Conditioning for the FAA Maximal Stress Test

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Exercise prescription and lifestyle modification may not provide all the answers for unfit pilot applicants, yet many conditions can be improved—and sometimes eliminated—by a properly dosed activity regime. Improved oxygen transport, physical strength, and endurance are a few of the well-known benefits of exercise. Pilots slated for treadmill stress tests may greatly benefit by conditioning prior to the test. In addition, this provides an excellent opportunity to implement healthy lifestyle changes.

Pre-Activity Screening

Pilots who are unaccustomed to moderately vigorous activity, such as brisk walking (3.2 mph or greater) should be encouraged to begin slowly and possibly enlist the help and supervision of a qualified health/fitness professional. Any parameter under evaluation or treatment (blood pressure, EKG, etc.) should be monitored during the initial phase of a conditioning program. While the benefits usually far outweigh the potential risks, unfit applicants should be informed of all risks and benefits of a conditioning program. The American College of Sports Medicine recommends a signed informed consent statement.[1]

If the candidate is taking beta blockers or other medications that may affect heart rate, the perceived exertion scale should be used to determine intensity. Instruct patients to exercise between 3 and 5 on the Rating of Perceived Exertion (RPE) Scale (see Chart 1).

[1] American College of Sports Medicine, 401 W. Michigan St., Indianapolis, IN 46202-3233 or from the author at 405-787-0303.

Chart 1. Perceived Exertion: The RPE Scale

PERCEIVED EXERTION* (RPE) Gunner Borg	
HOW DOES THE EXERCISE FEEL	RATING
Nothing at all	
Extremely Light	0
Very Light	0.5
Light	1
Moderate	2
Somewhat Heavy	3
Heavy	4
//////////////	5
Very Heavy	6
//////////////////////	7
//////////////////////////	8
Extremely Heavy	9
Maximal //////////////////	10

Caffeine, nicotine, several prescription medications, and many environmental factors can affect the accuracy of the heart rate method. To more accurately assess the intensity level, utilize the Perceived Exertion Scale.

* Rate your overall exertion, not just the fatigue in one area of your body. In addition you should comply with any specific level recommended by a health professional knowledgeable in your condition. Do not exercise at intensities greater than 6 on the RPE scale, or 70% of your maximum age predicted heart rate, without the supervision of a qualified health professional.

Specificity of Exercise

FAA cardiovascular evaluations usually require a maximal stress test which is typically performed on a treadmill. Insufficient performance on this test is often the reason for denial of an FAA medical certificate. There are many things which constitute insufficient performance. The most common disqualifiers are: insufficient work load achieved, insufficient heart rate achieved, insufficient blood pressure achieved, adverse EKG and adverse symptoms.

The FAA expects most applicants taking the maximal stress test to demonstrate a minimum functional capacity equivalent to completion of stage III of the Standard Bruce Treadmill Protocol. The benefit of conditioning is directly related to the activity employed as a training stimulus. To be successful at walking on an incline, conditioning should be commensurate. The use of a treadmill is recommended over outdoor walking due to the required incline and the ease of monitoring. If possible, find a treadmill unit with the capability of at least an 8% incline.

The level of exercise during stage III of Bruce protocol is equal to 10 Mets and is comparable to the following activities (see Chart 2).

Chart 2. Level of Exertion Required to Achieve Stage III of the Bruce Protocol (10 Mets)

RUNNING*			**WALKING***	
Mile Per Hour	**Min Per Mile**	**Incline /Grade**	**MPH**	**Incline / Grade**
			3.0	17%
			3.4	14%
4.0	15	10%	3.7	12%
5.0	12	4%	4.0	10%
6.0	10	0%	4.5	6%
			5.0	4%
STAIR CLIMBING* 55 feet per min (7 lights on a Stairmaster®) or at least 30 steps per min on a step height of 36cm or greater.				
BIKING* The intensity of 225 watts is considered an equivalent metabolic load for a 176 lb. subject.				

*All exercise candidates should comply with a level recommended by a health professional.

Warm Up

Before starting the treadmill test, warm up with light calisthenics. This helps prevent injuries and prepare for the task.

Instructions for Conditioning

1 Start a three minute timer and slowly begin walking on a treadmill.

2 Increase the speed to 3.4 mph with 0 %grade during the first 3 minutes. (Reduce speed if necessary to maintain Target Heart Rate or 3-5 on RPE scale.

3 Increase the grade/incline 2% every 3 minutes until achieving target heart rate equivalent to 70% of age - predicted max heart rate, or symptom-limited heart rate.

4 Continue to walk at or near target heart rate or perceived exertion value making adjustments in incline, if necessary.

5 Walk 3-5 times per week for 25-45 minutes.

To calculate target heart rate from 70% of age-predicted maximum heart rate, use the following formula: (220-age) x .7 = 70% Maximum Heart Rate. Calculation of target heart rate for individuals with known cardiovascular disease should take into consideration the occurrence of abnormal responses to exercise (exercise induced angina, inappropriate blood pressure response, arrhythmia, etc.)

Symptom-limited maximum heart rate can be determined by reviewing previous treadmill test data to identify the maximum achieved heart rate prior to the onset of symptoms or poor vital signs.

This symptom-limited heart rate value should be considered maximum, and no more than 70% of this value should be used for exercise programming.

If the candidate is de-conditioned time should be limited to a total of 10 – 12 minutes the first week. During the second week each exercise session should last 15-25 minutes.

When the candidate can exercise at 3.4mph and an incline of 8% while maintaining a heart rate in the 70% heart rate zone or 3-5 RPE without symptoms or inappropriate vital signs, completing the third stage of the Bruce protocol can be reasonably assured.

References

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David Hale is the Executive Director of Pilot Medical Solutions, Inc., in Bethany, Oklahoma. He can be reached at 800-699-4457 or email dhale @ leftseat.com