

The Search for Steve Fossett: A Study on the Physical Response of Adventure Athletes

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Goals of the Study

To understand how the body reacts to extreme conditions of exercise in highly trained athletes. Our main objective was to track the amount of calories burned (energy) while our group of 4 male adventure athletes searched for Steve Fossett's plane in the Sierra Nevada Mountains. These conditions were hot, dry, at a high altitude, and involved physically demanding activity for as much as 9-hours a day over the course of 6 days. We also wanted to see how body composition changed over this strenuous time (body fat).

Methods of the Study:

Body Measurements – height and weight was determined at the beginning of the study

DEXA Scanning – using a dual energy x-ray absorptiometry machine, we did whole body scanning on the athletes before and after the search. This machine gave us their body fat and muscle percentages as well as their bone density (Figures 1, 2, and 3).



Figure 1. DEXA Scanner bed

VO₂ Max Testing – we wanted to see what the maximum ability for the athlete's body was to use oxygen during a graded (increasingly difficult) exercise test. VO₂ testing is a good indicator of fitness levels in athletes. To do this we measured how they were breathing while doing a bike ride. This bike ride kept getting harder and harder until they couldn't ride anymore. The higher the VO₂ Max, the more conditioned the athlete is. We also measured their heart rates all the time.

Heart Rate Monitoring – using sophisticated Suunto heart rate monitors, the athletes were tracked every minute of their expedition. This allowed us to calculate the amount of calories they burned during exercise (see calculations).

Results:

Table 1: Subject Information

Subject	Age (y)	Weight (kg)	Height (cm)	Body Fat %		VO ₂ /kg	Ave Heart Rate/hr on Trek	Total Ave Calories burned/hr on Trek
				Pre	Post			
1	32	76.8	185	9.1	N/A	63.9	98.5	484.2
2	27	67.1	175	10.2	9.7	69.4	100	567.7
3	30	80.7	188	9.2	10.5	57.8	109	752
4	42	75.0	176	16.7	17.5	49.5	100.4	521.7

Calculations:

We know that the amount of oxygen (LO₂) we consume along with the calories (kcal) that we burn are connected, we can determine how many calories they were burning per hour with this calculation:

$$4.85 \text{ kcal} / \text{LO}_2 = 5.23 \text{ kcal/min} \times 60$$

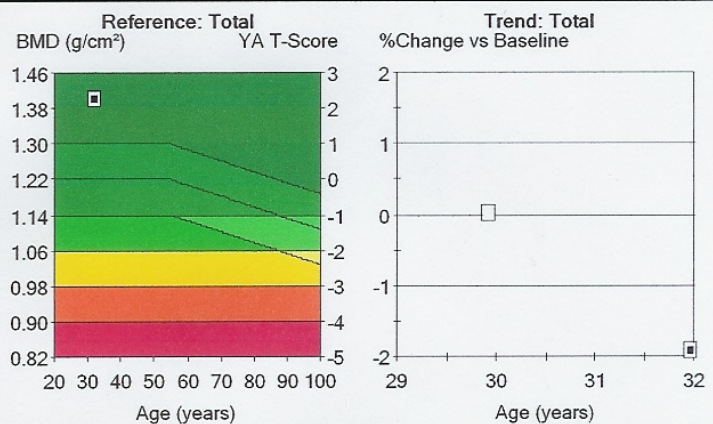
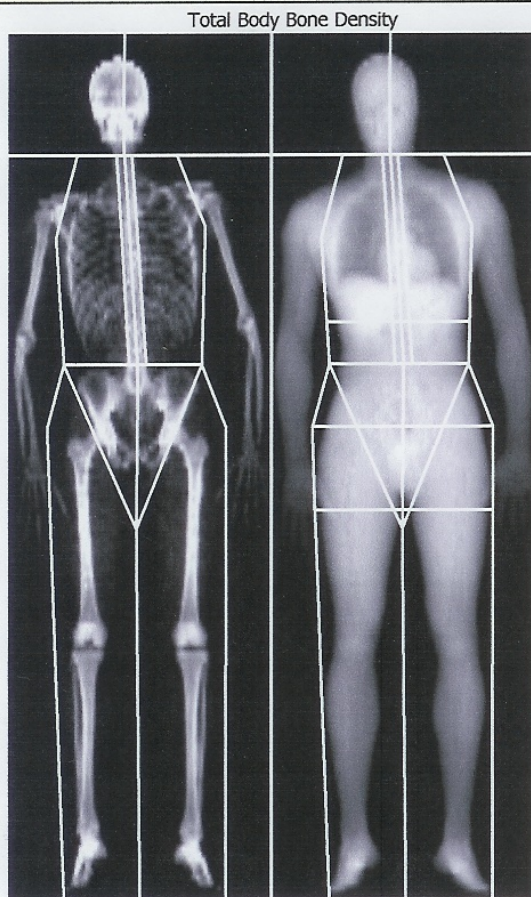
Conclusions:

By doing all these tests we determined that the athletes looking for Steve Fossett burned an average of 582 calories an hour while searching. In eight hours of the search alone they would have burned on average 4656 calories. Also, the fact that the athletes even while burning almost 5000 calories a day didn't lose any fat can be attributed to proper nutrition. It is very important to make sure the same amount of calories are coming in by eating properly during extreme sports. Improper nutrition can lead to a variety of physical problems including fatigue, cramping, fainting, shock and even death. In summary, it is fair to say that the athletes replaced the energy they burned during the day through eating and drinking regularly. This study is useful because it will be used for future Adventure Science projects to help predict how much energy the athletes will be using and plan for the nutrition accordingly.

Hamilton Health Sciences (McMaster Site)

1200 Main Street West
Hamilton, Ontario L8N 3Z5

Patient:	DONATO, SIMON	Patient ID:	FOSSETT
Birth Date:	10/07/1976 31.9 years	Referring Physician:	ALISSA
Height / Weight:	185.0 cm 76.8 kg	Measured:	28/06/2008 11:19:43 AM (9.15)
Sex / Ethnic:	Male White	Analyzed:	28/06/2008 11:20:51 AM (9.15)



Region	BMD ¹ (g/cm ²)	Young-Adult ² T-Score	Age-Matched ³ Z-Score
Head	2.122	-	-
Arms	1.108	-	-
Legs	1.738	-	-
Trunk	1.074	-	-
Ribs	0.773	-	-
Pelvis	1.382	-	-
Spine	1.433	-	-
Total	1.403	2.3	2.3

Measured Date	Age (years)	Trend: Total ¹		
		BMD (g/cm ²)	Change vs Previous (g/cm ²)	Change vs Baseline (g/cm ²)
28/06/2008	31.9	1.403	-0.028	-0.028
15/06/2006	29.9	1.430	-	baseline

COMMENTS:

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1 - Statistically 68% of repeat scans fall within 1SD (± 0.010 g/cm² for Total Body Total)
2 - USA (ages 20-40) Total Body Reference Population (v104)
3 - Matched for Age, Ethnic

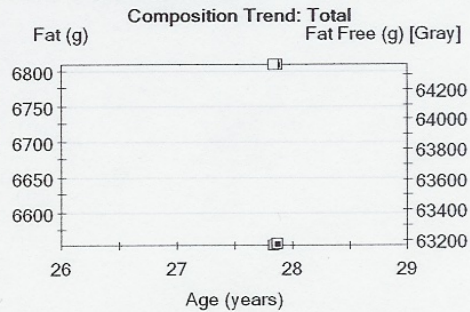
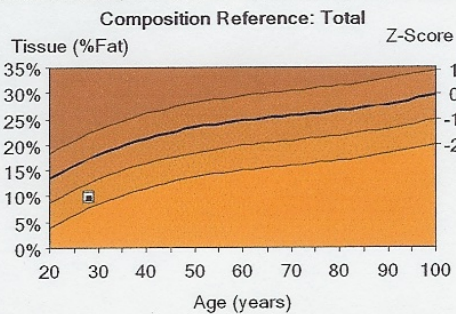
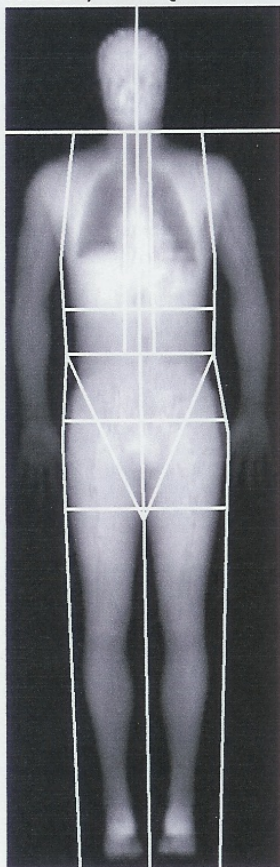
Figure 2. DEXA-scan results for Simon Donato. Bone density results displayed as BMD (grams/cm³)

Hamilton Health Sciences (McMaster Site)

1200 Main Street West
Hamilton, Ontario L8N 3Z5

Patient:	HUDSON, GARY	Patient ID:	FOSSETT S2
Birth Date:	09/09/1980 27.8 years	Referring Physician:	ERIN
Height / Weight:	172.5 cm 69.0 kg	Measured:	23/07/2008 2:11:48 PM (9.15)
Sex / Ethnic:	Male White	Analyzed:	23/07/2008 2:12:43 PM (9.15)

Total Body Tissue Quantitation



Trend: Total

Measured Date	Age (years)	Tissue (%Fat)	Z-Score ^{2,3}	T.Mass (kg)	Region (%Fat)	Tissue (g)	Fat (g)	Lean (g)	BMC (g)	Fat Free (g)
23/07/2008	27.8	9.7	-1.6	70.9	9.2	67,770	6,556	61,214	3,147	64,362
08/07/2008	27.8	10.2	-1.5	70.0	9.7	66,776	6,808	59,968	3,195	63,163

Trend: Fat Distribution

Measured Date	Age (years)	Android (%Fat)	Gynoid (%Fat)	A/G Ratio	Total Body (%Fat)
23/07/2008	27.8	14.9	13.0	1.15	9.7
08/07/2008	27.8	14.8	12.7	1.17	10.2

COMMENTS:

World Health Organization BMI Classification

Body Mass Index (BMI) = 23.2

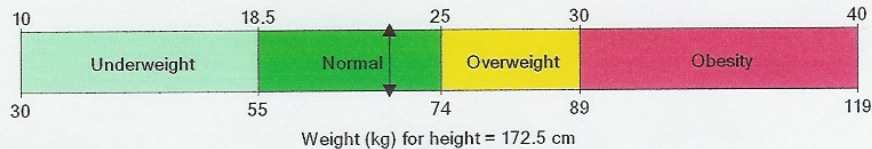


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Scan Mode: Standard 0.4 µGy

2 -USA Total Body Reference Population (v104)
3 -Matched for Age, Ethnic

Figure 3. Gary Hudson's BMI results from DEXA-scan place him in the normal and healthy category for his height and weight.