

* Evaluation of Exercise Intolerance (BCTT)

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Modified Balke protocol

- Graduated exercise test
- Constant speed
- Increased incline, 1° per minute
- Measure of physical exhaustion (Borg RPE) and/or exercise intolerance

*The BCTT

- Establish exercise intolerance - acute, post-concussion syndrome (PCS)
- Differential diagnosis of post-concussion symptoms (PCS, cervicogenic, etc.)
- Identify physiologic changes associated with concussion, exacerbation of symptoms (exercise intolerance)
- Assist in treatment protocols, Return to Play

 **Use of the BCTT**

*Contraindications

- Cardiovascular illness
- Respiratory dysfunction
- Beta blockers
- Serious vestibular/balance problems
- Inability to walk safely (orthopedic)
- Severe dizziness or noticeably poor balance
- Patient is too symptomatic

Absolute

- Acute myocardial infarction (within 2 d)
- High-risk unstable angina*
- Uncontrolled cardiac arrhythmias causing symptoms or hemodynamic compromise
- Symptomatic severe aortic stenosis
- Uncontrolled symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute myocarditis or pericarditis
- Acute aortic dissection

Relative†

- Left main coronary stenosis
- Moderate stenotic valvular heart disease
- Electrolyte abnormalities
- Severe arterial hypertension‡
- Tachyarrhythmias or bradyarrhythmias
- Hypertrophic cardiomyopathy and other forms of outflow tract obstruction
- Mental or physical impairment leading to inability to exercise adequately
- High-degree atrioventricular block

*ACC/AHA Guidelines for the Management of Patients With Unstable Angina/Non-ST-Segment Elevation Myocardial Infarction (350) (see Table 17).

†Relative contraindications can be superseded if the benefits of exercise outweigh the risks.

‡In the absence of definitive evidence, the committee suggests systolic blood pressure of

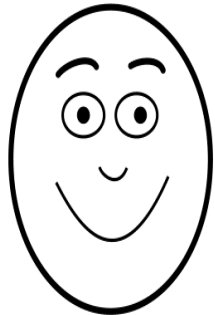
- Exercise clothing / shoes
- Chair, water, towel
- Treadmill w/ 15 (adaptable for 12°)
- Heart rate monitor
- Borg RPE scale & 10 point Likert scale
- Record sheet

*Preparation

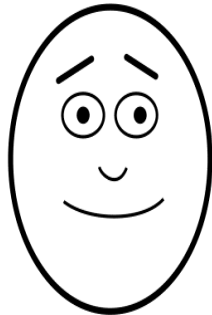
Borg's Rating of Perceived Exertion (RPE) Scale

Perceived Exertion Rating	Description of Exertion
6	No exertion. Sitting & resting
7	Extremely light
8	
9	Very light
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

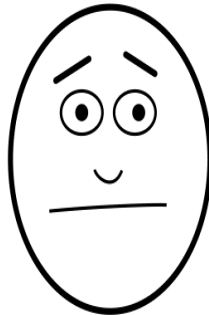
Rate Your Overall Condition



0



1-2



3-4



5-6



7-8



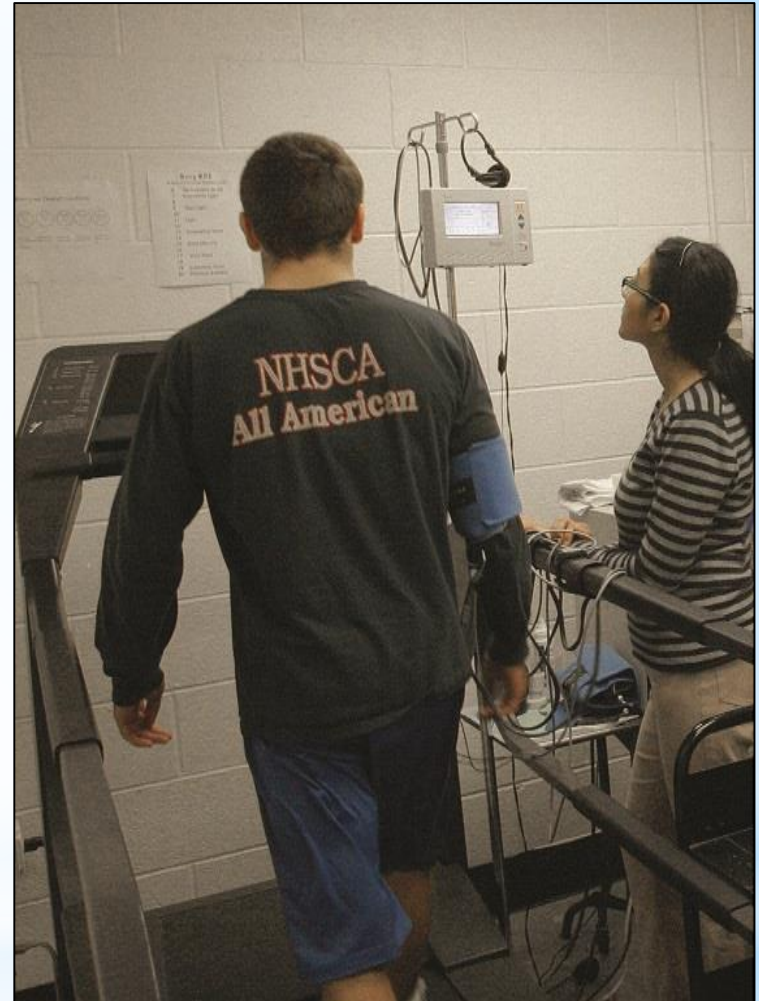
9-10

Feel terrific, no symptoms	Feel some symptoms but quite tolerable	Symptoms a little worse	Symptoms much worse	Feeling quite symptomatic	Feel terrible, worst I ever felt
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ex. Headache, Dizziness, Light/Sound Sensitivity, Feeling “Not Right”, Difficulty Concentrating

Participant ID: _____

Min	HR	RPE	Overall condition (Likert scale)	Symptoms / Observations
REST				
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
Post-Exercise				
1				
2				



Starting speed: brisk walk (approx. 3.3 mph)

Adjust according to height of patient

Increase incline 1° per minute

Record HR, RPE and symptoms until:

- Participant reaches max HR or RPE of 19 (exhaustion)

OR

- Symptoms increase by ≥ 3 points (new symptom or increased symptom load) on the Likert scale (symptom exacerbation)

* Protocol

- 2 minute cool down at 2.5mph, 0 incline
- Report symptoms & HR at full stop

*Protocol

- 2nd evaluator present
- Assess patient risk throughout (severe, sudden onset of symptoms, balance concerns)
- Engage in conversation
- Be aware of postural changes

Emphasize goal to **report** symptoms, not push through them

*Safety

- Evaluation of symptom load, exercise intolerance
- Differential diagnosis (cervicogenic, physiologic PCS, etc.)
- Determination of safe exercise threshold (HR)

*Outcomes

- * For general patients 80% of HRt, 20 minutes per day after a five minute warm up
- * For athletes 90% of HRt, 20 minutes per day, and if well tolerated, move to 2x per day with a separation in between.
- * Don't exercise if not feeling well, and stop exercising if symptoms become exacerbated.

* Establishing an exercise program

- * After one week, increase exercise HR goal by 5%-10%.
- * No need to re-examine
- * May re-examine after two weeks on BCTT
- * Regular communication is key
- * Sometimes team trainer helps or hinders

* Follow up

