FACT SHEET
Physiology

HOW MUCH DO YOU SWEAT?

Kris Freeman: US Cross Country Ski Team Member

Maintaining fluid balance, or hydration, is an important factor in preserving various body functions and supporting exercise performance. During exercise, fluids are lost, mainly through sweating. Unless the athlete consumes fluid to replace these losses, a fluid deficit will occur. Unfortunately, thirst is not an adequate indicator of fluid needs during exercise. To help develop a fluid intake plan, both during and after exercise, athletes need to know about the magnitude of their sweat losses.

How can sweat losses be estimated?

In the laboratory, sweat losses and sweat rates can be measured using various sophisticated techniques. In the field, the most practical way for athletes to monitor their sweat loss is to measure changes in body weight - that is, to weigh themselves pre- and post-exercise. Each lb of weight loss is approximately equal to 16 oz of fluid deficit. Total sweat loss can be estimated by adding the weight of any food or drinks consumed during the session, to this post session weight change. Dividing the total sweat loss by the duration of exercise will provide an estimation for the rate of loss.

Do sweat rates vary among athletes?

Yes. Individual sweat rates and fluid losses vary widely. Body size, gender, exercise intensity, environmental conditions and individual metabolism all influence sweat rates. The best way for athletes to gain information about their sweat rates for a given event or training session is to actually monitor their losses over a number of sessions under similar conditions. However, this is not always possible. Values representing average losses for a given type and intensity of exercise, in a given environment will provide guidelines for expected sweat loss when no specific information is available. In the following tables, mean fluid losses for sportsmen and sportswomen under varying conditions with different sporting activities are given.

Do men sweat more than women?

The information in the table on page 2 shows that most of the published information concerns male athletes. In general, women sweat less than men, even when data are expressed as a percentage of body weight. This does not mean that women regulate body temperature better than males, however. In fact, since the sweat rate is lower and provides less opportunity to dissipate body heat, body temperature may actually rise more in women during a given exercise bout at a particular relative intensity. Women may then need to take other measures to aid in heat regulation. These may include, sponging the body with cool water, wearing clothes that do not hold heat and if all else fails, reducing exercise intensity.

How to calculate your sweat rate during exercise:

Example:

- Pre-exercise weight – 121 lbs
- Post-exercise weight – 118 lbs
- Volume of fluid consumed during exercise
- (35 oz) – 2.2 lbs
- Exercise duration - 2 hrs

Calculations:

Fluid deficit (L) = 121 lbs – 118 lbs = 3 lbs
Total sweat loss (L) = 3 lbs + 2.2 lbs = 5.2 lbs
Sweat rate (L/h) = 5.2 lbs/2 h = 2.6 lbs/hr

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RUNNING

Exercise type	Sex	Intensity	Sweat rate (oz/h)	Ambient temperature (°F)	Relative humidity (%)
10 km	f	7.95 mph	50	66-75	-
	m	9.1 mph	62	66-75	-
30 km	-	-	42	48-63	30-90
2 hours	m	63% VO2max	48	72	40-45
42.2 km	-	9.3-15.5 kg/h	1.1	72-79	50-60
	f	5.5-7.5 mph	37	42-75	45-85
	m	5.5-7.5 mph	27	45	45-85
	m	5.5-10 mph	32	50-55	73
	m	10 mph	51	68	37
	-	6-9 mph	23-43	54-74	-
56 km	-	6.5-9.2 mph	34	54-79	-
80 min	m	70% VO2max	48	68	-

Does sport influence sweat loss?

Sweat losses vary according to the type of activity, the intensity of exercise and environmental conditions. The tables show that the rate of sweat loss increases with higher intensity running. For example, running at 10 km race pace will produce a higher sweat rate than running at marathon pace, all other things being equal. Of course, total sweat losses in a marathon will probably be greater since the athlete will exercise for a longer time. Heat and humidity play an obvious role in determining sweat rates - and athletes who compete in summer-based sports or events located in hot environments (e.g. the 1996 Olympics in Atlanta or the 2008 Olympics in Beijing) should be particularly aware of the need to monitor sweat losses. In some sports, airflow provides an opportunity for convective loss of heat and can reduce sweat losses (e.g. cycling versus running in the same environment or running with the wind versus against the wind). On the other hand, playing sport in a stadium may provide an artificial environment and prevent airflow. Some athletes do not realise that they can sweat while undertaking exercise in water. However studies on waterpolo and swimming show a small-moderate sweat rate when the intensity is high.

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Adapted from: Rehrer, N. J., and L. M. Burke. Sweat losses during various sports. Australian Journal of Nutrition and Dietetics. 53(4): S13-S16, 1996. Written by Michelle Minehan and the Department of Sports Nutrition, AIS