INTERPRETING YOUR RESULTS: HOW DO YOU MEASURE-UP?

PHLAME II Program
Oregon Health & Science University

PHLAME's health goals	Why the goal is important:
1. Be physically active for at least 30 minutes each day.	Regular exercise is the closest thing we have to a fountain of youth. If you are active, you live longer and reduce your risk for almost all diseases.
2. Eat more than 5 servings of fruits and vegetables each day.	Eating more than 5 servings of fruits and vegetables each day decreases cancer deaths by 50% and reduces your risk of heart disease. And, the more you eat, the better it is.
3. Reduce dietary saturated and trans-fats and increase omega-3 fatty acids.	Saturated fats (fats from red meat, eggs and dairy products) increase the risk for heart disease, strokes and certain cancers.
4. Achieve a healthy body weight.	Being overweight or obese increases your rate of high blood pressure 3-fold and your risk for diabetes 5 times. Overall, each pound of excess weight increases health care costs by approximately $100.

This handout has more information about your results for each type of fitness testing.

Physical Activity versus Physical Fitness

Exercising regularly is one of the most important steps you can take to improve your health. Regular exercise cuts your risk of heart disease by half, reduces your risk of diabetes, lowers blood pressure, increases bone mass, decreases your risk of colon, prostate and breast cancer, helps you maintain a healthy body weight, increases your sense of well-being and reduces anxiety and depression. Sometimes people mistakenly think that if they cannot work out intensely, then there is no use in exercising. That is not true, as almost any type of physical activity provides you with health benefits.

Fire fighters need exercise for two reasons. First, like all people, regular physical activity is good for your health. Not exercising regularly is like not getting enough sunshine or being deficient in a vitamin. You can not be healthy without regular physical activity. The second reason fire fighters need to exercise is to be fit, that is to have the endurance and physical strength to do your life saving work.

Physical Fitness = Strength + Endurance + Flexibility

The exercise tests performed with PHLAME are those recommended by the International Association of Fire Fighters as indices of your ability to perform typical fire fighting tasks. Your maximum oxygen uptake is a measure of your endurance. Exercising at your 'training' heart rate for at least 20 minutes three times each week is the minimum training intensity and duration needed to increase your endurance.

Your strength is increased by specific resistance exercises to stress your muscles. Your overall strength is assessed by your ability to do pushups, situps, wall sit and grip strength. Being flexible reduces your chance of injury. Your flexibility is assessed with the sit-and-reach test. When you lack flexibility, your muscles and tendons are like a cold rubberband, which easily breaks when you stretch it.

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Compare your results with the healthiest values and use the What's Your Score handout to gauge the potential effect of your results on your health by calculating how old you are in fire fighter years.

Blood Pressure *	Systolic (mm Hg)	Diastolic (mm Hg)
Normal	Below 120	Below 80
Pre-hypertension	120 - 139	80 - 89
Hypertension	140 or greater	90 or greater

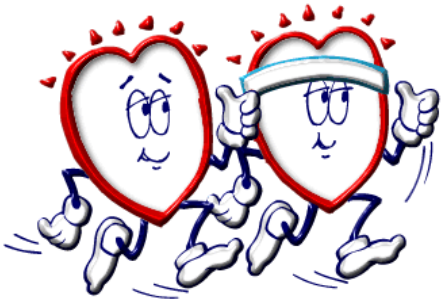
*The classification of blood pressure changed in 2003.

Your blood pressure measures the pressure on the wall of your blood vessels and that your heart is working against. Over time, an elevated blood pressure can strain your heart and damage blood vessels leading to heart attacks and strokes. You can help prevent and treat high blood pressure (hypertension) by eating more than five servings of fruits and vegetables every day, avoiding saturated fats, exercising regularly and losing excess body fat.

Glucose (Blood Sugar)	(mg/dL)
Normal	Below 110
Borderline	110 - 126
Elevated	Above 126

When your fasting blood glucose is elevated, it can indicate diabetes. You can reduce your risk for diabetes by having a healthy body weight, exercising regularly, and eating a low fat diet with at least 5 servings of fruits and vegetables each day.

Cardiac Heart Disease Risk Level	CRP Value (mg/dL)
Low	less than 1
Average	1-3
High	greater than 3



C-reactive protein (CRP) is a marker for inflammation in your blood stream. Higher levels of CRP, which are not due to a recent injury or illness, are an indicator of your risk for heart disease. Men with higher levels of CRP have triple the risk of heart attacks and double the risk of stroke, and for women, elevated levels of CRP may be associated with a seven-fold increase in heart attack risk. There are no specific medications to lower CRP. Having a healthy lifestyle and reducing your other risks for heart disease also will lower your CRP.

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CHOLESTEROL	Total Cholesterol (mg/dL)	LDL (Bad) Cholesterol (mg/dL)	HDL (Good) Cholesterol (mg/dL)
Optimal	Below 200	Below 100	55 or greater
Near Optimal		100 - 129	49 - 55
Moderate Risk	200 - 239	130 - 159	40 - 48
High Risk	240 or greater	160 - 189	Below 40
Very High Risk		190 or greater	

Your total cholesterol is a combination of good (HDL) and harmful (LDL) cholesterol. Every one percent increase in HDL cholesterol is associated with a three percent decrease in heart disease risk. HDL cholesterol levels can be increased by exercising regularly, not smoking and maintaining a healthy body weight. High LDL cholesterol is a risk factor for heart attacks and strokes. It is recommended that you lower your LDL cholesterol by reducing your intake of saturated fat, eating more than 5 servings of fruits and vegetables every day, exercising regularly and maintaining a healthy body weight.

Ratio of Total Cholesterol / HDL (Good) Cholesterol	Risk of Heart Disease
Below 3.4	Below average/Optimal risk
3.4 - 4.4	Average risk
4.5 - 7.1	Twice average risk
Above 7.1	Three times average risk

The ratio of total to HDL cholesterol takes into account your levels of LDL and HDL cholesterol and may be a better predictor for the development of coronary artery disease than either level alone.

Triglycerides	(mg/dL)
Optimal	Below 200
Moderate Risk	200 - 399
High Risk	400 - 1000
Very High Risk	1000 or greater

Your triglycerides are a form of blood fats. High triglycerides are associated with inherited traits, alcohol use, poorly controlled diabetes, low HDL cholesterol, and obesity. High levels can cause the blood to sludge, leading to organ damage. Your triglyceride level can be lowered by exercising regularly, losing weight (if you are overweight), limiting alcohol intake, and eating a low fat diet.

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Servings of Fruits and Vegetables per Day (The higher it is, the healthier you are.)

Servings of Fruits & Vegetables/Day	Risk
0 - 2	High
3 - 5	Moderate
6 - 9	Average
10 or greater	Low

Fruits and vegetables are good sources of vitamins, fiber and other health enhancing nutrients. A diet high in fruits and vegetables can reduce your risk of cardiovascular disease, certain cancers, high blood pressure and diabetes. PHLAME's goal is more than five total servings each day, and although five is good, even more is better. Taking vitamins can not duplicate the benefits of fruits and vegetables. The additional health enhancing nutrients in food out perform supplements every time.

Percent Calories from Saturated Fat

The American Heart Association recommends that you limit your total fat intake to less than 30% of your total calories and saturated fat to less than 10% of total calories. All fats are not created equal. In PHLAME II, we are focusing more on avoiding harmful saturated fats, which raise your cholesterol level and increase your risk of heart attacks, strokes and certain cancers. Replacing *saturated* with *unsaturated fats* can actually lower your cholesterol, even if your total percent calories from fat does not change.

The main sources of *saturated fats* are meat from animals with four legs, milk, milk products (such as butter and ice cream) and baked items, such as muffins and croissants, (due to being made with butter or animal lard).

In general, *unsaturated* fats are liquid at room temperature, such as the vegetable fats (for example, canola and olive oil). Most other vegetable oils, nuts and fish also are good sources of unsaturated fats. People living around the Mediterranean have diets high in fat but do not have more heart disease. It is believed that their use of vegetable fats protects them from the harm associated with a Western 'meat & potatoes' high fat diet.

Fish and poultry are lower in saturated fats. Fish also contains unsaturated fats called omega-3 fatty acids. These are especially 'good' fats. They can lower your triglyceride and LDL cholesterol levels and can be associated with a decreased risk for heart disease.

Vegetable fats are not all healthy. Tropical oils, such as palm and coconut oil, are higher in saturated fats. And, all vegetable fats can become unhealthy when they are altered, such as when liquid vegetable oils are hardened into margarines. This process, called partial hydrogenation, creates 'trans' fats, which are just as harmful as are saturated fats.

Don't trust the label to tell you the percent calories from fat. Two percent milk is 2% by weight, and 37% of its calories comes from fat. Meats labeled as 15% also refer to weight percentage. So the hamburger that you thought was low fat at 15% actually has more than 30% of its calories from fat.

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Endurance or Aerobic Fitness (Maximal Oxygen Uptake [mL/kg/min])

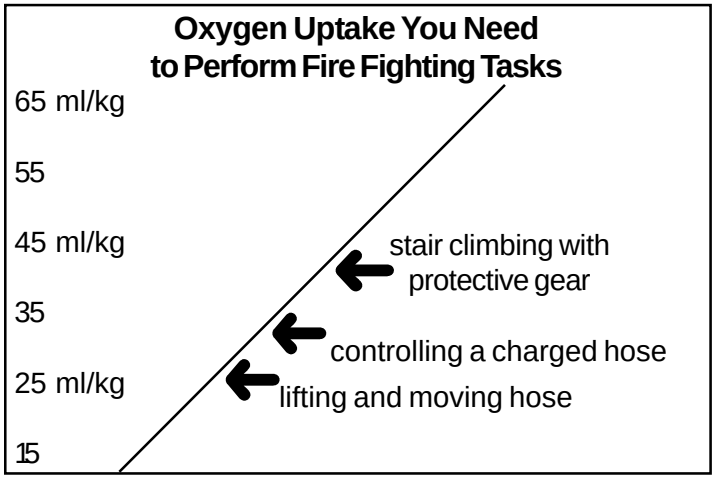
	Age			
Women	**20-29 Years**	**30-39 Years**	**40-49 Years**	**50+ Years**
High Fitness	Above 48	Above 44	Above 41	Above 38
Good Fitness	38 - 48	34 - 44	31 - 41	28 - 37
Average Fitness	31 - 37	28 - 33	24 - 30	21 - 27
Fair Fitness	24 - 30	20 - 27	17 - 23	15 - 20
Low Fitness	Below 24	Below 20	Below 17	Below 15

Your maximal oxygen uptake represents how well your muscles use oxygen and is the best indicator of overall aerobic fitness or endurance. Many factors affect your oxygen uptake: your lungs' ability to take up oxygen and transfer it to the blood; your heart's ability to pump the oxygen-rich blood to your muscles; and your muscles' ability to use oxygen. For people without heart or lung problems, your muscles limit your oxygen uptake. As your aerobic fitness increases, your muscles can take up more oxygen.

A major component of your oxygen uptake is determined by your genetics. Without regular aerobic exercise, most individuals are in the 'fair to average' fitness range. However, some people will have 'good' oxygen uptakes even when they do not exercise regularly. No matter where you start, nearly everyone can improve their oxygen uptake 10 to 15% with regular aerobic exercise. That is, exercising at your training heart rate for at least 20 minutes three times a week. Your aerobic training heart is 70 to 85% of your maximum heart rate. Your maximum heart rate can be estimated as 220 - your age in years. It takes the muscles some time to make cellular changes that result in increased oxygen uptake, and with aerobic training, your oxygen uptake changes over several months, not days or even weeks.

Researchers have measured the oxygen uptake you need to perform fire fighting activities. The results are shown in the figure.

If your oxygen uptake is less than the required level, you will build up lactic acid when performing these tasks. It is a physiologic fact that if your maximum oxygen uptake is less than the required level, you will not be able to do the activity for more than a few minutes without stopping.



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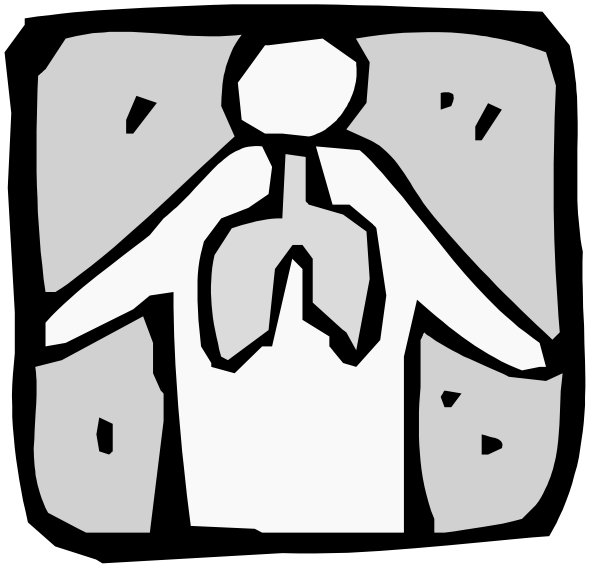
Lung Functions	Normal	Abnormal
FVC (L) or your Forced Vital Capacity is the total volume of air that you blow out.	Greater than 80% of the value predicted by your sex, height and weight.	If lower than 80% of predicted, it may indicate pulmonary disease. Lung size varies and for some, 80% of predicted may be normal.
FEV_1 (L) is the volume of air that you can force out in 1 second.	Greater than 80% of the value predicted by your sex, height and weight.	If lower than 80% of predicted, it may indicate pulmonary disease. Lung size varies and for some, 80% of predicted may be normal.
FEV_1/FVC % is the ratio indicating how much of your total lung volume you can blow out in 1 second.	Greater than 75%	Less than 75% suggests lung disease, such as asthma or chronic bronchitis.



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Percent Body Fat

Risk Category	Women
Too Low (unhealthy)	Below 16%
Low	16 - 21%
Optimal	22 - 26%
High	27 - 30%
Very High	Above 30%

Having a healthy body weight lowers your risk for joint and back problems, hypertension, heart disease, strokes, diabetes, cancer and many other health problems. It is recommended that you maintain your optimal weight with regular exercise and a healthy diet.

Waist to Hip Ratio

Risk Category	Women
Lower Risk	Below 0.80
Moderately High Risk	0.80 - 0.85
High Risk	Above 0.85

Your waist to hip ratio indicates where your body fat is distributed. The location of body fat may be as important as total fat in determining your risk for certain diseases. Some people tend to store fat in their waist and abdominal areas, while others have more fat in their lower body. Fat around the middle causes more health problems and is a greater risk for heart disease, hypertension, strokes and diabetes. The good news is that body fat around your middle is easier to lose with regular exercise.

Grip Strength (Left + Right Hand, Kg)

Age - Women					
Category	**20-29 Years**	**30-39 Years**	**40-49 Years**	**50-59 Years**	**60+ Years**
Excellent	Above 70	Above 72	Above 72	Above 64	Above 59
Good	65 - 70	66 - 72	65 - 72	59 - 64	54 - 59
Average	61 - 64	61 - 65	59 - 64	55 - 58	51 - 53
Fair	55 - 60	56 - 60	55 - 58	51 - 54	48 - 50
Poor	Below 55	Below 56	Below 55	Below 51	Below 48

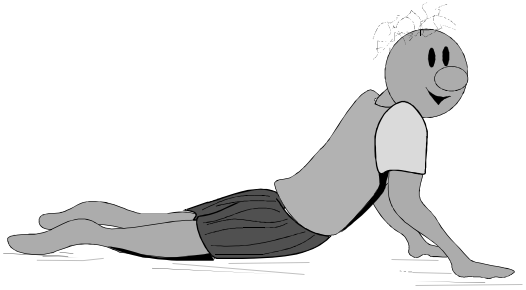
Sit Ups (Number completed in one minute)

Age					
Women	**20-29 Years**	**30-39 Years**	**40-49 Years**	**50-59 Years**	**60+ Years**
Excellent	Above 35	Above 28	Above 24	Above 18	Above 15
Good	31 - 35	24 - 28	20 - 24	12 - 18	12 - 15
Average	25 - 30	20 - 23	15 - 19	5 - 11	4 - 11
Fair	21 - 24	15 - 19	7 - 14	3 - 4	2 - 3
Poor	Below 21	Below 15	Below 7	Below 3	Below 2

Grip strength, sit ups, wall sit, and push ups are measures of strength. Strength in your legs, upper body, and trunk relate to your ability to effectively perform fire fighting tasks and avoid injury.

Push Ups (Number completed in one minute)

Age				
Women	**20-29 Years**	**30-39 Years**	**40-49 Years**	**50-59 Years**
Good	Above 25	Above 25	Above 22	Above 22
Average	18-25	16-25	13 - 22	11-22
Fair	10-17	10-16	8-12	7-10
Poor	Below 10	Below 10	Below 8	Below 7



Wall Sit (seconds)

Category	Seconds
High	Above 90
Average	75 - 90
Below Average	Below 75

Flexibility

Sit and Reach Results (cm)

	Age			
Women	**20-29 Years**	**30-39 Years**	**40-49 Years**	**50+ Years**
Excellent	Above 40	Above 40	Above 37	Above 37
Good	37 - 40	36 - 40	34 - 37	33 - 37
Average	33 - 36	32 - 35	30 - 33	30 - 32
Fair	28 - 32	27 - 31	25 - 29	25 - 29
Low	Below 28	Below 27	Below 25	Below 25

Your sit and reach measurement is an indication of hamstring and back flexibility. You can convert the number to inches by multiplying by 0.39. Normal flexibility allows your joints and muscles to work optimally and reduces your chance of musculoskeletal injury. Studies show that when fire fighters improved their flexibility, they decreased the frequency and severity of work-related injuries. Simple, daily stretching exercises can improve your flexibility and reduce your risk of musculoskeletal injuries.