

# Are our volunteer fire fighters fit for the task?

Brad Aisbett, Dr. Glenn McConell & David Nichols, Project D2: Fire Fighter Health & Safety

## Background

Professional fire fighters have above average fitness levels and perform highly strenuous work<sup>1,2</sup>. In Australia, professional fire fighters are outnumbered by volunteers 22 to 1<sup>3</sup> and yet little is known about the fitness levels of volunteer fire fighters or the energy demands of their work, specifically in wildfire suppression. As such, it is difficult to determine whether volunteer brigade members are sufficiently fit to safely perform their required tasks on the fire ground. If task demands do exceed an individual's capabilities, subsequent over exertion can have critical cardiac consequences<sup>4</sup>. The risk of heart attack through over exertion also increases with age, due to declines in cardiovascular fitness<sup>5</sup>. The mean age of volunteer fire fighters in Victoria is steadily increasing with the majority of members now over 45 years old<sup>6</sup>. As an older, and potentially, less fit fire fighting force, volunteers may face an increased cardiovascular risk during wildfire suppression. The relative stress incurred by Australian volunteer fire fighters during wildfire suppression cannot, however, be quantified without evaluating the physical demands of their work. The current project will, therefore:

## Aims

1. Evaluate the cardiovascular and musculoskeletal fitness levels of volunteer fire fighters;
2. Investigate the physiological demands of, and volunteer's responses to, simulated fire fighting tasks.

## References

1. Gledhill, N. and V. K. Jamnik (1992). *Can J Sport Sci* 17: 207-13.
2. Ruby, B. et al. (2003). *Med Sci Sports and Exerc* 35: 1760-1765.
3. McLellan, J. (2004). *Bushfire CRC Occasional Report*. Bundoora, Australia, School of Psychological Science, Latrobe University: 7.
4. Mangan, R. (1999). Wildland Fire Fighter Health and Safety Conference, Missoula, Montana, Missoula Technology and Development Centre.
5. Kallinen, M. (2005). *J Sports Sci Med Suppl* 7: 1-51.
6. Australasian Fire Authorities Council. Human Resource Department Records 2001.

## Methods

### Fire fighter fitness evaluation:

Male and female volunteer fire fighters across different age demographics (e.g. 20 – 30, 30 - 40 etc) to be examine for:

- Peak aerobic fitness ( $VO_2$ peak);
- Sustainable aerobic fitness (lactate threshold);
- Musculoskeletal strength, endurance, and flexibility.

### Simulating the physical demands of wildfire suppression

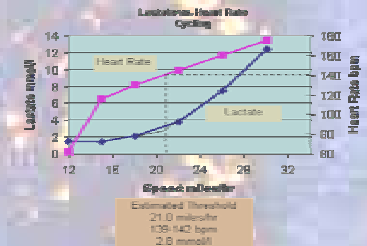
The following simulated fire fighting tasks and physiological measures will be examined to estimate physiological stress of wild land fire fighting;

#### Task

- Rolling out hoses
- Advancing a charged hose
- Spraying a charged hose

#### Measurements

- Heart rate
- Core temperature
- Oxygen uptake
- Activity patterns



In a later study, we hope to use portable heart rate, core temperature, and activity monitors to record fire fighters physiological responses and activity patterns during 'live' fire fighting.

## How can fire agencies use our research?

We hope that the data collected in our research will enable us to design a robust aptitude test which accurately simulates wildfire suppression and can be easily administered within fire agencies. The expected results from our research will allow brigade leaders to:

- Establish the required fitness levels to serve in different roles within a brigade;
- Match individual capabilities to task demands, reducing fire fighter distress;
- Preserve the health and safety of volunteer fire fighters.