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COLLECTION PERILOUS

BOX No. N/A
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Body Water at Sea Level and at Altitude¹

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IN A PREVIOUS COMMUNICATION (1) observa-
tions on the changes in weight and total
body water were reported for rats main-
tained at a pressure altitude of 15,000 feet.
Water loss closely paralleled weight loss during
the first week of acclimatization as well as
during the gradual recovery to nearly normal
values in the subsequent three weeks at this
altitude. Other observers have reported diure-
sis during acclimatization, and it is well known
that persons subjected to prolonged hypoxia
often undergo marked loss of weight. It has not
been possible as yet to say to what extent fat
and lean tissue may be involved in the weight
loss.

The present study is the first of a series in-
tended to elucidate changes in body water and
fat in humans during and after acclimatization
to low oxygen tension.

METHODS

Two groups of subjects were employed, rep-
resenting persons long acclimatized to sea level
and to high altitude. The first group consisted
of 15 normal young males (medical students),
residents of Lima, Peru, whereas the second
groups consisted of 13 normal male Peruvian
Indians (mine workers) living at 16,400 feet or
above. The latter group was studied in the hos-
pital of the Ticlio Mines situated near Moro-
cocha at an elevation of 16,400 feet. All sub-
jects were in good health.

Total body water was determined by the
tritium dilution method previously described
(2, 3). Fat was calculated from total body
water by the familiar formula, % fat = 100 -
1.37 X % water.

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Air Force, and by an anonymous donor.

RESULTS

Summaries of the body water and fat deter-
minations are given in table 1. The average to-
tal body water of 55.0% of body weight for
the group living at sea level is only slightly be-
low the average, but well within the normal
limits found previously by the authors and
other investigators (2, 3) for men in this age
group. The average of 60.0% body water for
the group living at 16,400 feet is about normal
for the age range. The values for fat percentage
are normal since they merely reflect normal
values for total body water.

The data reported here are intended only as
background for further studies on acclimatiza-
tion. The difference in body water of about 5%
cannot be construed as a significant effect of
acclimatization, but rather suggests a slight
difference in gross body composition, i.e., in
the relative amount of fat and lean body mass,

TABLE 1. BODY WATER AND FAT AT SEA LEVEL AND
AT 16,400 FEET

Subj. No.	Body Water, %	Body Fat, %	Subj. No.	Body Water, %	Body Fat, %
At Sea Level			At 16,400 Feet		
1	55.3	24.2	1	60.9	16.6
2	54.1	25.9	2	65.8	9.8
3	53.5	26.7	3	67.9	7.0
4	37.0	49.3	4	59.6	18.3
5	68.7	5.9	5	53.0	27.4
6	56.2	23.0	6	61.6	15.6
7	55.0	24.7	7	69.4	4.9
8	48.2	34.0	8	64.4	11.8
9	60.7	16.8	9	55.0	24.6
10	61.6	15.6	10	57.5	21.2
11	63.6	12.9	11	62.7	14.1
12	53.5	26.7	12	50.7	30.5
13	61.0	16.4	13	59.1	19.0
14	49.2	32.6			
15	57.0	21.9			
Mean	55.6	23.8	Mean	60.6	17.0

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because of the respective occupations of the two groups.

SUMMARY

Total body water was determined in two groups of young, normal subjects, one group living at sea level, the other acclimatized to 16,000 feet. The mean values of body water for the two groups are normal for their age range and occupations.

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