Functional Food Opportunities to Support Cognitive Fitness
Dr Roger Hurst, Plant & Food Research | April 14th 2016
Cognitive ‘fitness’ - maintained mental performance

Plant & Food Research’s interests:

» Cognitive function/performance
» Concentration/alertness
» Exercise performance/fatigue
» Mood/Relaxation
» Stress/Anxiety
» Sleep

prevention – not treatment
Consumer demand - Market opportunity

Globally 85% consumers are interested, 32% actively buying

‘Relaxation’ = 27% (USA) 45% (China)
‘Alertness’ = 27% (USA) 38% (China)
(DataMonitor Consumer Survey 2011)

Market value (2010) and growing...
» USA = $541M - just sales ‘mood’ = $430M (2009) (Nutras World, Jan 2011)
» Japan = $452M
» India = $382M
» China = $361M

30% US population, 40% China actively buying foods that improve ‘concentration’
Blueberries may help prevent Alzheimer's, new research suggests
Scientists say the fruit is loaded with healthful antioxidants which could help prevent the effects of the increasingly common form of dementia. *The Telegraph, May 2016*
PFR Approach: a functional food approach

**Pharmaceutical**
- Single activity
- Single mechanism
- Single potent bioactive
  - Valium

**Functional food**
- Single target
- Multiple mechanisms
- Multiple sub-pharma bioactives with synergies
  - GABA-A
  - MAO-I
  - ß-blocker
  - Benzos

**Anxiety**
Receptor evaluation - cultivar differences

Hops β2 Adrenergic

Hops Benzodiazepine
Pre-clinical studies

Human trial – blackcurrant - design

» Randomised, placebo controlled, double blinded, balanced, crossover human intervention trial

» n=35 healthy young adults between 18-35 years old

» Intense 70 min mathematical challenge

» Blackcurrant variety juice (142ml per 60kg/person) versus sugar matched control vs JTB delcyan™

» Berryfruit doses matched at 500mg total polyphenols

Cognitive benefits


**Extract:**
- Reduced fatigue
- Improved accuracy
- Improved alertness
  (*no improvement reaction time*)

**Juice:**
- Faster reactions without a loss in accuracy
  (*no improvement in alertness, no loss of fatigue*)
Game intelligence

Spatial awareness

Focus / alertness / learning

Game play / prediction

Motivation / drive to train

Muscle Recovery

Cognitive

National Science Challenges

HIGH-VALUE

Ko Ngā Kai

Whai Painga
Aims:
» Is cognitive fitness impaired post exercise/during fatigue/recovery
» Is cognitive fitness improved by HIT
» Does fruit consumption improve cognitive fitness post exercise, - improve cognitive recovery

Cognitive Fitness post High Intensity Training

Pre training measures

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Session 1</th>
<th>6 intervals</th>
<th>VO₂ max</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Cognitive testing</td>
<td>Submaximal cycle</td>
<td></td>
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</table>

High Intensity Interval Training

<table>
<thead>
<tr>
<th>Week 2</th>
<th>Session 2</th>
<th>7 intervals</th>
<th>Session 3</th>
<th>8 intervals</th>
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<tr>
<th>Week 3</th>
<th>Session 4</th>
<th>9 intervals</th>
<th>Session 5</th>
<th>10 intervals</th>
<th>Session 6</th>
<th>11 intervals</th>
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Post training measures

<table>
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<tr>
<th>Week 4</th>
<th>Session 1</th>
<th>6 intervals</th>
<th>VO₂ max</th>
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Immediate cognitive testing after VO₂ max

https://admin.joggleresearch.com/
Cognitive benefits

» HIT improved reaction time but not accuracy

Fruit:
» No further improvement of reaction time
» Improved accuracy

Digital Symbol Substitution Task – higher executive thinking

Accuracy (% Pre-HIT)  Reaction time

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<tr>
<th></th>
<th>Pre-HIT</th>
<th>Post-HIT</th>
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<th>Pre-HIT</th>
<th>Post-HIT</th>
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</thead>
<tbody>
<tr>
<td>PL Fruit</td>
<td>100</td>
<td>110</td>
<td>PL Fruit</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>Pre-HIT</td>
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<td>110</td>
<td>Post-HIT</td>
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Fruit intervention during sports training may enable an individual to maintain cognitive reasoning (smart game-play) during competition.
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