

Fast Facts for Exercise Testing

Exercise Testing Protocols																			
Functional Class	Clinical Status	Bicycle Ergometer	Treadmill Protocols																
			Modified Bruce		Bruce		Balke-Ware		Naughton		USAFSAM		"Slow" USAFSAM		Cornell				
			3-min Stages		3-min Stages		3-min Stages		2-min Stages		3-min Stages		2-min Stages		2-min Stages				
			kmh/mph	%GR	kmh/mph	%GR	kmh/mph	%GR	kmh/mph	%GR	kmh/mph	%GR	kmh/mph	%GR	kmh/mph	%GR			
Normal and I	Healthy, Dependent on Age, Activity	1 Watt = 6 KPDS	9.6/6.0	22	9.6/6.0	22													
		for 70 kg Body Weight KPDS 1500	8.9/5.5	20	8.9/5.5	20									8.9/5.5	19			
			8.1/5.0	18	8.1/5.0	18									8.1/5.0	18			
			7.4/4.6	17											7.4/4.6	17			
		II	Sedentary Healthy	kmh/KPDS	6.8/4.2	16	6.8/4.2	16				5.3/3.3	25						
				61/1350								5.3/3.3	20						
				55/1200															
				48/1050	5.5/3.4	14	5.5/3.4	14				5.3/3.3	15			3.2/2.0	25	4.8/3.0	13
				41/900															
				34/750	4.0/2.5	12	4.0/2.5	12				3.2/2.0	21.0	5.3/3.3	10	3.2/2.0	20		
III	Limited			27/600											3.2/2.0	15	4.0/2.5	12	
				21/450	2.7/1.7	10	2.7/1.7	10							3.2/2.0	10	3.4/2.1	11	
				14/300	2.7/1.7	5						5.3/3.3	5			3.2/2.0	5	2.7/1.7	10
				7/150	2.7/1.7	0						3.2/2.0	7.0	5.3/3.3	0	3.2/2.0	5	2.7/1.7	5
IV	Symptomatic		3.2/2.0	0					3.2/2.0	0	5.3/3.3	0	3.2/2.0	0	2.7/1.7	0			
			1.6/1.0	0															

Aerobic cost of exercise protocols. This figure shows the predicted aerobic cost of the stages of many of the currently used treadmill protocols. Total exercise time is not as important a value as is the estimated oxygen consumption value of the protocol stage or workload reached. mph = miles per hour, kmh = kilometer per hour, %GR = percent grade, KPDS = kiloponds, METS = metabolic equivalents

Rate of Perceived Exertion		
20		Very, Very Hard
19		
18		
17		Very Hard
16		
15		Somewhat Hard
14		
13		
12		
11		Fairly Light
10		
9		
8		Very Light
7		
6		

Electrode Troubleshooting			
I	II	III	Electrode to Check
Artifact is Present	Artifact is Present	Artifact Free	Check RA Lead Free for Problems
Artifact Free	Artifact is Present	Artifact is Present	Check LL Lead for Problems
Artifact is Present	Artifact Free	Artifact is Present	Check LA Lead for Problems
Precordial Leads if Artifact is Present in Lead V1 through V6			Check the Appropriate V Lead for Problems

Modified Mason-Likar Electrode Placement

AHA Label	IEC Label	Electrode Location
V1 (red)	C1 (red)	Fourth intercostal space at the right sternal border.
V2 (yellow)	C2 (yellow)	Fourth intercostal space at the left sternal border.
V3 (green)	C3 (green)	Midway between locations V2 and V4 (C2 & C4).
V4 (blue)	C4 (brown)	Mid-clavicular line in the fifth intercostal space.
V5 (orange)	C5 (black)	Anterior axillary line on the same horizontal level as V4 (C4).
V6 (purple)	C6 (purple)	Mid-axillary line on the same horizontal level as V4 and V5 (C4 & C5).
LA (black)	L (yellow)	Just below the clavicle of the left arm.
RA (white)	R (red)	Just below the clavicle of the right arm.
LL (red)	F (green)	Lower left abdominal quadrant.
RL (green)	N (black)	Lower right abdominal quadrant.

	Distance Traveled in Kilometer/Miles in Stages						
	End of Stage						
	1	2	3	4	5	6	7
Bruce	0.13/.08	0.32/.20	0.52/.32	0.77/.48	1.11/.69	1.34/.83	1.77/1.10
Modified Bruce	0.13/.08	0.26/.16	0.46/.28	0.71/.44	1.05/.65	1.44/.89	1.87/1.16
Naughton	0.05/.03	0.15/.09	0.19/.12	0.29/.18	0.39/.24	0.48/.30	0.58/.36

Bruce & Modified Bruce are 3-Minute Stages. Naughton is 2-Minute Stages

This poster is part of a series of posters to assist healthcare professionals. The interpreter should memorize the essential components and practice by applying them to clinical situations. There are many variables to consider in any clinical situation including the patient's signs and symptoms. It is not unusual to find different opinions; therefore, we believe that interpretations should be left to experienced clinicians. For consistency and clarity, we have referenced the following sources to complete this poster: • "Exercise and the Heart - Clinical Concepts," 2nd edition, Victor Froelicher, 1983, 1987, Yearbook Medical Publishers. • "Guidelines for Exercise Testing and Prescription," American Sports Medicine Association (ACSM). We hope this guide will compliment any text study and/or classroom instruction.