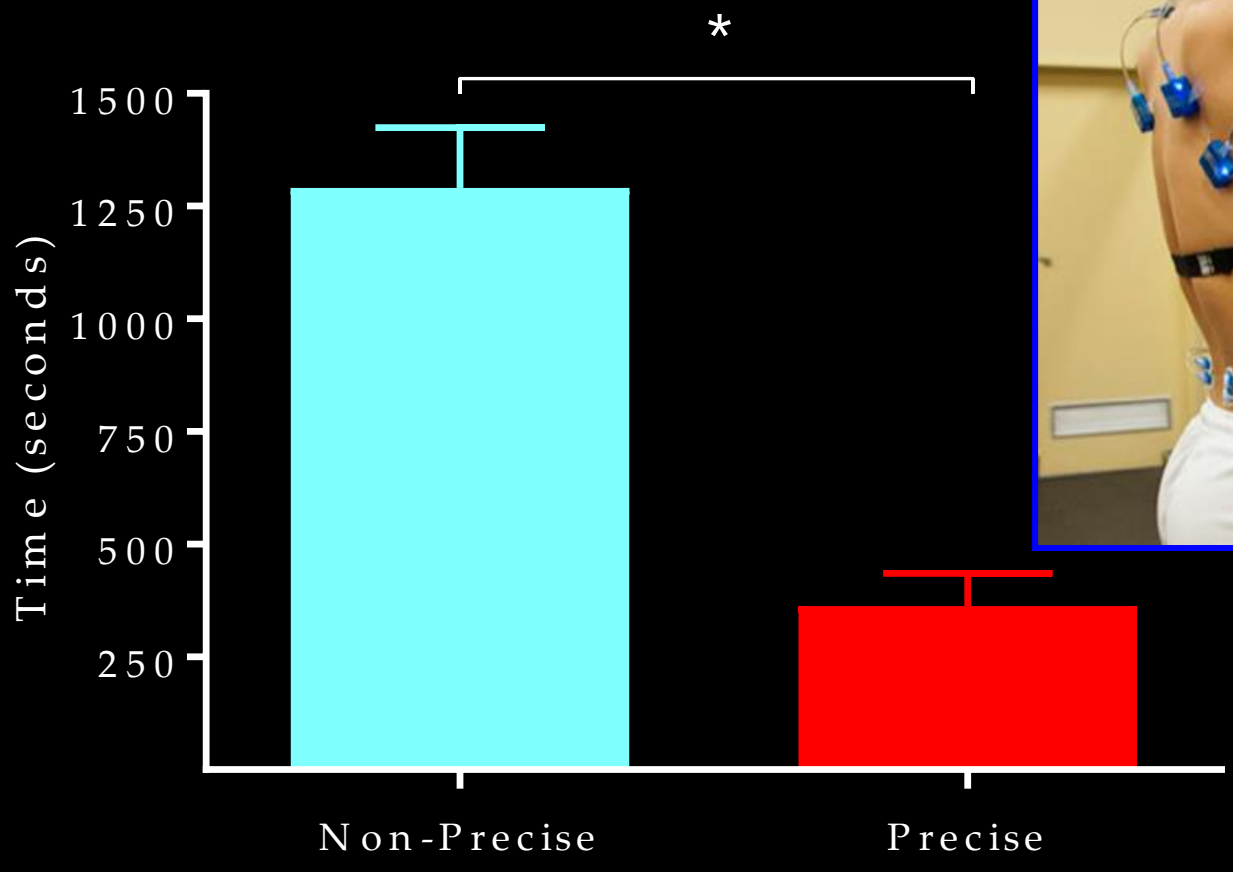
Lung volumes

~ 20% reduction peaking at 35kg

Operational lung volumes

Reflective of chest restriction (pathology) and most evident >25 kg





Time to task failure

Training adaptation and injury

Table 3.10: Current AUSCDT One RAN PT

Day	Programme	Purpose	Function	Impact
Monday	45 min run	*esprit de corps* Running endurance	Low	High
Tuesday	Boxercise or wrestling	*esprit de corps* Hand-to-hand combat	Low	Low
Wednesday	Interval running	*esprit de corps* Sprint running speed	Low	High
Thursday	Swim/Fin	*esprit de corps* Finning endurance	High	Low
Friday	Touch Football	*esprit de corps* Mixed fitness	Low	High

- Physical integration:
  - Increased physical demands.
    - Longer dismount periods.
    - Greater mass.
    - Increased cognitive processing and multi-tasking.
    - Modified operational tactics.

Australian Army Military Recruits
N=216

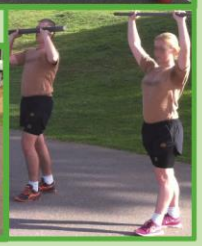
Experimental Training
N=118, 12 weeks, 41 sessions: 3100 min

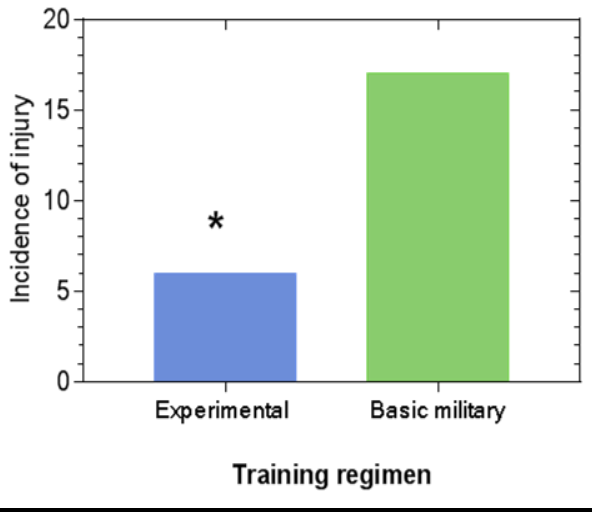




Basic Military Training
N=98, 12 weeks, 41sessions: 3100 min



Training adaptations and injury monitoring

Prospective Physical Performance and Resilience Study (P3R)

Post-graduate Projects:

- PhD 1 – Training Load & Physical Performance
- PhD 2 – Injury Monitoring & Prediction

Broad Goals:
- Optimise physical conditioning of personnel
- Better understand impact of service on physical performance and injury
- Inform recruiting standards

- MSc – Physical Conditioning Intervention Study
  - Location: School of Infantry (SOI)

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