Heart Rate Variability in Cancer-Related Fatigue

B Brady¹,², M Barrett¹, MJ Kennedy³,⁴, S Cuffe³, RT Murphy³, D Walsh¹,⁴,⁵

Background
- Cancer-Related Fatigue (CRF) is a common, high-impact symptom
- Pathophysiology poorly understood
- Hypothesis: Cardiovascular autonomic nervous system (CV ANS) dysfunction contributes to CRF
- Heart rate variability (HRV) is a non-invasive method of measuring CV ANS function
- HRV reported as root mean square of successive differences (RMSSD) and standard deviation of the NN (R-R) intervals (SDNN).
- SDNN represents total variability - lower numbers indicate loss of dynamic response

Aim
Investigate CRF and CV ANS function in solid tumours

Methods
- Prospective observational study
- Consecutive, treatment naïve, oncology outpatients
- Exclusion: previous cancer, known cardiovascular disease
- Participants identified as ‘fatigued’ based on brief fatigue inventory (BFI) score of ≥3

Outcome Measures
FATIGUE
- BFI
- Hand grip strength
- Timed Up and Go (TUG)
- Sit to Stand (STS)

CV ANS FUNCTION
- HRV
  - 5 mins spontaneous breathing
  - 5 mins paced breathing

Results
N=10; 6♀
Age: Median 54 (range 40-73)
Cancer type:
  - Breast 6
  - Oesophageal 4
Loco-regional disease: 3
BFI: Median 1.25 (range 0-5.9)
BFI ≥3: 3/10 (30%)

<table>
<thead>
<tr>
<th></th>
<th>Fatigued N=3</th>
<th>Non-Fatigued N=7</th>
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<tbody>
<tr>
<td>Grip strength (kg force)</td>
<td>23 (18-33)</td>
<td>35 (14-48)</td>
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<tr>
<td>TUG (s)</td>
<td>8 (7-8)</td>
<td>7 (6-9)</td>
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<tr>
<td>STS (number in 30s)</td>
<td>13 (9-16)</td>
<td>13 (11-18)</td>
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<tr>
<td>RMSSD, spontaneous</td>
<td>16 (6-25)</td>
<td>18 (11-79)</td>
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<tr>
<td>RMSSD, paced</td>
<td>18 (8-71)</td>
<td>23 (17-86)</td>
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<tr>
<td>SDNN, spontaneous</td>
<td>22 (18-27)</td>
<td>30 (17-124)</td>
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<tr>
<td>SDNN, paced</td>
<td>30 (17-96)</td>
<td>45 (28-121)</td>
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Conclusions
- Significant proportion fatigued pre-treatment
- Indicators of CV ANS dysfunction present:
  - Lower SDNN in fatigued participants
- Feasible study; tests well tolerated

Contact: bbrady@olh.ie