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(NASA-CR-140668) IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION Semiannual Status Report, 1 Jan. - 30 Jun. 1974 (California Univ.) 101 p HC $5.25 CSCL 06P G3/52

N75-10690

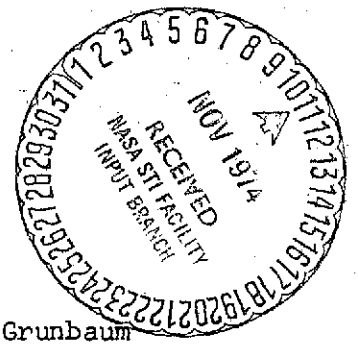
Unclas 52683

IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION

NASA Grant NGR 05-003-470

SEMI-ANNUAL STATUS REPORT NO. 4

1 January 1974 - 30 June 1974



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6 November 1974

NASA Scientific & Technical Information Facility
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Dear Sirs:

Enclosed herewith please find two (2) copies of Semi-Annual Status Report No. 4 on Grant NGR 05-003-470, covering the time period from 1 January 1974 to 30 June 1974.

Sincerely yours,

Nello Pace

Nello Pace
Professor of Physiology
and Director

NP:emn

Enclosures (2)

IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION

The work performed during this 6-month period was concerned entirely with completion of the laboratory analysis of the blood and urine samples collected from the subjects of the 1973 NASA/Ames Female Bed-Rest Study. Details of our participation in this study were given in the previous Semi-Annual Status Report, No. 3.

Briefly, 12 female subjects resided in the NASA/Ames Human Research Facility from 16 September to 22 October 1973. After a preliminary base-line period of 2 weeks, 8 of the subjects remained continuously recumbent for 17 days and were designated the Bed-Rest Group. The other 4 subjects remained ambulatory but were confined to the Facility throughout the study, and were designated the Ambulatory Group. Both groups were studied for an additional 6 days after the period of continuous recumbency for the Bed-Rest Group. Table 1 lists the vital statistics of the 12 subjects at the start of the study.

In order to accomplish our measurements the subjects were arbitrarily subdivided into 2 sections, each containing 4 members of the Bed-Rest Group and 2 members of the Ambulatory Group. The measurement schedules for the 2 sections were staggered by a day, so that the subjects could be transported to Berkeley on successive days for the tests conducted here. The Berkeley measurements for each section were made on Day 7 before the Bed-Rest Group started the continuous recumbency, on Day 17 of the recumbency, and on Day 6 after continuous recumbency of the Bed Rest Group was terminated. Thus, each subject was studied on 3 occasions in Berkeley.

Body Weight. Table 2 gives the morning body-weight values for each subject in the 2 groups on Day 7 before the start of continuous recumbency of the Bed-Rest Group, on Day 17 of recumbency of the Bed-Rest Group, and on

Day 6 after continuous recumbency was concluded. The mean, standard deviation, and standard error for each group on each of the 3 days are also shown.

The t-test was applied to these data to determine whether or not significant differences existed between the various group means. Thus, the mean value on Day 17 of recumbency was compared with the base-line mean obtained before recumbency began. Similarly, the mean value on Day 6 after recumbency was terminated was compared with the base-line mean. These comparisons were made for each of the 2 groups, and the probabilities that the pairs of means compared came from the same statistical population are shown in Table 2. If the value of P was less than .05, the means were considered to differ significantly. Comparison was also made between the normalized means for each of the 2 groups on Day 17 of recumbency, and on Day 6 of recovery, considering the base-line value for each subject to represent 100%. The P values for these comparisons are also given in Table 2.

It may be seen that in the case of body weight none of the P values computed fell below 0.05. Hence, it can be concluded that in this group of subjects there was no significant change in body weight, either as a result of 17 days of recumbency or as a result of the more general confinement conditions under which the study was carried out.

Plasma Volume. A substantial decrease in plasma volume, amounting to 10-15%, has come to be recognized as a characteristic response of male subjects to continuous recumbency lasting a week or more. Table 3 gives the results of the plasma volumes measured by dilution of T-1824 (Evans Blue) dye in the present study.

It may be seen that on Day 17 of continuous recumbency, the Bed-Rest Group exhibited a highly significant fall of 12.6% in their mean plasma volume,

whereas the Ambulatory Group showed no significant change at this same time. By Day 6 of recovery, the Bed-Rest Group plasma volume was apparently completely restored. It should be noted that the comparison between the normalized means for the 2 groups on Day 17 of recumbency also showed a highly significant difference in the way in which the 2 groups responded to the experiment conditions; whereas, on Day 6 of recovery there was no demonstrable difference between the 2 groups.

It may be concluded, therefore, that plasma volume was significantly reduced on Day 17 in the Bed-Rest Group, but not in the Ambulatory Group, and that this was the result of the continuous recumbency experienced by the former group. It may also be concluded that the other experiment conditions had no significant effect on plasma volume.

Hematology. Both venous hematocrit value and blood hemoglobin concentration were measured in these subjects, and the results are given in Tables 4 and 5. Unfortunately, a decision was made by NASA before the experiment to eliminate the measurement of ^{51}Cr red cell volume from our protocol in the interests of avoiding the 5 millirad radiation dose to the subjects, which is associated with the procedure. Therefore, changes in this important parameter could not be followed.

As may be seen in Tables 4 and 5, both the venous hematocrit value and the blood hemoglobin level fell progressively in both groups throughout the course of the study, reaching values of 85 to 88% of base line for both parameters by Day 6 of the post-recumbency period. This is in contrast with results from previous bed-rest studies, which show that venous hematocrit values and blood hemoglobin levels are characteristically elevated during periods of continuous recumbency. It is regrettable that the red cell volume could not have been

measured to substantiate it, but a likely inference which can be drawn is that both groups in the present study experienced a substantial decrease in total circulating red blood cells. Whether this may have been the result of the rather sizeable blood sampling that occurred during the total study, or a consequence of the general conditions of the confinement in the Human Research Facility cannot be stated with certainty. However, the former explanation appears to be the more likely one at this time.

Body Water Compartments. As may be seen in Table 6, the mean value of total body water content in both groups was lower on Day 17 of the recumbency period than it was before recumbency began; however, despite the fact that the mean decrease from the base value was greater in the Bed-Rest Group, the difference achieved statistical significance only in the Ambulatory Group. There was no significant difference between the normalized means of the two groups on Day 17.

The extracellular fluid volume was measured as the bromide space, and the results are given in Table 7. As may be seen, the extracellular volume tended to be lower in the Bed-Rest Group on Day 17 of the recumbency period, but was significantly elevated in the Ambulatory Group on the same day. Comparison of the change in normalized means for the two groups on Day 17 revealed a significant difference between them. There was no statistically significant difference between the base values and the values measured on Day 6 of the post-recumbency period in either group; likewise, there was no significant difference in the change in normalized means between the two groups on that day.

The intracellular fluid volume was computed as the difference between total body water (Table 6) and extracellular volume (Table 7), and the results are shown in Table 8. Intracellular volume was significantly lower in the Ambulatory Group on Day 17 of the recumbency period, and in both groups on

Day 6 of the post-recumbency period. It also tended to be lower in the Bed-Rest Group on Day 17 of the recumbency period, but the difference from the base value did not attain statistical significance. There were no significant differences between the normalized means for the two groups on either day.

As in the RGG Bed-Rest Study, there is strong indication in the water compartment data that a net loss of water from the body occurs during prolonged recumbency, and that the loss amounts to about 1 liter. However, the inherent variance in the water-compartment measurement procedures themselves put the statistics right at the edge of significance. There is the further indication in these data from the Female Bed-Rest Study that water is lost from both the extracellular and intracellular compartments, but further investigation is needed to establish this conclusion firmly. The recommendation made in the previous Status Report, that radioactive tritiated water rather than deuterated water be used for total body water measurements, is reiterated. Use of T_2O as the tracer would materially reduce the procedural variance associated with these measurements, and the enhanced accuracy should permit better assessment of the body fluid changes associated with prolonged recumbency.

Body Potassium. Total body potassium content was measured by determining the natural gamma radiation from 40K when the subject was placed in the whole-body scintillation counter, and the results are shown in Table 9. It is evident that the Bed-Rest Group lost an average of 3.3% of their total body potassium by Day 17 of recumbency, whereas there was no significant change in body potassium content of the Ambulatory Group during this period. The normalized means for the two groups were also significantly different from each other on Day 17. By Day 6 of the recovery period, the body potassium content of the Bed-Rest Group had apparently been restored to the pre-recumbency base-line values.

It may be concluded that female subjects display a reduction in total body potassium content after 2-3 weeks of continuous recumbency, but the decrease in body potassium may be somewhat less in women than in men.

Plasma Electrolytes. Plasma levels of potassium, sodium, calcium, magnesium, and chloride were measured during the study, and the results are given in Tables 10-14. Plasma potassium tended to fall in the Bed-Rest Group, as has been the case in male bed-rest subjects, but if anything increased slightly in the Ambulatory Group. Thus, the normalized means for the 2 groups on Day 17 of the recumbency period were significantly different from each other. The entire question of potassium balance of the body during prolonged recumbency remains of interest.

Plasma sodium, magnesium, and chloride concentrations exhibited small, but statistically significant elevations in both groups on Day 17 of the recumbency period. Sodium levels had returned to base-line values by Day 6 of recovery in both groups, but magnesium and chloride remained elevated in both groups at this time. Plasma calcium concentration remained unchanged in both groups throughout the study. The significance of these small, but apparently real, changes in plasma electrolyte concentrations with respect to prolonged recumbency is not clear at present, but may be related to the overall shifts in fluid and electrolyte balance. In any case, these parameters are worthy of further study.

Plasma Proteins. Total plasma protein concentration did not change significantly either in the Bed-Rest Group or in the Ambulatory Group, as may be seen in Table 15. On the other hand, when the individual plasma protein fractions were examined electrophoretically, as shown in Tables 16-18, several significant differences emerged.

Plasma albumin concentration tended to be low in both groups on Day 17 of

the recumbency period, but attained statistical significance only in the Bed-Rest Group. The mean values for both groups seemed to have returned to base line by Day 6 of the post-recumbency period. Comparison of the normalized means on Day 17 of recumbency revealed no significant difference between the two groups.

In contrast, both the plasma globulins concentration and the plasma fibrinogen concentration were elevated on Day 17 of the recumbency period in both the Bed-Rest Group and the Ambulatory Group, as shown in Tables 17 and 18. Only the plasma globulins concentration increase in the Ambulatory Group did not attain statistical significance. Again, there were no significant differences between the normalized means of these parameters for the two groups on Day 17. Also, by Day 6 of the post-recumbency period the mean values for both parameters were indistinguishable from the base-line values.

As might be expected from the foregoing results, and as may be seen in Table 19, the plasma albumin/globulin ratio was depressed on Day 17 of the recumbency period in both groups, although statistical significance was attained only in the Bed-Rest Group. By Day 6 of the post-recumbency period the albumin/globulin ratio had been restored to base line.

In general terms, it appears that while total plasma protein concentration was unchanged on Day 17 of the recumbency period, a shift in composition had occurred such that albumin concentration was reduced while the other major fractions had increased proportionately. The reasons for this shift are not clear, but may be related to the increased hemopoietic challenge occasioned by the sizeable blood-sampling program involved in the study. It is also possible, of course, that the changes may have been a consequence of the overall confinement conditions experienced by both groups, although this would seem less likely a possibility.

Closer examination of the plasma protein concentration shifts was made by

computing the circulating quantities of total and individual fractions, as presented in Tables 20-23. When circulating total plasma protein was examined (Table 20), the interesting result emerged that on Day 17 of the recumbency period a substantial and significant drop had occurred in the Bed-Rest Group, while at the same time the Ambulatory Group was unchanged and, if anything, was slightly elevated. This difference was clearly reflected by the highly significant difference between the normalized means for the two groups on Day 17. By Day 6 of the post-recumbency period, the circulating total plasma protein of the Bed-Rest Group had returned to base line, and the difference between the two groups had disappeared.

The decrease in total circulating plasma protein of the Bed-Rest Group was probably a consequence of the substantial decrease in plasma volume in this group noted earlier. It is of interest, and probably of physiological significance, that the mean decrease in plasma volume measured on Day 17 of recumbency in the Bed-Rest Group amounted to 12.6% (Table 3), while the mean decrease in total circulating plasma protein in the same group on that day was 11.4% (Table 20). Thus, prolonged recumbency results not only in a decrease in plasma volume, but also in a concomitant decrease in total circulating plasma protein.

As may be seen in Tables 21 and 22, the decrease of about 20 g in total circulating plasma protein by Day 17 of recumbency in the Bed-Rest Group was accounted for entirely by a comparable reduction in the quantity of circulating albumin, while the quantity of circulating globulins was essentially unchanged. Thus, the decrease in total circulating plasma protein during recumbency seems to occur as the result of a specific decrease in the amount of albumin circulating in the vascular system.

Inspection of the data in Table 23 for the quantity of circulating plasma fibrinogen reveals another interesting change. By Day 17 of the recumbency period, both the Bed-Rest Group and the Ambulatory Group displayed a substantial and highly significant increase in circulating fibrinogen, which persisted into Day 6 of the post-recumbency period although to a lesser extent. Furthermore, the increase on Day 17 was significantly greater in the Ambulatory Group than it was in the Bed-Rest Group. An explanation for this change is not apparent; however, it may possibly be another manifestation of the hemopoietic challenge consequent upon the sizeable blood sampling, as noted earlier.

The plasma concentrations of the individual globulin fractions were also measured separately, and the results are given in Tables 24-27. Although the concentration of each of the 4 globulin fractions was slightly elevated on Day 17 of recumbency in the Bed-Rest Group, only the concentration of β-globulin was statistically significantly increased. No significant change from base line was noted either in the Ambulatory Group on Day 17 of the recumbency period, or in both groups on Day 6 of the post-recumbency period. When the circulating quantities of the individual globulin fractions were computed as shown in Tables 28-31, no changes were discernible during the study. Thus, it may safely be concluded that prolonged recumbency had no effect on the plasma globulins.

Plasma Enzymes. A puzzling increase in plasma alkaline phosphatase concentration was observed in both the Bed-Rest Group and the Ambulatory Group on Day 17 of the recumbency period, and the increase persisted to Day 6 of the post-recumbency period. The data are shown in Table 32. The increase was moderately large and highly significant statistically. Plasma alkaline phosphatase levels are thought to reflect osteoblast activity in the skeleton, and in the previous RGG Bed-Rest Study with male subjects the levels were down

after prolonged recumbency. Why these female subjects in both groups should display elevated plasma alkaline phosphatase levels is totally unclear.

As may be seen in Table 33, both the Bed-Rest Group and the Ambulatory Group showed a small but statistically significant decrease in glutamate-oxaloacetate transaminase levels on Day 17 of the recumbency period and on Day 6 of the post-recumbency period. Glutamate-pyruvate plasma levels, shown in Table 34, also showed a tendency to decline in both groups, reaching statistical significance on Day 6 of the post-recumbency period. The physiological import of these changes in plasma transaminase enzyme levels is once again not readily apparent.

Plasma total lactate dehydrogenase concentration was significantly reduced in both the Bed-Rest Group and the Ambulatory Group on Day 17 of the recumbency period, as indicated in Table 35. There was a tendency for the mean values in both groups to return toward base line by Day 6 of the post-recumbency period; however, they were still significantly lower than base line at that time.

When the LDH isoenzymes were examined electrophoretically (Tables 36-40) it was seen that the decrease in total LDH on Day 17 of the recumbency period in both the Bed-Rest Group and the Ambulatory Group was accounted for almost entirely by a large decrease in plasma concentration of the LDH-1 fraction, the isoenzyme associated primarily with heart muscle (Table 36). The other 4 isoenzymes either did not change at all, or in the case of LDH-3 actually increased. Of particular interest is the fact that LDH-5, the isoenzyme associated with skeletal muscle, showed no significant change in either group. In general, these results are not dissimilar to the findings on the male subjects of the RGG Bed-Rest Study, and further examination of the plasma LDH enzyme system in future bed-rest studies appears to be warranted.

Urinary Constituents Excretion Rates. The values measured for 24 different parameters on the 24-hour urine collections obtained during the study are given in Tables 41-64. Overall perusal of the changes found, which may be done conveniently from summary Table 65, reveals the startling fact that without exception the individual urinary constituent values either decreased or did not change significantly on Day 17 of the recumbency period for either the Bed-Rest Group or the Ambulatory Group.

In searching for an explanation for this unexpected result, attention was directed to the data in Table 55 for the urinary creatinine excretion rate. Previous bed-rest studies have shown quite clearly that creatinine excretion rate is relatively stable and unchanged during prolonged recumbency, as indeed was found to be the case in the RGG Bed-Rest Study. In the latter study, the coefficient of variation (S.D./Mean) hovered right around 10% for creatinine excretion rates during the various phases.

In the present study, examination of Table 55 shows that while the coefficient of variation for the base-line creatinine values was 9.8% in the Bed-Rest Group and 9.1% for the Ambulatory Group, it rose substantially to 24.1% and 25.4%, respectively, on Day 17 of the recumbency period, and to 28.2% and 30.4%, respectively, on Day 6 of the post-recumbency period.

Closer inspection of the data in Table 55 reveals that the greatly increased variances in creatinine excretion rate on Day 17 and Day 6 result from exceptionally low values for only some of the subjects. Furthermore, these large deviations are not systematic.

In a similar vein, when Tables 41 and 42, which give the urine volume and specific gravity data, are examined and compared with Table 55, the same large variance is seen in the urine volume for the same subjects, but without a corresponding large variance in the urine specific gravity which one would

expect. The values for many of the urine constituents show comparable anomalies.

The conclusion which must regrettably be drawn, therefore, is that the 24-hour urine collections were incomplete for a number of the subjects of both groups during Day 17 of the recumbency period, and during Day 6 of the post-recumbency period. If this was indeed the case, it would not only explain the tendency for so many of the mean values of the parameters to be lower than base line during the experiment, but more seriously it precludes drawing significant conclusions about the effect of prolonged recumbency on the excretion rate of any of the urinary constituents measured.

As an alternative, the excretion rates of the various urinary constituents can be computed per unit creatinine excreted, instead of in absolute terms. While the normal physiological variance in creatinine excretion rate artifactually increases the true variance of constituent involved and while the missing fractions of the 24-hour collections are not taken into account, at least this approach should reveal any major changes in urine constituent excretion rate.

Accordingly, the data for appropriate urine constituents were recomputed in terms of excretion per unit of urinary creatinine instead of excretion per unit of time. The results are presented in Tables 66-83, and a summary of the significant changes is given in Table 84. It is suggested that this summary is more correct for the behavior of the urine constituents than is the summary given in Table 65.

In general, it may be seen that the monovalent ions, chloride, sodium and potassium (Tables 67-69) were statistically significantly reduced on Day 17 of the recumbency period in the Bed-Rest Group. However, while statistical significance was not achieved, there was a strong tendency for these parameters to change in the same direction in the Ambulatory Group as well. There was also a small, but significant, difference between the normalized means for

potassium excretion per unit creatinine of the Bed-Rest Group and the Ambulatory Group on Day 17, but this appeared to be a difference in degree of change and was not interpreted as signifying a particular effect of prolonged recumbency. No significant change in urinary Na/K ratio (Table 48) was observed. The overall impression is that the differences observed in these parameters may have arisen from dietary differences. It is of interest that the total osmotic activity of the urine (Table 66) was also depressed significantly on Day 17, but this seems largely accounted for by the reduction primarily in sodium and chloride ions.

In contrast, magnesium, calcium and phosphate excretion per unit creatinine (Tables 70-72) all were elevated on Day 17 of the recumbency period in both the Bed-Rest Group and the Ambulatory Group. Again, the changes achieved statistical significance in the Bed-Rest Group but not quite in the Ambulatory Group. Although these changes are in agreement with the earlier findings from the NASA/Ames RGG Bed-Rest Study, and with other bed-rest studies, it must be pointed out that there was no significant difference between the normalized means for the Bed-Rest Group and the Ambulatory Group on Day 17. Also, as noted earlier, the plasma alkaline phosphatase levels in both groups showed an unexpected, and unexplained, increase. Thus, it is not possible to conclude with certainty that these urine ion changes are a particular consequence of prolonged recumbency. It is of some interest to note that the excretion of magnesium and calcium had returned to base line by Day 6 of the post-recumbency period, whereas phosphate excretion still tended to be elevated at that time. These results are strongly reminiscent of the changes observed during the earlier RGG Bed-Rest Study.

Urine urea excretion per unit creatinine (Table 75) was significantly lower

in both the Bed-Rest Group and the Ambulatory Group, as was urine glucose excretion per unit creatinine (Table 78). However, in neither case was there a demonstrable difference between the normalized means for the two groups. It is concluded, therefore, that these changes more likely represent dietary variance than an effect of prolonged recumbency *per se*.

Urine citrate excretion per unit creatinine (Table 79) was significantly elevated by about 55% in the Bed-Rest Group, both on Day 17 of the recumbency period and on Day 6 of the post-recumbency period. It was elevated to the same extent on both these days in the Ambulatory Group as well, but the difference did not attain statistical significance in this group. On re-examination of the RGG Bed-Rest Study urine citrate data (Table 50 of Status Report No. 3), it emerges clearly that urinary citrate excretion rate tended to be about 40% elevated both on Day 14 of bed rest and on Day 6 of recovery, and nearly reached statistical significance. For the combined data of the Control Group and RGG Group, the value of P on Day 14 of bed rest was 0.089, and on Day 6 of recovery it was 0.053. Thus, it is concluded that prolonged recumbency may involve a substantial increase in urinary citrate excretion rate, and that this phenomenon deserves further study.

Urine norepinephrine excretion per unit creatinine (Table 82) was significantly depressed on Day 17 of the recumbency period in the Bed-Rest Group, but not in the Ambulatory Group. Furthermore, the difference between the normalized means for the two groups on that day was nearly ($P = 0.055$) statistically significant. Thus, it appears that prolonged recumbency may result in a significant reduction in norepinephrine production. It is of further interest to note that both groups displayed a significant elevation over base line in norepinephrine excretion on Day 6 of the post-recumbency period.

Urine cyclic-AMP excretion per unit creatinine (Table 83) was significantly elevated in the Ambulatory Group on Day 17 of the recumbency period, and approached significant elevation (P = 0.098) in the Bed-Rest Group at that time. This observation would seem to warrant further attention to urinary cyclic-AMP measurements during prolonged recumbency studies.

Summary. In general, the 1973 NASA/Ames Female Bed-Rest Study has shown that, for the parameters measured by this laboratory, the response of women to prolonged recumbency of 2-3 weeks duration is very similar to that displayed by men. There were several minor differences between the results of the 1973 NASA/Ames RGG Study and those from the present study, but it is concluded that most were probably the result of differences in experiment conditions between the two studies rather than the result of a true sex difference in response to prolonged recumbency.

Some of the key findings in the women after 17 days of continuous recumbency were:

- A decrease in plasma volume of 12-13 per cent.
- A small decrease in total body water.
- A decrease in total body potassium of 3-4 per cent.
- A decrease in plasma potassium concentration of 4-5 per cent.
- A decrease in total circulating plasma protein, largely from the circulating albumin, of 11-12 per cent.
- A decrease in urinary norepinephrine excretion rate of 27-28 per cent.
- A possible increase in urinary magnesium, calcium, and phosphate excretion rates.
- A possible increase in urinary citrate excretion rate.

A number of other parameters exhibited changes possibly related to the effects of prolonged recumbency, but further investitation is needed to verify such a conclusion. There seems to be little doubt concerning the importance of conducting additional studies of this fundamental physiological phenomenon.

Table 1. Identification and vital statistics for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	Age (yr)	Height (cm)	Weight (kg)	Surface Area (m^2)
Bed-Rest Group				
CAP	33	163	60.8	1.65
FRE	35	159	55.3	1.56
KEE	26	173	63.4	1.76
KUL	24	157	53.1	1.52
PAR	32	163	58.2	1.62
SCH	25	157	50.4	1.49
VAN	23	157	53.0	1.52
ZIM	32	164	66.5	1.73
Mean	29	162	57.6	1.61
S.D.	± 5	± 5	± 5.6	± 0.10
Ambulatory Group				
BEN	27	159	47.7	1.47
DEJ	29	170	61.5	1.71
PAC	27	170	64.1	1.74
QUE	25	164	51.0	1.54
Mean	27	166	56.1	1.62
S.D.	± 2	± 5	± 8.0	± 0.13

Table 2. Body weight (kg) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	60.8	55.7	56.9	91.6	93.6
FRE	55.3	53.1	54.7	96.0	98.9
KEE	63.4	62.8	63.5	99.1	100.2
KUL	53.1	55.5	55.7	104.5	104.9
PAR	58.2	59.6	60.3	102.4	103.6
SCH	50.4	46.4	47.7	92.1	94.6
VAN	53.0	52.4	53.3	98.9	100.6
ZIM	66.5	65.5	65.8	98.5	98.9
Mean	57.6	56.4	57.2	97.9	99.4
S.D.	±5.6	±6.1	±5.8	±4.5	±3.9
S.E.	±2.0	±2.2	±2.1	±1.6	±1.4
P Bed Rest = Base Value*		0.22			
P Recovery = Base Value			0.67		

Ambulatory Group

BEN	47.7	48.4	48.1	101.5	100.8
DEJ	61.5	60.5	61.0	98.4	99.2
PAC	64.1	64.0	64.0	99.8	99.8
QUE	51.0	49.6	50.8	97.3	99.6
Mean	56.1	55.6	56.0	99.3	99.8
S.D.	±8.0	±7.8	±7.7	±1.8	±0.7
S.E.	±4.0	±3.9	±3.9	±0.9	±0.3
P 16-17 Oct = Base Value		0.41			
P 21-22 Oct = Base Value			0.63		
P Bed Rest = Ambulatory				0.48	
P Recovery = Ambulatory					0.77

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 3. Plasma volume (liters) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	2.73	2.24	2.83	82.1	103.7
FRE	2.65	2.17	2.74	81.9	103.4
KEE	2.78	2.45	2.77	88.1	99.6
KUL	2.56	2.33	2.56	91.0	100.0
PAR	2.89	2.47	2.90	85.5	100.3
SCH	2.30	2.00	2.31	87.0	100.4
VAN	2.28	2.06	2.35	90.4	103.1
ZIM	2.80	2.60	3.02	92.9	107.9
Mean	2.62	2.29	2.68	87.4	102.3
S.D.	±0.23	±0.21	±0.26	±4.0	±2.8
S.E.	±0.08	±0.07	±0.09	±1.4	±1.0
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.063		

Ambulatory Group

BEN	2.32	2.56	2.82	110.3	121.6
DEJ	2.74	2.80	2.82	102.2	102.9
PAC	2.63	2.71	2.76	103.0	104.9
QUE	2.61	2.68	2.72	102.7	104.2
Mean	2.58	2.69	2.78	104.6	108.4
S.D.	±0.18	±0.10	±0.05	±3.8	±8.8
S.E.	±0.09	±0.05	±0.02	±1.9	±4.4
P 16-17 Oct = Base Value		0.083			
P 21-22 Oct = Base Value			0.14		
P Bed Rest = Ambulatory				<0.001*	
P Recovery = Ambulatory					0.21

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 4. Venous hematocrit value (%) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	40.4	41.6	33.8	103.0	83.7
FRE	42.9	40.1	34.7	93.5	80.9
KEE	43.8	39.4	35.8	90.0	81.7
KUL	40.7	37.4	32.1	91.9	78.9
PAR	39.9	39.6	37.2	99.2	93.2
SCH	40.8	39.0	36.5	95.6	89.5
VAN	38.9	34.4	32.1	88.4	82.5
ZIM	40.6	38.4	34.7	94.6	85.5
Mean	41.0	38.7	34.6	94.5	84.5
S.D.	±1.6	±2.1	±1.9	±4.8	±4.8
S.E.	±0.6	±0.8	±0.7	±1.7	±1.7
P Bed Rest = Base Value*		0.015*			
P Recovery = Base Value			<0.001*		
Ambulatory Group					
BEN	40.0	36.2	32.0	90.5	80.0
DEJ	39.5	36.2	34.6	91.6	87.6
PAC	42.0	37.5	35.9	89.3	85.5
QUE	35.5	33.3	32.0	93.8	90.1
Mean	39.3	35.8	33.6	91.3	85.8
S.D.	±2.7	±1.8	±2.0	±1.9	±4.3
S.E.	±1.4	±0.9	±1.0	±1.0	±2.1
P 16-17 Oct = Base Value		0.008*			
P 21-22 Oct = Base Value			0.010*		
P Bed Rest = Ambulatory				0.14	
P Recovery = Ambulatory					0.64

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 5. Blood hemoglobin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	13.9	14.5	12.1	104.3	87.1
FRE	14.4	13.9	12.3	96.5	85.4
KEE	15.3	13.9	13.1	90.8	85.6
KUL	14.4	13.8	12.5	95.8	86.8
PAR	13.8	14.1	13.3	102.2	96.4
SCH	14.8	14.3	13.1	96.6	88.5
VAN	13.8	12.3	11.8	89.1	85.5
ZIM	13.7	13.8	12.6	100.7	92.0
Mean	14.3	13.8	12.6	97.0	88.4
S.D.	±0.6	±0.7	±0.5	±5.3	±3.9
S.E.	±0.2	±0.2	±0.2	±1.9	±1.4
P Bed Rest = Base Value*		0.15			
P Recovery = Base Value			<0.001*		

Ambulatory Group

BEN	14.0	12.2	11.2	87.1	80.0
DEJ	14.1	12.6	13.0	89.4	92.2
PAC	15.1	13.6	12.9	90.1	85.4
QUE	12.4	12.6	11.8	101.6	95.2
Mean	13.9	12.8	12.2	92.1	88.2
S.D.	±1.1	±0.6	±0.9	±6.5	±6.8
S.E.	±0.6	±0.3	±0.4	±3.2	±3.4
P 16-17 Oct = Base Value		0.090			
P 21-22 Oct = Base Value			0.047*		
P Bed Rest = Ambulatory				0.22	
P Recovery = Ambulatory					0.96

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 6. Body water values (liters) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	32.4	28.1	29.6	86.7	91.4
FRE	30.4	28.4	29.6	93.4	97.4
KEE	33.4	33.2	34.3	99.4	102.7
KUL	30.7	32.3	31.8	105.2	103.6
PAR	32.4	33.2	33.2	102.5	102.5
SCH	29.7	26.6	27.7	89.6	93.3
VAN	28.0	27.2	28.1	97.1	100.4
ZIM	36.0	36.1	36.7	100.3	101.9
Mean	31.6	30.6	31.4	96.8	99.2
S.D.	±2.5	±3.5	±3.2	±6.4	±4.6
S.E.	±0.9	±1.2	±1.1	±2.3	±1.6

P Bed Rest = Base Value* 0.21

P Recovery = Base Value 0.65

Ambulatory Group

BEN	30.6	30.1	29.9	98.4	97.7
DEJ	32.7	32.4	33.2	99.1	101.5
PAC	34.4	33.9	33.4	98.5	97.1
QUE	32.1	31.5	31.9	98.1	99.4
Mean	32.5	32.0	32.1	98.5	98.9
S.D.	±1.6	±1.6	±1.6	±0.4	±2.0
S.E.	±0.8	±0.8	±0.8	±0.2	±1.0

P 16-17 Oct = Base Value 0.005*

P 21-22 Oct = Base Value 0.36

P Bed Rest = Ambulatory 0.61

P Recovery = Ambulatory 0.93

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 7. Extracellular water values (liters) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	17.2	15.7	17.3	91.3	100.6
FRE	16.7	15.4	16.9	92.2	101.2
KEE	17.8	17.4	19.5	97.8	109.6
KUL	17.3	17.7	17.4	102.3	100.6
PAR	17.4	18.1	21.4	104.0	123.0
SCH	15.0	14.7	15.1	98.0	100.7
VAN	14.7	13.8	14.3	93.9	97.3
ZIM	19.3	19.7	22.4	102.1	116.1
Mean	16.9	16.6	18.0	97.7	106.1
S.D.	±1.5	±2.0	±2.9	±4.9	±9.2
S.E.	±0.5	±0.7	±1.0	±1.7	±3.2
P Bed Rest = Base Value*		0.25			
P Recovery = Base Value			0.097		
Ambulatory Control Group					
BEN	16.4	17.5	16.7	106.7	101.8
DEJ	16.9	17.3	18.2	102.4	107.7
PAC	17.2	18.0	17.3	104.7	100.6
QUE	17.3	18.0	19.6	104.0	113.3
Mean	17.0	17.7	18.0	104.4	105.8
S.D.	±0.4	±0.4	±1.3	±1.8	±5.9
S.E.	±0.2	±0.2	±0.6	±0.9	±2.9
P 16-17 Oct = Base Value		0.014*			
P 21-22 Oct = Base Value			0.14		
P Bed Rest = Control				0.025*	
P Recovery = Control					0.96

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 8. Intracellular water values (liters) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	15.2	12.4	12.3	81.6	80.9
FRE	13.7	13.0	12.7	94.9	92.7
KEE	15.6	15.8	14.8	101.3	94.9
KUL	13.4	14.6	14.4	109.0	107.5
PAR	15.0	15.1	11.8	100.7	78.7
SCH	14.7	11.9	12.6	81.0	85.7
VAN	13.3	13.4	13.8	100.8	103.8
ZIM	16.7	16.4	14.3	98.2	85.6
Mean	14.7	14.1	13.3	95.9	91.2
S.D.	±1.2	±1.6	±1.1	±9.9	±10.4
S.E.	±0.4	±0.6	±0.4	±3.5	± 3.7

P Bed Rest = Base Value* 0.26

P Recovery = Base Value 0.042*

Ambulatory Control Group

BEN	14.2	12.6	13.2	88.7	93.0
DEJ	15.8	15.1	15.0	95.6	94.9
PAC	17.2	15.9	16.1	92.4	93.6
QUE	14.8	13.5	12.3	91.2	83.1
Mean	15.5	14.3	14.2	92.0	91.2
S.D.	±1.3	±1.5	±1.7	±2.9	±5.4
S.E.	±0.7	±0.7	±0.9	±1.4	±2.7

P 16-17 Oct = Base Value 0.007*

P 21-22 Oct = Base Value 0.040*

P Bed Rest = Control 0.46

P Recovery = Control 0.99

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 9. Body potassium content (eq) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	3.06	2.90	2.99	94.8	97.7
FRE	3.11	2.97	3.04	95.5	97.7
KEE	2.97	2.81	2.83	94.6	95.3
KUL	3.05	2.97	3.02	97.4	99.0
PAR	2.97	2.95	3.07	99.3	103.4
SCH	3.25	3.12	3.20	96.0	98.5
VAN	2.61	2.49	2.55	95.4	97.7
ZIM	3.06	3.07	3.17	100.3	103.6
Mean	3.01	2.91	2.98	96.7	99.1
S.D.	±0.18	±0.19	±0.21	±2.1	±2.9
S.E.	±0.07	±0.07	±0.07	±0.8	±1.0
P Bed Rest = Base Value*		0.006*			
P Recovery = Base Value			0.42		
Ambulatory Group					
BEN	3.43	3.36	3.37	98.0	98.3
DEJ	2.98	3.01	2.97	101.0	99.7
PAC	3.09	3.14	3.18	101.6	102.9
QUE	3.04	2.99	3.01	98.4	99.0
Mean	3.23	3.12	3.13	99.8	100.0
S.D.	±0.20	±0.17	±0.18	±1.8	±2.0
S.E.	±0.10	±0.09	±0.09	±0.9	±1.0
P 16-17 Oct = Base Value		0.76			
P 21-22 Oct = Base Value			0.94		
P Bed Rest = Ambulatory				0.028*	
P Recovery = Ambulatory					0.57

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 10. Plasma potassium concentration (meq/liter) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	4.42	4.18	3.95	94.6	89.4
FRE	4.23	3.94	3.60	93.1	85.1
KEE	4.81	4.52	4.70	94.0	97.7
KUL	4.14	4.38	4.30	105.8	103.9
PAR	4.81	4.14	3.85	86.1	80.0
SCH	4.33	4.33	4.10	100.0	94.7
VAN	4.23	4.04	3.65	95.5	86.3
ZIM	4.71	4.42	4.30	93.8	91.3
Mean	4.46	4.24	4.06	95.4	91.1
S.D.	±0.28	±0.20	±0.37	±5.7	±7.6
S.E.	±0.10	±0.07	±0.13	±2.0	±2.7
P Bed Rest = Base Value*		0.053			
P Recovery = Base Value			0.014*		
Ambulatory Group					
BEN	4.14	4.14	4.00	100.0	96.6
DEJ	4.23	4.38	4.15	103.5	98.1
PAC	4.04	4.33	3.95	107.2	97.8
QUE	4.04	4.47	4.15	110.6	102.7
Mean	4.11	4.33	4.06	105.3	98.8
S.D.	±0.09	±0.14	±0.10	±4.6	±2.7
S.E.	±0.05	±0.07	±0.05	±2.3	±1.3
P 16-17 Oct = Base Value		0.10			
P 21-22 Oct = Base Value			0.43		
P Bed Rest = Ambulatory				0.014*	
P Recovery = Ambulatory					0.085

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 11. Plasma sodium concentration (meq/liter) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	138	147	144	106.5	104.3
FRE	137	149	137	108.8	100.0
KEE	136	147	141	108.1	103.7
KUL	138	152	137	110.1	99.3
PAR	138	145	141	105.1	102.2
SCH	136	140	132	102.9	97.1
VAN	137	152	132	110.9	96.4
ZIM	138	152	137	110.1	99.3
Mean	137	148	138	107.8	100.3
S.D.	± 1	± 4	± 4	± 2.8	± 2.9
S.E.	± 1	± 1	± 2	± 1.0	± 1.0

P Bed Rest = Base Value* <0.001*

P Recovery = Base Value 0.80

Ambulatory Group

BEN	134	147	134	109.7	100.0
DEJ	136	154	134	113.2	98.5
PAC	141	152	139	107.8	98.6
QUE	134	147	130	109.7	97.0
Mean	136	150	134	110.1	98.5
S.D.	± 3	± 4	± 4	± 2.3	± 1.2
S.E.	± 2	± 2	± 2	± 1.1	± 0.6

P 16-17 Oct = Base Value 0.003*

P 21-22 Oct = Base Value 0.092

P Bed Rest = Ambulatory 0.19

P Recovery = Ambulatory 0.28

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 12. Plasma calcium concentration (meq/liter) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	4.20	4.39	4.25	104.5	101.2
FRE	4.45	4.39	4.20	98.7	94.4
KEE	4.55	4.39	4.35	96.5	95.6
KUL	4.45	4.39	4.30	98.7	96.6
PAR	4.50	4.55	4.40	101.1	97.8
SCH	4.35	4.39	4.50	100.9	103.4
VAN	4.25	4.55	4.30	107.1	101.2
ZIM	4.35	4.22	4.35	97.0	100.0
Mean	4.39	4.41	4.33	100.6	98.8
S.D.	±0.12	±0.11	±0.09	±3.7	±3.2
S.E.	±0.04	±0.04	±0.03	±1.3	±1.1
P Bed Rest = Base Value*		0.72			
P Recovery = Base Value			0.29		
Ambulatory Group					
BEN	4.35	4.56	4.25	104.8	97.7
DEJ	4.20	4.22	4.20	100.5	100.0
PAC	4.50	4.39	4.45	97.6	98.9
QUE	4.15	4.22	4.30	101.7	103.6
Mean	4.30	4.35	4.30	101.2	100.1
S.D.	±0.16	±0.16	±0.11	±3.0	±2.5
S.E.	±0.08	±0.08	±0.05	±1.5	±1.3
P 16-17 Oct = Base Value		0.52			
P 21-22 Oct = Base Value			1.00		
P Bed Rest = Ambulatory				0.79	
P Recovery = Ambulatory					0.50

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 13. Plasma magnesium concentration (meq/liter) for the subjects of the 1973 NASA/Ames Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.54	1.50	1.56	97.4	101.3
FRE	1.54	1.65	1.60	107.1	103.9
KEE	1.41	1.68	1.64	119.1	116.3
KUL	1.38	1.62	1.46	117.4	105.8
PAR	1.41	1.50	1.60	106.4	113.5
SCH	1.41	1.56	1.50	110.6	106.4
VAN	1.51	1.68	1.72	111.3	113.9
ZIM	1.41	1.56	1.56	110.6	110.6
Mean	1.45	1.59	1.58	110.0	109.0
S.D.	±0.07	±0.07	±0.08	± 6.8	± 5.4
S.E.	±0.02	±0.03	±0.03	± 2.4	± 1.9
P Bed Rest = Base Value*		0.004*			
P Recovery = Base Value			0.002*		
Ambulatory Group					
BEN	1.49	1.56	1.56	104.7	104.7
DEJ	1.51	1.62	1.58	107.3	104.6
PAC	1.44	1.74	1.62	120.8	112.5
QUE	1.45	1.62	1.66	111.7	114.5
Mean	1.47	1.63	1.60	111.1	109.1
S.D.	±0.03	±0.08	±0.04	± 7.1	± 5.2
S.E.	±0.02	±0.04	±0.02	± 3.5	± 2.6
P 16-17 Oct = Base Value		0.048*			
P 21-22 Oct = Base Value			0.036*		
P Bed Rest = Ambulatory				0.79	
P Recovery = Ambulatory					0.97

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 14. Plasma chloride concentration (meq/liter) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	104.3	105.5	107.5	101.2	103.1
FRE	99.0	104.8	105.8	105.9	106.9
KEE	103.8	108.1	108.0	104.1	104.0
KUL	100.3	105.0	105.6	104.7	105.3
PAR	104.0	104.8	106.2	100.8	102.1
SCH	103.0	105.9	104.9	102.8	101.8
VAN	104.3	107.0	107.2	102.6	102.8
ZIM	104.0	106.8	105.3	102.7	101.3
Mean	102.8	106.0	106.3	103.1	103.4
S.D.	± 2.0	± 1.2	± 1.1	± 1.7	± 1.9
S.E.	± 0.7	± 0.4	± 0.4	± 0.6	± 0.7
P Bed Rest = Base Value*		0.001*			
P Recovery = Base Value			0.001*		
Ambulatory Group					
BEN	100.5	103.5	105.0	103.0	104.5
DEJ	103.8	106.7	105.7	102.8	101.8
PAC	102.4	107.8	108.8	105.3	106.3
QUE	103.6	106.7	106.4	103.0	102.7
Mean	102.6	106.2	106.5	103.5	103.8
S.D.	± 1.5	± 1.9	± 1.7	± 1.2	± 2.0
S.E.	± 0.8	± 0.9	± 0.8	± 0.6	± 1.0
P 16-17 Oct = Base Value		0.009*			
P 21-22 Oct = Base Value			0.029*		
P Bed Rest = Ambulatory				0.67	
P Recovery = Ambulatory					0.74

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 15. Plasma protein concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	6.26	6.58	6.12	105.1	97.8
FRE	7.31	7.05	6.74	96.4	92.2
KEE	6.97	6.58	6.31	94.4	90.5
KUL	6.72	6.58	6.01	97.9	89.4
PAR	6.38	6.55	6.56	102.7	102.8
SCH	6.35	7.05	7.01	111.0	110.4
VAN	6.67	6.55	6.71	98.2	100.6
ZIM	5.93	6.28	5.88	105.9	99.2
Mean	6.57	6.65	6.42	101.5	97.9
S.D.	±0.44	±0.26	±0.40	± 5.7	± 7.1
S.E.	±0.15	±0.09	±0.14	± 2.0	± 2.5
P Bed Rest = Base Value*		0.57			
P Recovery = Base Value			0.38		

Ambulatory Group

BEN	7.10	6.70	6.41	94.4	90.3
DEJ	6.58	6.60	6.34	100.3	96.4
PAC	6.49	6.62	6.44	102.0	99.2
QUE	6.38	7.15	6.81	112.1	106.7
Mean	6.64	6.77	6.50	102.2	98.2
S.D.	±0.32	±0.26	±0.21	± 7.4	± 6.8
S.E.	±0.16	±0.13	±0.11	± 3.7	± 3.4
P 16-17 Oct = Base Value		0.63			
P 21-22 Oct = Base Value			0.60		
P Bed Rest = Ambulatory				0.85	
P Recovery = Ambulatory					0.95

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 16. Plasma albumin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	3.82	3.51	3.29	91.9	86.1
FRE	4.03	3.49	3.84	86.6	95.3
KEE	3.81	3.41	3.48	89.5	91.3
KUL	4.25	3.50	3.32	82.4	78.1
PAR	4.06	3.41	4.05	84.0	99.8
SCH	3.66	3.62	4.24	98.9	115.8
VAN	3.67	3.44	3.93	93.7	107.1
ZIM	3.59	3.30	3.46	91.9	96.4
Mean	3.86	3.46	3.70	89.9	96.2
S.D.	±0.23	±0.09	±0.36	± 5.4	±11.8
S.E.	±0.08	±0.03	±0.13	± 1.9	± 4.2
P Bed Rest = Base Value*		0.004*			
P Recovery = Base Value			0.36		

Ambulatory Group

BEN	3.70	3.32	3.54	89.7	95.7
DEJ	3.77	3.52	3.61	93.4	95.8
PAC	3.98	3.68	4.15	92.5	104.3
QUE	3.72	3.84	4.01	103.2	107.8
Mean	3.79	3.59	3.83	94.7	100.9
S.D.	±0.13	±0.22	±0.30	± 5.9	± 6.1
S.E.	±0.06	±0.11	±0.15	± 2.9	± 3.1
P 16-17 Oct = Base Value		0.17			
P 21-22 Oct = Base Value			0.78		
P Bed Rest = Ambulatory				0.19	
P Recovery = Control					0.48

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 17. Plasma globulins concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	2.00	2.44	2.38	122.0	119.0
FRE	2.79	2.81	2.44	100.7	87.5
KEE	2.63	2.53	2.27	96.2	86.3
KUL	2.03	2.36	2.16	116.3	106.4
PAR	1.92	2.39	1.98	124.5	103.1
SCH	2.26	2.68	2.31	118.6	102.2
VAN	2.47	2.32	2.25	93.9	91.1
ZIM	1.84	2.28	1.93	123.9	104.9
Mean	2.24	2.48	2.22	112.0	100.1
S.D.	±0.35	±0.19	±0.18	±12.9	±11.1
S.E.	±0.12	±0.07	±0.06	± 4.6	± 3.9
P Bed Rest = Base Value*		0.044*			
P Recovery = Base Value			0.77		

Ambulatory Group

BEN	2.81	2.55	2.20	90.7	78.3
DEJ	2.39	2.40	2.21	100.4	92.5
PAC	2.22	2.42	2.01	109.0	90.5
QUE	2.28	2.66	2.40	116.7	105.3
Mean	2.42	2.51	2.20	104.2	91.7
S.D.	±0.27	±0.12	±0.16	±11.2	±11.1
S.E.	±0.13	±0.06	±0.08	± 5.6	± 5.5
P 16-17 Oct = Base Value		0.59			
P 21-22 Oct = Base Value			0.24		
P Bed Rest = Ambulatory				0.33	
P Recovery = Ambulatory					0.25

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 18. Plasma fibrinogen concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.44	0.63	0.45	143.2	102.3
FRE	0.49	0.75	0.46	153.1	93.9
KEE	0.53	0.64	0.56	120.8	105.7
KUL	0.44	0.72	0.53	163.6	120.5
PAR	0.40	0.75	0.53	187.5	132.5
SCH	0.43	0.75	0.46	174.4	107.0
VAN	0.53	0.79	0.53	149.1	100.0
ZIM	0.50	0.70	0.49	140.0	98.0
Mean	0.47	0.72	0.50	154.0	107.5
S.D.	±0.05	±0.06	±0.04	±20.9	±12.9
S.E.	±0.02	±0.02	±0.01	± 7.4	± 4.5
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.15		
Ambulatory Group					
BEN	0.59	0.83	0.67	140.7	113.6
DEJ	0.42	0.68	0.52	161.9	123.8
PAC	0.29	0.52	0.28	179.3	96.6
QUE	0.38	0.65	0.40	171.1	105.3
Mean	0.42	0.67	0.47	163.3	109.8
S.D.	±0.13	±0.13	±0.17	±16.6	±11.6
S.E.	±0.06	±0.06	±0.08	± 8.3	± 5.8
P 16-17 Oct = Base Value		<0.001*			
P 21-22 Oct = Base Value			0.17		
P Bed Rest = Ambulatory				0.46	
P Recovery = Ambulatory					0.77

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 19. Plasma albumin/globulin ratio for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.91	1.44	1.38	75.4	72.3
FRE	1.44	1.24	1.57	86.1	109.0
KEE	1.45	1.35	1.53	93.1	105.5
KUL	2.09	1.48	1.54	70.8	73.7
PAR	2.11	1.43	2.05	67.8	97.2
SCH	1.62	1.35	1.84	83.3	113.6
VAN	1.49	1.48	1.75	99.3	117.4
ZIM	1.95	1.45	1.79	74.4	91.8
Mean	1.76	1.40	1.68	81.3	97.6
S.D.	±0.29	±0.08	±0.22	±11.1	±17.3
S.E.	±0.10	±0.03	±0.08	± 3.9	± 6.1
P Bed Rest = Base Value*		0.007*			
P Recovery = Base Value			0.52		
Ambulatory Group					
BEN	1.32	1.30	1.61	98.5	122.0
DEJ	1.58	1.47	1.63	93.0	103.2
PAC	1.79	1.52	2.06	84.9	115.1
QUE	1.63	1.44	1.67	88.3	102.5
Mean	1.58	1.43	1.74	91.2	110.7
S.D.	±0.20	±0.09	±0.21	± 5.9	± 9.5
S.E.	±0.10	±0.05	±0.11	± 3.0	± 4.7
P 16-17 Oct = Base Value		0.076			
P 21-22 Oct = Base Value			0.098		
P Bed Rest = Ambulatory				0.14	
P Recovery = Ambulatory					0.19

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 20. Circulating plasma protein (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	171	147	173	86.0	101.2
FRE	194	153	185	78.9	95.4
KEE	194	161	175	83.0	90.2
KUL	172	153	154	89.0	89.5
PAR	184	162	190	88.0	103.3
SCH	146	141	162	96.6	111.0
VAN	152	135	158	88.8	103.9
ZIM	166	163	178	98.2	107.2
Mean	172	152	172	88.6	100.2
S.D.	±18	±10	±13	±6.4	±7.8
S.E.	± 6	± 4	± 5	±2.3	±2.8
P Bed Rest = Base Value*		0.005*			
P Recovery = Base Value			0.92		
Ambulatory Group					
BEN	165	172	181	104.2	110.0
DEJ	180	185	179	102.8	99.4
PAC	171	179	178	104.7	104.1
QUE	167	192	185	115.0	110.8
Mean	171	182	181	106.7	106.1
S.D.	±7	±9	±3	±5.6	±5.4
S.E.	±3	±4	±2	±2.8	±2.7
P 16-17 Oct = Base Value		0.095			
P 21-22 Oct = Base Value			0.11		
P Bed Rest = Ambulatory				<0.001*	
P Recovery = Ambulatory					0.21

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 21. Circulating plasma albumin (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	104	79	93	76.0	89.4
FRE	107	76	105	71.0	98.1
KEE	106	84	96	79.2	90.6
KUL	109	82	85	75.2	78.0
PAR	117	84	117	71.8	100.0
SCH	84	72	98	85.7	116.7
VAN	84	71	92	84.5	109.5
ZIM	101	86	104	85.1	103.0
Mean	102	79	99	78.6	98.2
S.D.	±12	±6	±10	± 6.0	±12.2
S.E.	± 4	±2	± 3	± 2.1	± 4.3
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.54		
Ambulatory Group					
BEN	86	85	100	98.8	116.3
DEJ	103	99	102	96.1	99.0
PAC	105	100	115	95.2	109.5
QUE	97	103	109	106.2	112.4
Mean	98	97	107	99.1	109.3
S.D.	± 9	± 8	± 7	± 5.0	± 7.4
S.E.	± 4	± 4	± 3	± 2.5	± 3.7
P 16-17 Oct = Base Value		0.71			
P 21-22 Oct = Base Value			0.084		
P Bed Rest = Ambulatory				<0.001*	
P Recovery = Ambulatory					0.14

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 22. Circulating plasma globulins (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	54.6	54.7	67.4	100.2	123.4
FRE	73.9	61.0	66.9	82.5	90.5
KEE	73.1	62.0	62.9	84.8	86.0
KUL	52.0	55.0	55.3	105.8	106.3
PAR	55.5	59.0	57.4	106.3	103.4
SCH	52.0	53.6	53.4	103.1	102.7
VAN	56.3	47.8	52.9	84.9	94.0
ZIM	51.5	59.3	58.3	115.1	113.2
Mean	58.6	56.6	59.3	97.8	102.4
S.D.	±9.4	±4.7	±5.8	±12.2	±12.3
S.E.	±3.3	±1.7	±2.0	± 4.3	± 4.3
P Bed Rest = Base Value*		0.47			
P Recovery = Base Value			0.80		
Ambulatory Group					
BEN	65.2	65.3	62.0	100.2	95.1
DEJ	65.5	67.2	62.3	102.6	95.1
PAC	58.4	65.6	55.5	112.3	95.0
QUE	59.5	71.3	65.3	119.8	109.7
Mean	62.2	67.4	61.3	108.7	98.7
S.D.	±3.7	±2.8	±4.1	± 9.0	± 7.3
S.E.	±1.9	±1.4	±2.1	± 4.5	± 3.7
P 16-17 Oct = Base Value		0.16			
P 21-22 Oct = Base Value			0.72		
P Bed Rest = Ambulatory				0.16	
P Recovery = Ambulatory					0.59

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 23. Circulating plasma fibrinogen (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	12.0	14.1	12.7	117.5	105.8
FRE	13.0	16.3	12.6	125.4	96.9
KEE	14.7	15.7	15.5	106.8	105.4
KUL	11.3	16.8	13.6	148.7	120.4
PAR	11.6	18.5	15.4	159.5	132.8
SCH	9.9	15.0	10.6	151.5	107.1
VAN	12.1	16.3	12.5	134.7	103.3
ZIM	14.0	18.2	14.8	130.0	105.7
Mean	12.3	16.4	13.5	134.3	109.7
S.D.	±1.5	±1.5	±1.7	±18.0	±11.4
S.E.	±0.5	±0.5	±0.6	± 6.4	± 4.0
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.045*		
Ambulatory Group					
BEN	13.7	21.2	18.9	154.7	138.0
DEJ	11.5	19.0	14.7	165.2	127.8
PAC	7.6	14.1	7.7	185.5	101.3
QUE	9.9	17.4	10.9	175.8	110.1
Mean	10.7	17.9	13.1	170.3	119.3
S.D.	±2.6	±3.0	±4.8	±13.3	±16.6
S.E.	±1.3	±1.5	±2.4	± 6.6	± 8.3
P 16-17 Oct = Base Value		<0.001*			
P 21-22 Oct = Base Value			0.14		
P Bed Rest = Ambulatory				0.008*	
P Recovery = Ambulatory					0.26

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 24. Plasma α-1-globulin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.14	0.20	0.23	142.9	164.3
FRE	0.20	0.24	0.25	120.0	125.0
KEE	0.22	0.18	0.23	81.8	104.5
KUL	0.16	0.21	0.16	131.3	100.0
PAR	0.18	0.19	0.18	105.6	100.0
SCH	0.24	0.23	0.23	95.8	95.8
VAN	0.24	0.22	0.23	91.7	95.8
ZIM	0.11	0.21	0.17	190.9	154.5
Mean	0.19	0.21	0.21	120.0	117.5
S.D.	±0.05	±0.02	±0.03	±35.3	±27.6
S.E.	±0.02	±0.01	±0.01	±12.5	± 9.8
P Bed Rest = Base Value*		0.20			
P Recovery = Base Value			0.12		
Ambulatory Group					
BEN	0.21	0.15	0.17	71.4	81.0
DEJ	0.21	0.20	0.17	95.2	90.5
PAC	0.25	0.21	0.18	84.0	72.0
QUE	0.16	0.19	0.18	118.8	112.5
Mean	0.21	0.19	0.18	92.4	89.0
S.D.	±0.04	±0.03	±0.01	±20.1	±17.4
S.E.	±0.02	±0.01	±0.01	±10.1	± 8.7
P 16-17 Oct = Base Value		0.38			
P 21-22 Oct = Base Value			0.25		
P Bed Rest = Ambulatory				0.19	
P Recovery = Ambulatory					0.094

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 25. Plasma α-2-globulin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.54	0.68	0.65	125.9	120.4
FRE	0.62	0.64	0.61	103.2	98.4
KEE	0.65	0.57	0.56	87.7	86.2
KUL	0.57	0.65	0.66	114.0	115.8
PAR	0.41	0.57	0.44	139.0	107.3
SCH	0.49	0.52	0.53	106.1	108.2
VAN	0.64	0.61	0.57	95.3	89.1
ZIM	0.45	0.56	0.48	124.4	106.7
Mean	0.55	0.60	0.56	112.0	104.0
S.D.	±0.09	±0.05	±0.08	±17.2	±12.0
S.E.	±0.03	±0.02	±0.03	± 6.1	± 4.3
P Bed Rest = Base Value*		0.12			
P Recovery = Base Value			0.54		
Ambulatory Group					
BEN	0.65	0.52	0.50	80.0	76.9
DEJ	0.50	0.48	0.46	96.0	92.0
PAC	0.57	0.59	0.53	103.5	93.0
QUE	0.58	0.61	0.62	105.2	106.9
Mean	0.57	0.55	0.53	96.2	92.2
S.D.	±0.06	±0.06	±0.07	±11.5	±12.3
S.E.	±0.03	±0.03	±0.03	± 5.8	± 6.1
P 16-17 Oct = Base Value		0.55			
P 21-22 Oct = Base Value			0.31		
P Bed Rest = Ambulatory				0.14	
P Recovery = Ambulatory					0.15

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 26. Plasma β-globulin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.51	0.64	0.59	125.5	115.7
FRE	0.79	0.81	0.75	102.5	94.9
KEE	0.77	0.89	0.69	115.6	89.6
KUL	0.65	0.75	0.62	115.4	95.4
PAR	0.59	0.72	0.66	122.0	111.9
SCH	0.66	0.89	0.72	134.8	109.1
VAN	0.81	0.80	0.84	98.8	103.7
ZIM	0.60	0.74	0.66	123.3	110.0
Mean	0.67	0.78	0.69	117.2	103.8
S.D.	±0.11	±0.09	±0.08	±11.9	± 9.5
S.E.	±0.04	±0.03	±0.03	± 4.2	± 3.3
P Bed Rest = Base Value*		0.007*			
P Recovery = Base Value			0.41		
Ambulatory Group					
BEN	0.71	0.83	0.63	116.9	88.7
DEJ	0.75	0.72	0.72	96.0	96.0
PAC	0.68	0.81	0.70	119.1	102.9
QUE	0.58	0.68	0.62	117.2	106.9
Mean	0.68	0.76	0.67	112.3	98.6
S.D.	±0.07	±0.07	±0.05	±10.9	± 8.0
S.E.	±0.04	±0.04	±0.02	± 5.5	± 4.0
P 16-17 Oct = Base Value		0.13			
P 21-22 Oct = Base Value			0.67		
P Bed Rest = Ambulatory				0.51	
P Recovery = Ambulatory					0.38

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 27. Plasma γ-globulin concentration (g/100 ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	0.81	0.92	0.91	113.6	112.3
FRE	1.18	1.12	0.83	94.9	70.3
KEE	0.99	0.89	0.79	89.9	79.8
KUL	0.65	0.75	0.72	115.4	110.8
PAR	0.74	0.91	0.70	123.0	94.6
SCH	0.87	1.04	0.83	119.5	95.4
VAN	0.78	0.69	0.61	88.5	78.2
ZIM	0.68	0.77	0.62	113.2	91.2
Mean	0.84	0.89	0.75	107.3	91.6
S.D.	±0.18	±0.15	±0.11	±13.9	±15.1
S.E.	±0.06	±0.05	±0.04	± 4.9	± 5.3
P Bed Rest = Base Value *		0.27			
P Recovery = Base Value			0.15		

Ambulatory Group

BEN	1.24	1.05	0.90	84.7	72.6
DEJ	0.93	1.00	0.84	107.5	90.3
PAC	0.72	0.81	0.60	112.5	83.3
QUE	0.96	1.18	0.98	122.9	102.1
Mean	0.96	1.01	0.83	106.9	87.1
S.D.	±0.21	±0.15	±0.16	±16.1	±12.4
S.E.	±0.11	±0.08	±0.08	± 8.1	± 6.2
P 16-17 Oct = Base Value		0.62			
P 21-22 Oct = Base Value			0.18		
P Bed Rest = Ambulatory				0.97	
P Recovery = Ambulatory					0.62

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 28. Circulating α-1-globulin (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	3.8	4.5	6.5	118.4	171.1
FRE	5.3	5.2	6.9	98.1	130.2
KEE	6.1	4.4	6.4	72.1	104.9
KUL	4.1	4.9	4.1	119.5	100.0
PAR	5.2	4.7	5.2	90.4	100.0
SCH	5.5	4.6	5.3	83.6	96.4
VAN	5.5	4.5	5.4	81.8	98.2
ZIM	3.1	5.5	5.2	177.4	167.7
Mean	4.8	4.8	5.6	105.2	121.1
S.D.	±1.0	±0.4	±0.9	±33.7	±31.7
S.E.	±0.4	±0.1	±0.3	±11.9	±11.2
P Bed Rest = Base Value*		0.94			
P Recovery = Base Value			0.090		
Ambulatory Group					
BEN	4.9	3.8	4.8	77.6	98.0
DEJ	5.8	5.6	5.3	96.6	91.4
PAC	6.6	5.7	5.0	86.4	75.8
QUE	4.2	5.1	4.9	121.4	116.7
Mean	5.4	5.1	5.0	95.5	95.5
S.D.	±1.0	±0.9	±0.2	±18.9	±16.9
S.E.	±0.5	±0.4	±0.1	± 9.5	± 8.5
P 16-17 Oct = Base Value		0.52			
P 21-22 Oct = Base Value			0.49		
P Bed Rest = Ambulatory				0.61	
P Recovery = Ambulatory					0.17

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 29. Circulating α-2-globulin (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	14.8	15.2	18.4	102.7	124.3
FRE	16.4	13.9	16.7	84.8	101.8
KEE	18.1	14.0	15.5	77.3	85.6
KUL	14.6	15.1	16.9	103.4	115.8
PAR	11.8	14.1	12.8	119.5	108.5
SCH	11.3	10.4	12.3	92.0	108.8
VAN	14.6	12.6	13.4	86.3	91.8
ZIM	12.6	14.6	14.5	115.9	115.1
Mean	14.3	13.7	15.1	97.7	106.5
S.D.	±2.3	±1.6	±2.2	±15.2	±12.9
S.E.	±0.8	±0.6	±0.8	± 5.4	± 4.6
P Bed Rest = Base Value*		0.52			
P Recovery = Base Value			0.30		
Ambulatory Group					
BEN	15.1	13.3	14.1	88.1	93.4
DEJ	13.7	13.4	13.0	97.8	94.9
PAC	15.0	16.0	14.6	106.7	97.3
QUE	15.1	16.4	16.9	108.6	111.9
Mean	14.7	14.8	14.6	100.3	99.4
S.D.	±0.7	±1.7	±1.6	± 9.4	± 8.5
S.E.	±0.3	±0.8	±0.8	± 4.7	± 4.3
P 16-17 Oct = Base Value		0.95			
P 21-22 Oct = Base Value			0.91		
P Bed Rest = Ambulatory				0.77	
P Recovery = Ambulatory					0.35

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 30. Circulating β-globulin (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	13.9	14.4	16.7	103.6	120.1
FRE	20.9	17.6	20.6	84.2	98.6
KEE	21.4	21.8	19.1	101.9	89.3
KUL	16.6	17.5	15.9	105.4	95.8
PAR	17.1	17.8	19.1	104.1	111.7
SCH	15.2	17.8	16.6	117.1	109.2
VAN	18.4	16.5	19.8	89.7	107.6
ZIM	16.8	19.2	19.9	114.3	118.5
Mean	17.5	17.8	18.5	102.5	106.4
S.D.	±2.6	±2.1	±1.8	±11.1	±10.9
S.E.	±0.9	±0.7	±0.6	± 3.9	± 3.9
P Bed Rest = Base Value*		0.70			
P Recovery = Base Value			0.20		
Ambulatory Group					
BEN	16.4	21.3	17.7	129.9	107.9
DEJ	20.5	20.2	20.3	98.5	99.0
PAC	17.9	21.9	19.3	122.3	107.8
QUE	15.1	18.2	16.9	120.5	111.9
Mean	17.5	20.4	18.6	117.8	106.7
S.D.	±2.3	±1.6	±1.5	±13.5	± 5.4
S.E.	±1.2	±0.8	±0.8	± 6.7	± 2.7
P 16-17 Oct = Base Value		0.082			
P 21-22 Oct = Base Value			0.092		
P Bed Rest = Ambulatory				0.062	
P Recovery = Ambulatory					0.96

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 31. Circulating γ-globulin (g) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	22.1	20.6	25.8	93.2	116.7
FRE	31.3	24.3	22.7	77.6	72.5
KEE	27.5	21.8	21.9	79.3	79.6
KUL	16.7	17.5	18.4	104.8	110.2
PAR	21.4	22.4	20.3	104.7	94.9
SCH	20.0	20.8	19.2	104.0	96.0
VAN	17.8	14.2	14.3	79.8	80.3
ZIM	19.0	20.0	18.7	105.3	105.1
Mean	22.0	20.2	20.2	93.6	94.4
S.D.	±5.0	±3.1	±3.4	±12.8	±15.9
S.E.	±1.8	±1.1	±1.2	± 4.5	± 5.6
P Bed Rest = Base Value*		0.17			
P Recovery = Base Value			0.24		
Ambulatory Group					
BEN	28.8	26.9	25.4	93.4	88.2
DEJ	25.5	28.0	23.7	109.8	92.9
PAC	18.9	22.0	16.6	116.4	87.8
QUE	25.1	31.6	26.6	125.9	106.0
Mean	24.6	27.1	23.1	111.4	93.7
S.D.	±4.1	±4.0	±4.5	±13.7	±8.5
S.E.	±2.1	±2.0	±2.2	± 6.8	±4.3
P 16-17 Oct = Base Value		0.24			
P 21-22 Oct = Base Value			0.25		
P Bed Rest = Ambulatory				0.050	
P Recovery = Ambulatory					0.94

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 32. Plasma alkaline phosphatase concentration (units/liter) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	14.5	17.2	17.3	118.6	119.3
FRE	23.3	24.3	30.0	104.3	128.8
KEE	19.2	21.9	23.6	114.1	122.9
KUL	12.6	14.7	15.8	116.7	125.4
PAR	11.8	14.6	16.4	123.7	139.0
SCH	23.3	27.8	29.7	119.3	127.5
VAN	17.0	18.6	20.4	109.4	120.0
ZIM	14.0	18.0	17.9	128.6	127.9
Mean	17.0	19.6	21.4	116.8	126.4
S.D.	± 4.6	± 4.7	± 5.8	± 7.7	± 6.2
S.E.	± 1.6	± 1.7	± 2.0	± 2.7	± 2.2
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			<0.001*		
Ambulatory Group					
BEN	19.2	21.4	20.3	111.5	105.7
DEJ	12.9	18.6	19.4	144.2	150.4
PAC	21.6	25.7	26.1	119.0	120.8
QUE	17.3	21.4	20.3	123.7	117.3
Mean	17.8	21.8	21.5	124.6	123.6
S.D.	± 3.7	± 2.9	± 3.1	±14.0	±19.0
S.E.	± 1.8	± 1.5	± 1.5	± 7.0	± 9.5
P 16-17 Oct = Base Value		0.011*			
P 21-22 Oct = Base Value			0.046*		
P Bed Rest = Ambulatory				0.23	
P Recovery = Ambulatory					0.70

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 33. Plasma glutamate-oxaloacetate transaminase concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	37.4	29.3	30.4	78.3	81.3
FRE	48.0	30.2	30.2	62.9	62.9
KEE	38.8	29.5	31.2	76.0	80.4
KUL	39.0	33.7	30.4	86.4	77.9
PAR	40.1	29.5	30.6	73.6	76.3
SCH	53.8	35.5	33.3	66.0	61.9
VAN	39.8	30.8	31.5	77.4	79.1
ZIM	42.7	30.1	30.1	70.5	70.5
Mean	42.5	31.1	31.0	73.9	73.8
S.D.	± 5.6	± 2.3	± 1.1	± 7.4	± 7.8
S.E.	± 2.0	± 0.8	± 0.4	± 2.6	± 2.7
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			<0.001*		

Ambulatory Group

BEN	38.8	30.2	31.0	77.8	79.9
DEJ	36.9	30.6	31.0	82.9	84.0
PAC	39.0	30.6	30.0	78.5	76.9
QUE	38.0	30.5	29.7	80.3	78.2
Mean	38.2	30.5	30.4	79.9	79.8
S.D.	± 1.0	± 0.2	± 0.7	± 2.3	± 3.1
S.E.	± 0.5	± 0.1	± 0.3	± 1.1	± 1.5
P 16-17 Oct = Base Value		<0.001*			
P 21-22 Oct = Base Value			0.0014*		
P Bed Rest = Ambulatory				0.15	
P Recovery = Ambulatory					0.18

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 34. Plasma glutamate-pyruvate transaminase concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	21.3	19.7	19.2	92.5	90.1
FRE	29.7	19.5	20.4	65.7	68.7
KEE	22.2	20.9	20.5	94.1	92.3
KUL	22.5	26.4	22.7	117.3	100.9
PAR	22.0	21.4	20.5	97.3	93.2
SCH	34.0	29.8	25.8	87.6	75.9
VAN	21.6	21.1	21.7	97.7	100.5
ZIM	24.0	20.9	21.4	87.1	89.2
Mean	24.7	22.5	21.5	92.4	88.9
S.D.	± 4.7	± 3.7	± 2.0	±14.3	±11.3
S.E.	± 1.6	± 1.3	± 0.7	± 5.1	± 4.0

P Bed Rest = Base Value* 0.16

P Recovery = Base Value 0.044*

Ambulatory Group

BEN	21.3	19.1	19.4	89.7	91.1
DEJ	23.2	20.5	20.4	88.4	87.9
PAC	22.4	22.1	21.1	98.7	94.2
QUE	21.6	21.3	20.5	98.6	94.9
Mean	22.1	20.8	20.4	93.9	92.0
S.D.	± 0.9	± 1.3	± 0.7	± 5.6	± 3.2
S.E.	± 0.4	± 0.6	± 0.4	± 2.8	± 1.6

P 16-17 Oct = Base Value 0.12

P 21-22 Oct = Base Value 0.019*

P Bed Rest = Ambulatory 0.85

P Recovery = Ambulatory 0.60

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 35. Plasma total lactate dehydrogenase concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	301	251	264	83.4	87.7
FRE	274	245	260	89.4	94.9
KEE	287	253	272	88.2	94.8
KUL	291	248	263	85.2	90.4
PAR	285	252	280	88.4	98.2
SCH	281	242	277	86.1	98.6
VAN	287	261	278	90.9	96.9
ZIM	279	268	284	96.1	101.8
Mean	286	252	272	88.5	95.4
S.D.	± 8	± 8	± 9	± 3.9	± 4.6
S.E.	± 3	± 3	± 3	± 1.4	± 1.6

P Bed Rest = Base Value* <0.001*

P Recovery = Base Value 0.027*

Ambulatory Group

BEN	277	244	256	88.1	92.4
DEJ	285	264	249	92.6	87.4
PAC	290	278	272	95.9	93.8
QUE	279	249	263	89.2	94.3
Mean	283	259	260	91.5	92.0
S.D.	± 6	±15	±10	± 3.5	± 3.2
S.E.	± 3	± 8	± 5	± 1.8	± 1.6

P 16-17 Oct = Base Value 0.015*

P 21-22 Oct = Base Value 0.015*

P Bed Rest = Ambulatory 0.23

P Recovery = Ambulatory 0.21

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 36. Plasma LDH-1 isoenzyme concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	127.0	76.9	112.4	60.6	88.5
FRE	122.0	68.8	107.1	56.4	87.8
KEE	106.5	75.5	108.2	70.9	101.6
KUL	100.8	70.4	98.0	69.8	97.2
PAR	113.0	57.6	98.9	51.0	87.5
SCH	108.1	49.9	102.1	46.2	94.4
VAN	112.5	65.3	109.5	58.0	97.3
ZIM	116.7	72.3	114.1	62.0	97.8
Mean	113.3	67.1	106.3	59.4	94.0
S.D.	± 8.5	± 9.2	± 6.0	± 8.5	± 5.4
S.E.	± 3.0	± 3.3	± 2.1	± 3.0	± 1.9

P Bed Rest = Base Value* <0.001*

P Recovery = Base Value 0.019*

Ambulatory Group

BEN	122.3	66.4	118.8	54.3	97.1
DEJ	119.0	66.5	102.2	55.9	85.9
PAC	127.0	69.4	101.7	54.6	80.1
QUE	106.4	64.4	103.8	60.5	97.6
Mean	118.7	66.7	106.6	56.3	90.2
S.D.	± 8.8	± 2.1	± 8.2	± 2.9	± 8.6
S.E.	± 4.4	± 1.0	± 4.1	± 1.4	± 4.3

P 16-17 Oct = Base Value <0.001*

P 21-22 Oct = Base Value 0.12

P Bed Rest = Ambulatory 0.51

P Recovery = Ambulatory 0.36

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 37. Plasma LDH-2 isoenzyme concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	122.6	88.7	86.6	72.3	70.6
FRE	98.2	76.9	80.6	78.3	82.1
KEE	97.0	98.2	93.7	101.2	96.6
KUL	145.9	88.5	76.9	60.7	52.7
PAR	96.0	94.2	92.2	98.1	96.0
SCH	80.3	92.3	85.3	114.9	106.2
VAN	87.8	91.7	80.7	104.4	91.9
ZIM	81.1	99.8	89.0	123.1	109.7
Mean	101.1	91.3	85.6	94.1	88.2
S.D.	±22.5	± 7.1	± 5.9	±21.7	±19.0
S.E.	± 7.9	± 2.5	± 2.1	± 7.7	± 6.7

P Bed Rest = Base Value* 0.32

P Recovery = Base Value 0.13

Ambulatory Group

BEN	80.1	73.1	71.6	91.3	89.4
DEJ	97.0	82.4	72.6	84.9	74.8
PAC	96.0	114.5	73.0	119.3	76.0
QUE	96.3	102.8	87.4	106.7	90.8
Mean	92.4	93.2	76.2	100.6	82.8
S.D.	± 8.2	±18.9	± 7.5	±15.5	± 8.5
S.E.	± 4.1	± 9.4	± 3.8	± 7.7	± 4.3

P 16-17 Oct = Base Value 0.91

P 21-22 Oct = Base Value 0.034*

P Bed Rest = Ambulatory 0.61

P Recovery = Ambulatory 0.60

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 38. Plasma LDH-3 isoenzyme concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	39.3	51.6	41.3	131.3	105.1
FRE	38.0	60.5	44.9	159.2	118.2
KEE	46.9	59.7	43.4	127.3	92.5
KUL	32.8	62.6	53.5	190.9	163.1
PAR	52.8	64.5	59.5	122.2	112.7
SCH	36.0	68.3	57.4	189.7	159.4
VAN	47.5	53.4	50.4	112.4	106.1
ZIM	47.5	60.7	51.0	127.8	107.4
Mean	42.6	60.2	50.2	145.1	120.6
S.D.	± 7.0	± 5.5	± 6.6	±30.9	±26.2
S.E.	± 2.5	± 1.9	± 2.3	±10.9	± 9.3
P Bed Rest = Base Value*		0.001*			
P Recovery = Base Value			0.047*		
Ambulatory Group					
BEN	44.4	60.4	41.1	136.0	92.6
DEJ	45.5	71.8	41.5	157.8	91.2
PAC	40.7	70.8	56.5	174.0	138.8
QUE	45.0	61.0	46.8	135.6	104.0
Mean	43.9	66.0	46.5	150.9	106.7
S.D.	± 2.2	± 6.1	± 7.2	±18.6	±22.2
S.E.	± 1.1	± 3.1	± 3.6	± 9.3	±11.1
P 16-17 Oct = Base Value		0.009*			
P 21-22 Oct = Base Value			0.61		
P Bed Rest = Ambulatory				0.74	
P Recovery = Ambulatory					0.39

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 39. Plasma LDH-4 isoenzyme concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	3.0	15.6	12.4	520.0	413.3
FRE	3.2	19.4	14.9	606.3	465.6
KEE	15.9	9.1	14.5	57.2	91.2
KUL	6.6	10.4	18.1	157.6	274.2
PAR	16.9	14.9	17.6	88.2	104.1
SCH	12.4	12.0	18.2	96.8	146.8
VAN	18.6	31.7	20.9	170.4	112.4
ZIM	20.8	15.0	17.8	72.1	85.6
Mean	12.2	16.0	16.8	221.1	211.7
S.D.	± 7.0	± 7.1	± 2.7	±216.0	±153.6
S.E.	± 2.5	± 2.5	± 0.9	± 76.4	± 54.3
P Bed Rest = Base Value*		0.27			
P Recovery = Base Value			0.059		
Ambulatory Group					
BEN	15.1	21.8	13.1	144.4	86.8
DEJ	11.8	23.6	17.6	200.0	149.2
PAC	14.6	9.3	23.6	63.7	161.6
QUE	12.5	13.2	13.3	105.6	106.4
Mean	13.5	17.0	16.9	128.4	126.0
S.D.	± 1.6	± 6.8	± 4.9	±58.0	±35.2
S.E.	± 0.8	± 3.4	± 2.5	±29.0	±17.6
P 16-17 Oct = Base Value		0.42			
P 21-22 Oct = Base Value			0.26		
P Bed Rest = Ambulatory				0.43	
P Recovery					0.31

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 40. Plasma LDH-5 isoenzyme concentration (units/ml) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	9.1	18.2	11.3	200.0	124.2
FRE	12.6	19.4	12.5	154.0	99.2
KEE	20.7	10.5	12.2	50.7	58.9
KUL	4.9	16.1	16.5	328.6	336.7
PAR	6.3	20.8	11.8	330.2	187.3
SCH	44.2	19.5	14.0	44.1	31.7
VAN	20.6	18.9	16.5	91.7	80.1
ZIM	12.9	20.2	12.1	156.6	93.8
Mean	16.4	18.0	13.4	169.5	126.5
S.D.	±12.7	± 3.3	± 2.1	±112.4	± 96.7
S.E.	± 4.5	± 1.2	± 0.7	± 39.7	± 34.2
P Bed Rest = Base Value*		0.75			
P Recovery = Base Value			0.51		
Ambulatory Group					
BEN	15.1	22.3	11.4	147.7	75.5
DEJ	11.7	19.7	15.1	168.4	129.1
PAC	11.7	14.0	17.2	119.7	147.0
QUE	18.8	7.6	11.7	40.4	62.2
Mean	14.3	15.9	13.9	119.1	103.5
S.D.	± 3.4	± 6.5	± 2.8	± 56.1	± 41.0
S.E.	± 1.7	± 3.3	± 1.4	± 28.1	± 20.5
P 16-17 Oct = Base Value		0.75			
P 21-22 Oct = Base Value			0.88		
P Bed Rest = Ambulatory				0.42	
P Recovery = Ambulatory					0.66

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 41. Urine volume (liters/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.35	0.36	0.44	26.7	32.6
FRE	1.00	0.41	--	41.0	--
KEE	1.74	0.93	1.16	53.4	66.7
KUL	1.74	1.04	1.72	59.8	98.9
PAR	2.55	1.98	2.90	77.6	113.7
SCH	2.33	2.20	2.77	94.4	118.9
VAN	0.90	0.43	0.67	47.8	74.4
ZIM	1.20	0.32	1.24	26.7	103.3
Mean	1.60	0.96	1.56	53.4	86.9
S.D.	±0.60	±0.75	±0.97	±23.7	±30.7
S.E.	±0.21	±0.27	±0.36	± 8.4	±11.6
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.51		
Ambulatory Group					
BEN	1.22	1.48	1.32	121.3	108.2
DEJ	1.30	0.92	0.99	70.8	76.2
PAC	1.02	0.80	1.35	78.4	132.4
QUE	1.93	0.60	1.62	31.1	83.9
Mean	1.37	0.95	1.32	75.4	100.2
S.D.	±0.39	±0.38	±0.26	±37.0	±25.4
S.E.	±0.20	±0.19	±0.13	±18.5	±12.7
P 16-17 Oct = Base Value		0.30			
P 21-22 Oct = Base Value			0.78		
P Bed Rest = Ambulatory				0.23	
P Recovery = Ambulatory					0.49

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 42. Urine specific gravity (24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	1.013	1.022	1.015	169.2	115.4
FRE	1.013	1.018	--	138.5	--
KEE	1.012	1.020	1.012	166.7	100.0
KUL	1.015	1.016	1.008	106.7	53.3
PAR	1.009	1.007	1.008	77.8	88.9
SCH	1.008	1.007	1.004	87.5	50.0
VAN	1.015	1.017	1.016	113.3	106.7
ZIM	1.018	1.020	1.018	111.1	100.0
Mean	1.013	1.016	1.012	121.4	87.8
S.D.	±0.003	±0.006	±0.005	±33.9	±25.9
S.E.	±0.001	±0.002	±0.002	±12.0	± 9.8

P Bed Rest = Base Value* 0.72

P Recovery = Base Value 0.32

Ambulatory Group

BEN	1.015	1.014	1.016	93.3	106.7
DEJ	1.017	1.019	1.009	111.8	52.9
PAC	1.017	1.016	1.014	94.1	82.4
QUE	1.011	1.015	1.017	136.4	154.5
Mean	1.015	1.016	1.014	108.9	99.1
S.D.	±0.003	±0.002	±0.004	±20.2	±43.0
S.E.	±0.001	±0.001	±0.002	±10.1	±21.5

P 16-17 Oct = Base Value 0.47

P 21-22 Oct = Base Value 0.76

P Bed Rest = Ambulatory 0.52

P Recovery = Ambulatory 0.59

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 43. Urine osmotic activity (osmols/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.744	0.295	0.242	39.7	32.5
FRE	0.571	0.233	--	40.8	--
KEE	0.826	0.708	0.538	85.7	65.1
KUL	0.814	0.569	0.600	69.9	73.7
PAR	0.955	0.466	0.924	48.8	96.8
SCH	0.799	0.492	0.542	61.6	67.8
VAN	0.353	0.312	0.475	88.4	134.6
ZIM	0.996	0.288	0.847	28.9	85.0
Mean	0.757	0.420	0.595	58.0	79.4
S.D.	±0.208	±0.166	±0.230	±22.1	±31.5
S.E.	±0.074	±0.059	±0.087	± 7.8	±11.9
P Bed Rest = Base Value*		0.003*			
P Recovery = Base Value			0.046*		
Ambulatory Group					
BEN	0.792	0.751	0.811	94.8	102.4
DEJ	1.051	0.761	0.439	72.4	41.8
PAC	0.950	0.523	0.785	55.1	82.6
QUE	0.840	0.343	0.929	40.8	110.6
Mean	0.908	0.595	0.741	65.8	84.4
S.D.	±0.116	±0.200	±0.211	±23.3	±30.7
S.E.	±0.058	±0.100	±0.105	±11.6	±15.4
P 16-17 Oct = Base Value		0.052			
P 21-22 Oct = Base Value			0.37		
P Bed Rest = Ambulatory				0.58	
P Recovery = Ambulatory					0.80

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 44. Urine pH (24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	6.51	5.93	5.92	91.1	90.9
FRE	7.01	5.69	--	81.2	--
KEE	6.78	6.16	7.30	90.9	107.7
KUL	7.16	6.26	5.71	87.4	79.7
PAR	6.66	6.34	6.28	95.2	94.3
SCH	7.11	5.78	6.35	81.3	89.3
VAN	6.41	6.32	6.75	98.6	105.3
ZIM	6.89	5.71	6.82	82.9	99.0
Mean	6.82	6.02	6.45	88.6	95.2
S.D.	±0.28	±0.28	±0.55	± 6.5	± 9.7
S.E.	±0.10	±0.10	±0.21	± 2.3	± 3.7
P Bed Rest = Base Value*		0.002*			
P Recovery = Base Value			0.23		
Ambulatory Group					
BEN	6.42	6.37	7.46	99.2	116.2
DEJ	7.17	5.21	6.08	72.7	84.8
PAC	5.56	6.66	5.90	119.8	106.1
QUE	6.78	6.32	6.64	93.2	97.9
Mean	6.48	6.14	6.52	96.2	101.3
S.D.	±0.69	±0.64	±0.70	±19.4	±13.3
S.E.	±0.34	±0.32	±0.35	± 9.7	± 6.6
P 16-17 Oct = Base Value		0.63			
P 21-22 Oct = Base Value			0.94		
P Bed Rest = Ambulatory				0.32	
P Recovery = Ambulatory					0.40

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 45. Urine chloride excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	163	42	48	25.8	29.4
FRE	152	37	--	24.3	--
KEE	211	108	91	51.2	43.1
KUL	241	96	141	39.8	58.5
PAR	241	85	154	35.3	63.9
SCH	235	93	144	39.6	61.3
VAN	124	56	120	45.2	96.8
ZIM	225	43	202	19.1	89.8
Mean	199	70	129	35.0	63.3
S.D.	± 46	± 28	± 49	± 11.1	± 23.8
S.E.	± 16	± 10	± 19	± 3.9	± 9.0

P Bed Rest = Base Value* <0.001*

P Recovery = Base Value 0.0041*

Ambulatory Group

BEN	182	156	178	85.7	97.8
DEJ	241	125	126	51.9	52.3
PAC	144	107	167	74.3	116.0
QUE	239	63	251	26.4	105.0
Mean	201	113	180	59.6	92.8
S.D.	± 47	± 39	± 52	± 26.2	± 28.0
S.E.	± 24	± 19	± 26	± 13.1	± 14.0

P 16-17 Oct = Base Value 0.087

P 21-22 Oct = Base Value 0.56

P Bed Rest = Ambulatory 0.041*

P Recovery = Ambulatory 0.096

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 46. Urine sodium excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	159	39	46	24.5	28.9
FRE	159	49	--	30.8	--
KEE	206	130	111	63.1	53.9
KUL	256	147	146	57.4	57.0
PAR	259	126	183	48.6	70.7
SCH	288	120	162	41.7	56.3
VAN	121	66	138	54.5	114.0
ZIM	217	51	236	23.5	108.8
Mean	208	91	146	43.0	69.9
S.D.	± 58	± 44	± 59	±15.3	±30.9
S.E.	± 21	± 15	± 22	± 5.4	±11.7

P Bed Rest = Base Value* <0.001*

P Recovery = Base Value 0.025*

Ambulatory Group

BEN	170	179	185	105.3	108.8
DEJ	267	121	126	45.3	47.2
PAC	127	145	189	114.2	148.8
QUE	267	81	275	30.3	103.0
Mean	208	132	194	73.8	102.0
S.D.	± 71	± 41	± 61	± 42.1	± 41.8
S.E.	± 35	± 21	± 31	± 21.1	± 20.9

P 16-17 Oct = Base Value 0.24

P 21-22 Oct = Base Value 0.77

P Bed Rest = Ambulatory 0.086

P Recovery = Ambulatory 0.18

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 47. Urine potassium excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	46.1	24.7	18.5	53.6	40.1
FRE	32.9	12.7	--	38.6	--
KEE	67.2	52.8	61.2	78.6	91.1
KUL	85.9	42.0	32.4	48.9	37.7
PAR	79.2	46.3	67.7	58.5	85.5
SCH	65.3	39.6	34.6	60.6	53.0
VAN	41.8	19.4	20.2	46.4	48.3
ZIM	77.5	15.6	54.0	20.1	69.7
Mean	62.0	31.6	41.2	50.7	60.8
S.D.	±19.5	±15.3	±19.8	±17.1	±21.6
S.E.	± 6.9	± 5.4	± 7.5	± 6.1	± 8.1
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.0051*		

Ambulatory Group

BEN	53.3	50.4	90.5	94.6	169.8
DEJ	59.0	58.1	25.4	98.5	43.1
PAC	48.0	30.7	45.4	64.0	94.6
QUE	60.0	29.8	44.2	49.7	73.7
Mean	55.1	42.3	51.4	76.7	95.3
S.D.	± 5.6	±14.2	±27.6	±23.7	±54.0
S.E.	± 2.8	± 7.1	±13.8	±11.9	±27.0
P 16-17 Oct = Base Value		0.16			
P 21-22 Oct = Base Value			0.82		
P Bed Rest = Ambulatory				0.052	
P Recovery = Ambulatory					0.16

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 48. Urine Na/K ratio (24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	3.45	1.58	2.49	45.8	72.2
FRE	4.83	3.86	--	79.9	--
KEE	3.07	2.46	1.81	80.1	59.0
KUL	2.98	3.50	4.51	117.4	151.3
PAR	3.27	2.72	2.70	83.2	82.6
SCH	4.41	3.03	4.68	68.7	106.1
VAN	2.89	3.40	6.83	117.6	236.3
ZIM	2.80	3.27	4.37	116.8	156.1
Mean	3.46	2.94	3.91	88.7	123.4
S.D.	±0.75	±0.76	±1.71	±26.4	±62.4
S.E.	±0.27	±0.29	±0.65	± 9.3	±23.6
P Bed Rest = Base Value*		0.18			
P Recovery = Base Value			0.39		
Ambulatory Group					
BEN	3.19	3.55	2.04	111.3	63.9
DEJ	4.53	2.08	4.96	45.9	109.5
PAC	2.65	4.72	4.16	178.1	157.0
QUE	4.45	2.72	6.22	61.1	139.8
Mean	3.71	3.27	4.35	99.1	117.6
S.D.	±0.93	±1.14	±1.76	±59.6	±40.8
S.E.	±0.47	±0.57	±0.88	±29.8	±20.4
P 16-17 Oct = Base Value		0.70			
P 21-22 Oct = Base Value			0.41		
P Bed Rest = Ambulatory				0.68	
P Recovery = Ambulatory					0.87

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 49. Urine magnesium excretion (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	2.58	2.08	0.85	80.6	32.9
FRE	2.66	2.38	--	89.5	--
KEE	2.78	5.62	1.90	202.2	68.3
KUL	4.20	7.03	2.41	167.4	57.4
PAR	4.04	4.39	5.25	108.7	130.0
SCH	2.83	5.48	2.19	193.6	77.4
VAN	2.27	1.72	2.09	75.8	92.1
ZIM	4.35	1.93	3.94	44.4	90.6
Mean	3.21	3.83	2.66	120.3	78.4
S.D.	±0.84	±2.06	±1.46	±59.4	±30.6
S.E.	±0.30	±0.73	±0.55	±21.0	±11.6
P Bed Rest = Base Value*		0.40			
P Recovery = Base Value			0.15		
Ambulatory Group					
BEN	3.74	5.87	2.87	157.0	76.7
DEJ	2.82	4.17	1.64	147.9	58.2
PAC	2.34	3.59	3.60	153.4	153.8
QUE	5.60	3.08	4.66	55.0	83.2
Mean	3.63	4.18	3.19	128.3	93.0
S.D.	±1.44	±1.21	±1.27	±49.0	±41.9
S.E.	±0.72	±0.61	±0.63	±24.5	±21.0
P 16-17 Oct = Base Value		0.63			
P 21-22 Oct = Base Value			0.50		
P Bed Rest = Ambulatory				0.82	
P Recovery = Ambulatory					0.52

* Value of $P < 0.05$ indicates a statistically significant difference between the two populations compared.

Table 50. Urine calcium excretion (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	3.84	2.70	1.59	70.3	41.4
FRE	2.76	3.30	--	119.6	--
KEE	5.20	6.15	2.08	118.3	40.0
KUL	5.77	5.94	4.15	102.9	71.9
PAR	5.31	5.36	6.66	100.9	125.4
SCH	4.51	5.40	3.64	119.7	80.7
VAN	2.35	1.37	2.44	58.3	103.8
ZIM	5.59	2.08	5.32	37.2	95.2
Mean	4.42	4.04	3.70	90.9	79.8
S.D.	±1.31	±1.89	±1.84	±31.7	±31.7
S.E.	±0.46	±0.67	±0.69	±11.2	±12.0
P Bed Rest = Base Value*		0.49			
P Recovery = Base Value			0.15		
Ambulatory Group					
BEN	4.16	5.32	3.79	127.9	91.1
DEJ	4.65	4.99	2.56	107.3	55.1
PAC	4.66	3.87	4.70	83.0	100.9
QUE	3.64	2.24	4.59	61.5	126.1
Mean	4.28	4.11	3.91	94.9	93.3
S.D.	±0.48	±1.39	±0.99	±28.9	±29.4
S.E.	±0.24	±0.69	±0.49	±14.4	±14.7
P 16-17 Oct = Base Value		0.78			
P 21-22 Oct = Base Value			0.60		
P Bed Rest = Ambulatory				0.84	
P Recovery = Ambulatory					0.50

* Value of $P < 0.05$ indicates a statistically significant difference between the two populations compared.

Table 51. Urine phosphate excretion (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	17.0	13.6	8.8	80.0	51.8
FRE	16.8	15.1	--	89.9	--
KEE	28.7	30.9	23.1	107.7	80.5
KUL	34.4	28.6	20.3	83.1	59.0
PAR	23.2	25.8	36.2	111.2	156.0
SCH	18.8	24.9	18.6	132.4	98.9
VAN	17.8	11.4	13.7	64.0	77.0
ZIM	24.5	11.7	34.4	47.8	140.4
Mean	22.7	20.3	22.2	89.5	94.8
S.D.	±6.4	±8.1	±10.1	±27.2	±39.8
S.E.	±2.2	±2.9	± 3.8	± 9.6	±15.0

P Bed Rest = Base Value* 0.30

P Recovery = Base Value 0.73

Ambulatory Group

BEN	23.3	32.2	24.0	138.2	103.0
DEJ	26.8	29.5	11.5	110.1	42.9
PAC	19.0	21.0	29.0	110.5	152.6
QUE	21.8	10.7	32.2	49.1	147.7
Mean	22.7	23.4	24.2	102.0	111.6
S.D.	±3.2	±9.7	±9.1	±37.6	±50.9
S.E.	±1.6	±4.8	±4.5	±18.8	±25.5

P 16-17 Oct = Base Value 0.89

P 21-22 Oct = Base Value 0.83

P Bed Rest = Ambulatory 0.52

P Recovery = Ambulatory 0.56

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 52. Urine total nitrogen excretion rate (g/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	8.84	4.67	3.03	52.8	34.3
FRE	6.32	3.36	--	53.2	--
KEE	12.61	12.61	7.36	100.0	58.4
KUL	16.88	10.22	6.09	60.5	36.1
PAR	12.74	7.77	11.94	61.0	93.7
SCH	6.96	9.04	4.34	129.9	62.4
VAN	7.60	3.50	5.28	46.1	69.5
ZIM	12.95	3.26	11.00	25.2	84.9
Mean	10.61	6.80	7.01	66.1	62.8
S.D.	±3.72	±3.61	±3.35	±33.2	±22.5
S.E.	±1.32	±1.28	±1.26	±11.7	± 8.5
P Bed Rest = Base Value*		0.022*			
P Recovery = Base Value			0.017*		

Ambulatory Group

BEN	10.36	9.89	8.94	95.5	86.3
DEJ	13.45	13.35	3.90	99.3	29.0
PAC	10.63	4.88	9.38	45.9	88.2
QUE	7.06	7.87	13.28	111.5	188.1
Mean	10.38	9.00	8.88	88.1	97.9
S.D.	±2.61	±3.56	±3.85	±28.9	±66.1
S.E.	±1.31	±1.78	±1.92	±14.5	±33.1
P 16-17 Oct = Base Value		0.42			
P 21-22 Oct = Base Value			0.67		
P Bed Rest = Ambulatory				0.29	
P Recovery = Ambulatory					0.22

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 53. Urine ammonia excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	25.0	14.9	11.8	59.6	47.2
FRE	18.2	24.7	--	135.7	--
KEE	30.7	36.2	22.1	117.9	72.0
KUL	29.5	26.2	25.7	88.8	87.1
PAR	34.3	26.6	50.6	77.6	147.5
SCH	23.0	36.7	26.6	159.6	115.7
VAN	21.8	12.2	13.4	56.0	61.5
ZIM	24.0	12.7	17.3	52.9	72.1
Mean	25.8	23.8	23.9	93.5	86.2
S.D.	±5.3	±9.8	±13.1	±40.0	±34.5
S.E.	±1.9	±3.5	± 4.9	±14.2	±13.1
P Bed Rest = Base Value*		0.56			
P Recovery = Base Value			0.46		
Ambulatory Group					
BEN	30.5	40.1	11.3	131.5	37.0
DEJ	22.3	32.6	11.5	146.2	51.6
PAC	39.8	15.8	36.0	39.7	90.5
QUE	23.5	19.4	25.0	82.6	106.4
Mean	29.0	27.0	21.0	100.0	71.4
S.D.	±8.0	±11.3	±11.9	±48.5	±32.5
S.E.	±4.0	± 5.7	± 6.0	±24.3	±16.2
P 16-17 Oct = Base Value		0.82			
P 21-22 Oct = Base Value			0.17		
P Bed Rest = Ambulatory				0.81	
P Recovery = Ambulatory					0.50

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 54. Urine urea excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	456	154	99	33.8	21.7
FRE	273	111	--	40.7	--
KEE	535	399	257	74.6	48.0
KUL	624	300	269	48.1	43.1
PAR	677	372	473	54.9	69.9
SCH	331	292	299	88.2	90.3
VAN	260	131	177	50.4	68.1
ZIM	426	123	334	28.9	78.4
Mean	448	235	273	52.5	59.9
S.D.	±156	±119	±118	±20.1	±23.5
S.E.	± 55	± 42	± 45	± 7.1	± 8.9
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.008*		
Ambulatory Group					
BEN	393	332	315	84.5	80.2
DEJ	549	421	166	76.7	30.2
PAC	359	194	323	54.0	90.0
QUE	312	136	368	43.6	117.9
Mean	403	271	293	64.7	79.6
S.D.	±103	±130	±88	±19.1	±36.6
S.E.	± 51	± 65	±44	± 9.6	±18.3
P 16-17 Oct = Base Value		0.015*			
P 21-22 Oct = Base Value			0.33		
P Bed Rest = Ambulatory				0.34	
P Recovery = Ambulatory					0.30

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 55. Urine creatinine excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	10.32	7.56	6.02	73.3	58.3
FRE	8.66	5.40	--	62.4	--
KEE	9.31	8.30	5.76	89.2	61.9
KUL	10.49	7.44	6.72	70.9	64.1
PAR	10.22	7.42	11.16	72.6	109.2
SCH	8.23	8.62	7.73	104.7	93.9
VAN	8.50	5.02	5.66	59.1	66.6
ZIM	10.27	4.22	9.55	41.1	93.0
Mean	9.50	6.75	7.51	71.7	78.1
S.D.	±0.93	±1.63	±2.12	±19.2	±20.1
S.E.	±0.33	±0.58	±0.80	± 6.8	± 7.6
P Bed Rest = Base Value*		0.004*			
P Recovery = Base Value			0.032*		
Ambulatory Group					
BEN	9.10	8.59	9.10	94.4	100.0
DEJ	10.08	9.10	4.80	90.3	47.6
PAC	9.26	6.82	10.82	73.7	116.8
QUE	8.06	4.97	8.88	61.7	110.2
Mean	9.13	7.37	8.40	80.0	93.7
S.D.	±0.83	±1.87	±2.55	±15.1	±31.5
S.E.	±0.41	±0.94	±1.28	± 7.6	±15.7
P 16-17 Oct = Base Value		0.063			
P 21-22 Oct = Base Value			0.67		
P Bed Rest = Ambulatory				0.47	
P Recovery = Ambulatory					0.34

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 56. Urine creatine excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.85	1.24	0.51	145.9	60.0
FRE	1.34	0.95	--	70.9	--
KEE	2.50	2.90	3.28	116.0	131.2
KUL	3.66	3.62	1.46	98.9	39.9
PAR	3.63	1.60	1.21	44.1	33.3
SCH	2.56	2.87	1.57	112.1	61.3
VAN	1.80	2.52	1.16	140.0	64.4
ZIM	1.30	1.30	1.48	100.0	113.8
Mean	2.21	2.13	1.52	103.5	72.0
S.D.	±1.06	±0.98	±0.85	±33.8	±36.7
S.E.	±0.38	±0.35	±0.32	±11.9	±13.9
P Bed Rest = Base Value*		0.80			
P Recovery = Base Value			0.12		
Ambulatory Group					
BEN	1.54	1.78	0.66	115.6	42.9
DEJ	4.03	1.82	2.95	45.2	73.2
PAC	2.37	2.68	1.41	113.1	59.5
QUE	2.06	0.96	1.00	46.6	48.5
Mean	2.50	1.81	1.51	80.1	56.0
S.D.	±1.08	±0.70	±1.01	±39.5	±13.4
S.E.	±0.54	±0.35	±0.51	±19.8	± 6.7
P 16-17 Oct = Base Value		0.33			
P 21-22 Oct = Base Value			<0.001*		
P Bed Rest = Ambulatory				0.31	
P Recovery = Ambulatory					0.43

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 57. Urine hydroxyproline excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.332	0.253	0.117	76.2	35.2
FRE	--	--	--	--	--
KEE	0.433	0.330	0.186	76.2	43.0
KUL	0.425	0.416	0.198	97.9	46.6
PAR	0.455	0.227	0.380	49.9	83.5
SCH	0.469	0.325	0.303	69.3	64.6
VAN	0.356	0.157	0.191	44.1	53.7
ZIM	0.396	0.124	0.292	31.3	73.7
Mean	0.409	0.262	0.238	63.6	57.2
S.D.	±0.051	±0.103	±0.090	±22.9	±17.5
S.E.	±0.019	±0.039	±0.034	± 8.6	± 6.6
P Bed Rest = Base Value*		0.005*			
P Recovery = Base Value			<0.001*		
Ambulatory Group					
BEN	0.241	0.436	0.193	180.9	80.1
DEJ	0.415	0.280	0.029	67.5	7.0
PAC	0.338	0.153	0.208	45.3	61.5
QUE	0.074	0.136	0.286	183.8	386.5
Mean	0.267	0.251	0.179	119.4	133.8
S.D.	±0.147	±0.139	±0.108	±73.3	±171.3
S.E.	±0.074	±0.069	±0.054	±36.6	± 85.7
P 16-17 Oct = Base Value		0.87			
P 21-22 Oct = Base Value			0.53		
P Bed Rest = Ambulatory				0.086	
P Recovery = Abulatory					0.25

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 58. Urine glucose excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.401	0.084	0.139	20.9	34.7
FRE	0.526	0.149	--	28.3	--
KEE	0.518	0.451	--	87.1	--
KUL	0.691	0.329	0.502	47.6	72.6
PAR	0.588	0.449	1.162	76.4	197.6
SCH	0.922	0.473	0.936	51.3	101.5
VAN	0.302	0.197	0.233	65.2	77.2
ZIM	0.386	0.108	0.437	28.0	113.2
Mean	0.542	0.280	0.568	50.6	99.5
S.D.	±0.197	±0.165	±0.402	±24.2	±55.2
S.E.	±0.070	±0.058	±0.164	± 8.6	±22.5
P Bed Rest = Base Value*		0.001*			
P Recovery = Base Value			0.88		
Ambulatory Group					
BEN	0.480	0.386	0.386	80.4	80.4
DEJ	0.494	0.317	0.288	64.2	58.3
PAC	0.406	0.211	0.355	52.0	87.4
QUE	0.526	0.185	0.509	35.2	96.8
Mean	0.477	0.275	0.385	58.0	80.7
S.D.	±0.051	±0.094	±0.093	±19.1	±16.4
S.E.	±0.025	±0.047	±0.046	± 9.6	± 8.2
P 16-17 Oct = Base Value		0.029*			
P 21-22 Oct = Base Value			0.11		
P Bed Rest = Ambulatory				0.61	
P Recovery = Ambulatory					0.53

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 59. Urine citrate excretion rate (mmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.07	0.98	0.77	91.6	72.0
FRE	2.43	1.42	--	58.4	--
KEE	2.10	3.48	3.46	165.7	164.8
KUL	2.18	2.54	3.26	116.5	149.5
PAR	4.25	5.46	7.70	128.5	181.2
SCH	3.50	5.75	2.90	164.3	82.9
VAN	1.92	2.15	2.95	112.0	153.6
ZIM	2.86	1.75	3.84	61.2	134.3
Mean	2.54	2.94	3.55	112.3	134.0
S.D.	±0.99	±1.81	±2.08	±41.0	±41.3
S.E.	±0.35	±0.64	±0.79	±14.5	±15.6
P Bed Rest = Base Value*		0.36			
P Recovery = Base Value			0.091		
Ambulatory Group					
BEN	2.61	3.53	6.39	135.2	244.8
DEJ	3.12	3.32	2.71	106.4	86.9
PAC	2.39	4.10	3.67	171.5	153.6
QUE	4.63	3.66	4.60	79.0	99.4
Mean	3.19	3.65	4.34	123.0	146.2
S.D.	±1.01	±0.33	±1.57	±39.6	±71.8
S.E.	±0.50	±0.16	±0.78	±19.8	±35.9
P 16-17 Oct = Base Value		0.47			
P 21-22 Oct = Base Value			0.31		
P Bed Rest = Ambulatory				0.67	
P Recovery = Ambulatory					0.73

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 60. Urine 17-OH corticosteroid excretion rate (μmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.93	0.94	1.24	48.7	64.2
FRE	1.53	4.63	--	302.6	--
KEE	3.51	2.27	5.13	64.7	146.2
KUL	3.51	1.27	0.97	36.2	27.6
PAR	4.55	2.32	1.69	51.0	37.1
SCH	--	--	--	--	--
VAN	3.65	0.94	0.24	25.8	6.6
ZIM	2.15	0.20	1.45	9.3	67.4
Mean	2.98	1.80	1.79	76.9	58.2
S.D.	±1.11	±1.46	±1.71	±101.2	±48.8
S.E.	±0.42	±0.55	±0.70	± 38.2	±19.9
P Bed Rest = Base Value*		0.17			
P Recovery = Base Value			0.12		
Ambulatory Group					
BEN	2.09	0.86	1.12	41.1	53.6
DEJ	2.77	1.14	1.16	41.2	41.9
PAC	4.85	0.59	0.98	12.2	20.2
QUE	1.11	0.56	1.89	50.5	170.3
Mean	2.71	0.79	1.29	36.3	71.5
S.D.	±1.58	±0.27	±0.41	±16.6	±67.3
S.E.	±0.79	±0.14	±0.20	± 8.3	±33.7
P 16-17 Oct = Base Value		0.099			
P 21-22 Oct = Base Value			0.24		
P Bed Rest = Ambulatory				0.46	
P Recovery = Ambulatory					0.72

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 61. Urine epinephrine excretion rate (nmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	23.5	8.1	10.7	34.5	45.5
FRE	9.8	7.1	--	72.4	--
KEE	9.3	5.9	20.8	63.4	223.7
KUL	5.5	12.5	21.1	227.3	383.6
PAR	17.7	12.3	24.4	69.5	137.9
SCH	8.4	14.3	24.0	170.2	285.7
VAN	8.5	2.8	8.9	32.9	104.7
ZIM	11.7	1.2	14.4	10.3	123.1
Mean	11.8	8.0	17.8	85.1	186.3
S.D.	±5.9	±4.7	±6.4	±74.9	±117.6
S.E.	±2.1	±1.7	±2.4	±26.5	± 44.5

P Bed Rest = Base Value* 0.20

P Recovery = Base Value 0.19

Ambulatory Group

BEN	17.8	13.0	11.5	73.0	64.6
DEJ	10.8	11.1	4.7	102.8	43.5
PAC	9.2	5.4	11.0	58.7	119.6
QUE	13.3	2.4	13.9	18.0	104.5
Mean	12.8	8.0	10.3	63.1	83.1
S.D.	±3.8	±4.9	±3.9	±35.2	±35.1
S.E.	±1.9	±2.5	±2.0	±17.6	±17.6

P 16-17 Oct = Base Value 0.13

P 21-22 Oct = Base Value 0.33

P Bed Rest = Ambulatory 0.60

P Recovery = Ambulatory 0.13

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 62. Urine norepinephrine excretion rate (nmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	203	110	261	54.2	128.6
FRE	103	54	--	52.4	--
KEE	134	106	421	79.1	314.2
KUL	134	104	189	77.6	141.0
PAR	226	88	387	38.9	171.2
SCH	126	68	229	54.0	181.7
VAN	133	36	121	27.1	91.0
ZIM	167	50	287	29.9	171.9
Mean	153	77	271	51.7	171.4
S.D.	±42	±29	±106	±19.6	±70.4
S.E.	±15	±10	± 40	± 6.9	±26.6
P Bed Rest = Base Value*		0.001*			
P Recovery = Base Value			0.022*		
Ambulatory Group					
BEN	116	146	267	125.9	230.2
DEJ	90	121	106	134.4	117.8
PAC	142	68	243	47.9	171.1
QUE	112	62	180	55.4	160.7
Mean	115	99	199	90.9	170.0
S.D.	±21	±41	±72	±45.6	±46.3
S.E.	±11	±20	±36	±22.8	±23.2
P 16-17 Oct = Base Value		0.60			
P 21-22 Oct = Base Value			0.060		
P Bed Rest = Ambulatory				0.057	
P Recovery = Ambulatory					0.97

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 63. Urine norepinephrine/epinephrine excretion (24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	8.6	13.6	24.4	158.1	283.7
FRE	10.5	7.6	--	72.4	--
KEE	14.4	18.0	20.2	125.0	140.3
KUL	24.4	8.3	9.0	34.0	36.9
PAR	12.8	7.2	15.9	56.3	124.2
SCH	15.0	4.8	9.5	32.0	63.3
VAN	15.6	12.9	13.6	82.7	87.2
ZIM	14.3	41.7	19.9	291.6	139.2
Mean	14.5	14.3	16.1	106.5	125.0
S.D.	±4.7	±11.9	±5.8	±86.5	±80.2
S.E.	±1.7	± 4.2	±2.2	±30.6	±30.3

P Bed Rest = Base Value* 0.97

P Recovery = Base Value 0.79

Ambulatory Group

BEN	6.5	11.2	23.2	172.3	356.9
DEJ	8.3	10.9	22.6	131.3	272.3
PAC	15.4	12.6	22.1	81.8	143.5
QUE	8.4	25.8	12.9	307.1	153.6
Mean	9.7	15.1	20.2	173.1	231.6
S.D.	±3.9	±7.2	±4.9	±96.7	±102.0
S.E.	±2.0	±3.6	±2.4	±48.3	± 51.0

P 16-17 Oct = Base Value 0.29

P 21-22 Oct = Base Value 0.037*

P Bed Rest = Ambulatory 0.25

P Recovery = Ambulatory 0.086

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 64. Urine cyclic-AMP excretion rate (μmol/24 hr) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.91	1.05	1.59	55.0	83.2
FRE	1.17	1.40	--	119.7	--
KEE	1.48	3.28	1.93	221.6	130.4
KUL	1.62	1.22	1.26	75.3	77.8
PAR	2.80	2.97	2.55	106.1	91.1
SCH	1.74	2.29	1.56	131.6	89.7
VAN	1.61	0.96	1.81	59.6	112.4
ZIM	2.54	1.02	1.38	40.2	54.3
Mean	1.86	1.77	1.73	101.1	91.3
S.D.	±0.55	±0.94	±0.43	±58.6	±24.5
S.E.	±0.19	±0.33	±0.16	±20.7	± 9.2
P Bed Rest = Base Value*		0.82			
P Recovery = Base Value			0.27		
Ambulatory Group					
BEN	0.87	2.74	1.64	314.9	188.5
DEJ	1.40	3.01	1.32	215.0	94.3
PAC	1.82	2.01	2.34	110.4	128.6
QUE	2.13	1.89	1.82	88.7	85.4
Mean	1.56	2.41	1.78	182.3	124.2
S.D.	±0.55	±0.55	±0.43	±104.2	±46.7
S.E.	±0.27	±0.27	±0.21	± 52.1	±23.4
P 16-17 Oct = Base Value		0.20			
P 21-22 Oct = Base Value			0.44		
P Bed Rest = Ambulatory				0.11	
P Recovery = Ambulatory					0.15

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 65. Qualitative recapitulation of changes observed in the 63 parameters evaluated on day 17 of bed rest in the 8 subjects of the Bed-Rest Group and the 4 subjects of the Ambulatory Group during the 1973 NASA/Ames Female Bed-Rest Study.

	Bed-Rest Group	Amb. Group	Bed-Rest vs Amb.		Bed-Rest Group	Amb. Group	Bed-Rest vs Amb.
Body Weight	-	-	-	Plasma LDH-2	-	-	-
Plasma Volume	↓	-	*	Plasma LDH-3	↑	↑	-
Venous Hematocrit	↓	↓	-	Plasma LDH-4	-	-	-
Blood Hemoglobin	-	-	-	Plasma LDH-5	-	-	-
Body Water	-	↓	-	Plasma GOT	↓	↓	-
Extracellular Water	-	↑	*	Plasma GPT	-	-	-
Intracellular Water	-	↓	-	Plasma ALP	↑	↑	-
Body Potassium	↓	-	*				
Plasma Potassium	-	-	*	Urine Volume	↓	-	-
Plasma Sodium	↑	↑	-	Urine Sp Gr	-	-	-
Plasma Calcium	-	-	-	Urine Osm Act	↓	-	-
Plasma Magnesium	↑	↑	-	Urine pH	↓	-	-
Plasma Chloride	↑	↑	-	Urine Chloride	↓	-	*
Plasma Protein	-	-	-	Urine Sodium	↓	-	-
Plasma Albumin	↓	-	-	Urine Potassium	↓	-	-
Plasma Globulins	↑	-	-	Urine Na/K	-	-	-
Plasma Fibrinogen	↑	↑	-	Urine Magnesium	-	-	-
A/G Ratio	↓	-	-	Urine Calcium	-	-	-
Circ Plasma Protein	↓	-	*	Urine Phosphate	-	-	-
Circ Albumin	↓	-	*	Urine Total N	↓	-	-
Circ Globulins	-	-	-	Urine Ammonia	-	-	-
Circ Fibrinogen	↑	↑	*	Urine Urea	↓	↓	-
Plasma α-1-Globulin	-	-	-	Urine Creatinine	↓	-	-
Plasma α-2-Globulin	-	-	-	Urine Creatine	-	-	-
Plasma β-Globulin	↑	-	-	Urine Hydroxyproline	↓	-	-
Plasma γ-Globulin	-	-	-	Urine Glucose	↓	↓	-
Circ α-1-Globulin	-	-	-	Urine Citrate	-	-	-
Circ α-2-Globulin	-	-	-	Urine 17-OHCS	-	-	-
Circ β-Globulin	-	-	-	Urine Epinephrine	-	-	-
Circ γ-Globulin	-	-	-	Urine Norepinephrine	↓	-	-
Plasma Total LDH	↓	↓	-	Urine NE/E	-	-	-
Plasma LDH-1	↓	↓	-	Urine Cyclic-AMP	-	-	-

↓ Mean value significantly lower ($P < .05$) on day 17 of bed rest than 7 days before.
↑ Mean value significantly higher ($P < .05$) on day 17 of bed rest than 7 days before.
* Mean change on day 17 of bed rest for Bed-Rest Group significantly different ($P < .05$) from Ambulatory Group.

Table 66. Urine osmotic activity (mosm/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	72.1	39.0	40.2	54.1	55.8
FRE	65.9	43.1	--	65.4	--
KEE	88.7	85.3	93.4	96.2	105.3
KUL	77.6	76.5	89.3	98.6	115.1
PAR	93.4	62.8	82.8	67.2	88.7
SCH	97.1	57.1	70.1	58.8	72.2
VAN	41.5	62.2	63.9	149.9	202.2
ZIM	97.0	68.2	88.7	70.3	91.4
Mean	79.2	61.8	78.3	82.6	104.4
S.D.	±19.2	±15.6	±18.4	±31.7	±47.4
S.E.	± 6.8	± 5.5	± 6.9	±11.2	±17.9
P Bed Rest = Base Value*		0.049*			
P Recovery = Base Value			0.79		
Ambulatory Group					
BEN	87.0	87.4	89.1	100.5	102.4
DEJ	104.3	83.6	91.5	80.2	87.7
PAC	102.6	76.7	72.6	74.8	70.8
QUE	104.2	69.0	104.6	66.2	100.4
Mean	99.5	79.2	89.5	80.4	90.3
S.D.	± 8.4	± 8.1	±13.1	±14.6	±14.6
S.E.	± 4.2	± 4.1	± 6.6	± 7.3	± 7.3
P 16-17 Oct = Base Value		0.074			
P 21-22 Oct = Base Value			0.27		
P Bed Rest = Ambulatory				0.90	
P Recovery = Ambulatory					0.59

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 67. Urine chloride excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	15.8	5.6	8.0	35.4	50.6
FRE	17.6	6.9	--	39.2	--
KEE	22.7	13.0	15.8	57.3	69.6
KUL	23.0	12.9	21.0	56.1	91.3
PAR	23.6	11.5	13.8	48.7	58.5
SCH	28.6	10.8	18.6	37.8	65.0
VAN	14.6	11.2	21.2	76.7	145.2
ZIM	21.9	10.2	21.2	46.6	96.8
Mean	21.0	10.3	17.1	49.7	82.4
S.D.	±4.7	±2.7	±4.9	±13.6	±32.4
S.E.	±1.6	±0.9	±1.9	± 4.8	±12.2
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.10		
Ambulatory Group					
BEN	20.0	18.2	19.6	91.0	98.0
DEJ	23.9	13.7	26.3	57.3	110.0
PAC	15.6	15.7	15.4	100.6	98.7
QUE	29.7	12.7	28.3	42.8	95.3
Mean	22.3	15.1	22.4	72.9	100.5
S.D.	±6.0	±2.4	±6.0	±27.4	±6.5
S.E.	±3.0	±1.2	±3.0	±13.7	±3.3
P 16-17 Oct = Base Value		0.17			
P 21-22 Oct = Base Value			0.91		
P Bed Rest = Ambulatory				0.072	
P Recovery = Ambulatory					0.31

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 68. Urine sodium excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	15.4	5.2	7.6	33.8	49.4
FRE	18.4	9.1	--	49.5	--
KEE	22.1	15.7	16.5	71.0	74.7
KUL	24.4	19.8	21.7	81.1	88.9
PAR	25.3	17.0	16.4	67.2	64.8
SCH	35.0	13.9	21.0	39.7	60.0
VAN	14.2	13.1	24.4	92.3	171.8
ZIM	21.1	12.1	24.7	57.3	117.1
Mean	22.0	13.2	18.9	61.5	89.5
S.D.	±6.6	±4.6	±6.0	±20.2	±42.5
S.E.	±2.3	±1.6	±2.3	± 7.1	±16.1

P Bed Rest = Base Value* 0.004*

P Recovery = Base Value 0.29

Ambulatory Group

BEN	18.7	20.8	20.3	111.2	108.6
DEJ	26.5	13.3	26.3	50.2	99.2
PAC	13.7	21.3	17.5	155.5	82.2
QUE	33.1	16.3	31.0	49.2	93.7
Mean	23.0	17.9	23.8	91.5	95.9
S.D.	±8.5	±3.8	±6.1	±51.6	±11.0
S.E.	±4.3	±1.9	±3.0	±25.8	± 5.5

P 16-17 Oct = Base Value 0.45

P 21-22 Oct = Base Value 0.58

P Bed Rest = Ambulatory 0.17

P Recovery = Ambulatory 0.78

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 69. Urine potassium excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	4.47	3.27	3.07	73.1	68.7
FRE	3.80	2.35	--	61.8	--
KEE	7.22	6.36	10.63	88.1	147.2
KUL	8.19	5.65	4.82	69.0	58.9
PAR	7.75	6.24	6.07	80.5	78.3
SCH	7.93	4.59	4.48	57.9	56.5
VAN	4.92	3.86	3.57	78.5	72.6
ZIM	7.55	3.70	5.65	49.0	74.8
Mean	6.48	4.50	5.47	69.7	79.6
S.D.	±1.77	±1.46	±2.51	±13.0	±30.9
S.E.	±0.63	±0.52	±0.95	± 4.6	±11.7
P Bed Rest = Base Value*		0.002*			
P Recovery = Base Value			0.16		
Ambulatory Group					
BEN	5.86	5.87	9.95	100.2	169.8
DEJ	5.85	6.38	5.29	109.1	90.4
PAC	5.18	4.50	4.20	86.9	81.1
QUE	7.44	6.00	4.98	80.6	66.9
Mean	6.08	5.69	6.11	94.2	102.1
S.D.	±0.96	±0.82	±2.60	±12.9	±46.2
S.E.	±0.48	±0.41	±1.30	± 6.4	±23.1
P 16-17 Oct = Base Value		0.42			
P 21-22 Oct = Base Value			0.99		
P Bed Rest = Ambulatory				0.011*	
P Recovery = Ambulatory					0.35

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 70. Urine magnesium excretion (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	250	275	141	110.0	56.4
FRE	307	441	--	143.6	--
KEE	299	677	330	226.4	110.4
KUL	400	945	359	236.3	89.8
PAR	395	592	470	149.9	119.0
SCH	344	636	283	184.9	82.3
VAN	267	343	369	128.5	138.2
ZIM	424	457	413	107.8	97.4
Mean	336	546	338	160.9	99.1
S.D.	±65	±214	±105	±49.9	±26.6
S.E.	±23	± 76	± 40	±17.6	±10.1
P Bed Rest = Base Value*		0.014*			
P Recovery = Base Value			0.95		
Ambulatory Group					
BEN	411	683	315	166.2	76.6
DEJ	280	458	342	163.6	122.1
PAC	253	526	333	207.9	131.6
QUE	695	620	525	89.2	75.5
Mean	410	572	379	156.7	101.5
S.D.	±202	±100	±98	±49.4	±29.6
S.E.	±101	± 50	±49	±24.7	±14.8
P 16-17 Oct = Base Value		0.14			
P 21-22 Oct = Base Value			0.65		
P Bed Rest = Ambulatory				0.89	
P Recovery = Ambulatory					0.89

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 71. Urine calcium excretion rate (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	372	357	264	96.0	71.0
FRE	319	611	--	191.5	--
KEE	559	741	361	132.6	64.6
KUL	550	798	618	145.1	112.4
PAR	520	722	597	138.8	114.8
SCH	548	626	471	114.2	85.9
VAN	276	273	431	98.9	156.2
ZIM	544	493	557	90.6	102.4
Mean	461	578	471	126.0	101.0
S.D.	±118	±188	±130	±33.6	±31.2
S.E.	± 42	± 67	± 49	±11.9	±11.8
P Bed Rest = Base Value*		0.040*			
P Recovery = Base Value			0.84		
Ambulatory Group					
BEN	457	619	416	135.4	91.0
DEJ	461	548	533	118.9	115.6
PAC	503	567	434	112.7	86.3
QUE	452	451	517	99.8	114.4
Mean	468	546	475	116.7	101.8
S.D.	±23	±70	±59	±14.8	±15.3
S.E.	±12	±35	±29	± 7.4	± 7.7
P 16-17 Oct = Base Value		0.10			
P 21-22 Oct = Base Value			0.86		
P Bed Rest = Ambulatory				0.62	
P Recovery = Ambulatory					0.96

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 72. Urine phosphate excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	1.65	1.80	1.46	109.1	88.5
FRE	1.94	2.80	--	144.3	--
KEE	3.08	3.72	4.01	120.8	130.2
KUL	3.28	3.84	3.02	117.1	92.1
PAR	2.27	3.48	3.24	153.3	142.7
SCH	2.28	2.89	2.41	126.8	105.7
VAN	2.09	2.27	2.42	108.6	115.8
ZIM	2.39	2.77	3.60	115.9	150.6
Mean	2.37	2.95	2.88	124.5	117.9
S.D.	±0.55	±0.71	±0.86	±16.3	±24.2
S.E.	±0.20	±0.25	±0.32	± 5.8	± 9.2
P Bed Rest = Base Value*		0.002*			
P Recovery = Base Value			0.094		
Ambulatory Group					
BEN	2.56	3.75	2.64	146.5	103.1
DEJ	2.66	3.24	2.40	121.8	90.2
PAC	2.05	3.08	2.68	150.2	130.7
QUE	2.70	2.15	3.63	79.6	134.4
Mean	2.49	3.06	2.84	124.5	114.6
S.D.	±0.30	±0.67	±0.54	±32.5	±21.4
S.E.	±0.15	±0.33	±0.27	±16.2	±10.7
P 16-17 Oct = Base Value		0.25			
P 21-22 Oct = Base Value			0.29		
P Bed Rest = Ambulatory				0.99	
P Recovery = Ambulatory					0.82

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 73. Urine total nitrogen excretion (g/mmol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	0.86	0.62	0.50	72.1	58.1
FRE	0.73	0.62	--	84.9	--
KEE	1.35	1.52	1.28	112.6	94.8
KUL	1.61	1.37	0.91	85.1	56.5
PAR	1.25	1.05	1.07	84.0	85.6
SCH	0.85	1.05	0.77	123.5	90.6
VAN	0.89	0.70	0.93	78.7	104.5
ZIM	1.26	0.77	1.15	61.1	91.3
Mean	1.10	0.96	0.94	87.8	83.1
S.D.	±0.31	±0.34	±0.26	±20.6	±18.5
S.E.	±0.11	±0.12	±0.10	± 7.3	± 7.0
P Bed Rest = Base Value*		0.13			
P Recovery = Base Value			0.069		
Ambulatory Group					
BEN	1.14	1.15	0.98	100.9	86.0
DEJ	1.33	1.47	0.81	110.5	60.9
PAC	1.15	0.72	0.87	62.6	75.7
QUE	0.88	1.58	1.50	179.5	170.5
Mean	1.13	1.23	1.04	113.4	98.3
S.D.	±0.19	±0.39	±0.31	±48.7	±49.2
S.E.	±0.09	±0.19	±0.16	±24.3	±24.6
P 16-17 Oct = Base Value		0.68			
P 21-22 Oct - Base Value			0.75		
P Bed Rest = Ambulatory				0.22	
P Recovery = Ambulatory					0.75

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 74. Urine ammonia excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	2.42	1.97	1.96	81.4	81.0
FRE	2.10	4.57	--	217.6	--
KEE	3.30	4.36	3.84	132.1	116.4
KUL	2.81	3.52	3.82	125.3	135.9
PAR	3.36	3.58	4.53	106.5	134.8
SCH	2.79	4.26	3.44	152.7	123.3
VAN	2.56	2.43	2.37	94.9	92.6
ZIM	2.34	3.01	1.81	128.6	77.4
Mean	2.71	3.46	3.11	129.9	108.8
S.D.	±0.45	±0.94	±1.06	±42.0	±24.8
S.E.	±0.16	±0.33	±0.40	±14.9	± 9.4
P Bed Rest = Base Value*		0.056			
P Recovery = Base Value			0.28		

Ambulatory Group

BEN	3.35	4.67	1.24	139.4	37.0
DEJ	2.21	3.58	2.40	162.0	108.6
PAC	4.30	2.32	3.33	54.0	77.4
QUE	2.92	3.90	2.82	133.6	96.6
Mean	3.20	3.62	2.45	122.3	79.9
S.D.	±0.87	±0.98	±0.89	±47.1	±31.4
S.E.	±0.44	±0.49	±0.45	±23.6	±15.7
P 16-17 Oct = Base Value		0.64			
P 21-22 Oct - Base Value			0.24		
P Bed Rest = Ambulatory				0.78	
P Recovery = Ambulatory					0.12

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 75. Urine urea excretion (mol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	44.2	20.4	16.4	46.2	37.1
FRE	31.5	20.6	--	65.4	--
KEE	57.5	48.1	44.6	83.7	77.6
KUL	59.5	40.3	40.0	67.7	67.2
PAR	66.2	50.1	42.4	75.7	64.0
SCH	40.2	33.9	38.7	84.3	96.3
VAN	30.6	26.1	31.3	85.3	102.3
ZIM	41.5	29.1	35.0	70.1	84.3
Mean	46.4	33.6	35.5	72.3	75.5
S.D.	±13.2	±11.6	±9.5	±13.1	±22.0
S.E.	± 4.7	± 4.1	±3.6	± 4.6	± 8.3
P Bed Rest = Base Value*		<0.001*			
P Recovery = Base Value			0.021*		
Ambulatory Group					
BEN	43.2	38.6	34.6	89.4	80.1
DEJ	54.5	46.3	34.6	85.0	63.5
PAC	38.8	28.4	29.9	73.2	77.1
QUE	38.7	27.4	41.4	70.8	107.0
Mean	43.8	35.2	35.1	79.6	81.9
S.D.	±7.4	±9.0	±4.7	±9.0	±18.2
S.E.	±3.7	±4.5	±2.4	±4.5	± 9.1
P 16-17 Oct = Base Value		0.010*			
P 21-22 Oct = Base Value			0.16		
P Bed Rest = Ambulatory				0.35	
P Recovery = Ambulatory					0.64

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 76. Urine creatine excretion (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	82	164	85	200.0	103.6
FRE	155	176	--	113.5	--
KEE	269	349	569	129.7	211.5
KUL	349	487	217	139.5	62.2
PAR	355	216	108	60.8	30.4
SCH	311	333	203	107.1	65.3
VAN	212	502	205	236.8	96.7
ZIM	127	308	155	242.5	122.0
Mean	233	317	220	153.7	98.8
S.D.	±104	±130	±162	±65.6	±58.3
S.E.	± 37	± 46	± 61	±23.2	±22.0

P Bed Rest = Base Value* 0.10

P Recovery = Base Value 0.73

Ambulatory Group

BEN	169	207	73	122.5	43.2
DEJ	400	200	615	50.0	153.8
PAC	256	393	130	153.5	50.8
QUE	256	193	113	75.4	44.1
Mean	270	248	233	100.4	73.0
S.D.	±96	±97	±256	±46.5	±54.0
S.E.	±48	±48	±128	±23.2	±27.0

P 16-17 Oct = Base Value 0.78

P 21-22 Oct = Base Value 0.69

P Bed Rest = Ambulatory 0.18

P Recovery = Ambulatory 0.49

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 77. Urine hydroxyproline excretion rate (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	32.2	33.5	19.4	104.0	60.2
FRE	--	--	--	--	--
KEE	46.5	39.8	32.3	85.6	69.5
KUL	40.5	55.9	29.5	138.0	72.8
PAR	44.5	30.6	34.1	68.8	76.6
SCH	57.0	37.7	39.2	66.1	68.8
VAN	41.9	31.3	33.7	74.7	80.4
ZIM	38.6	29.4	30.6	76.2	79.3
Mean	43.0	36.9	31.3	87.6	72.5
S.D.	±7.7	±9.2	±6.1	±25.6	±7.1
S.E.	±2.9	±3.5	±2.3	± 9.7	±2.7
P Bed Rest = Base Value*		0.20			
P Recovery = Base Value			<0.001*		
Ambulatory Group					
BEN	26.5	50.8	21.2	191.7	80.0
DEJ	41.2	30.8	6.0	74.8	14.6
PAC	36.5	22.4	19.2	61.4	52.6
QUE	9.2	27.4	32.2	297.8	350.0
Mean	28.4	32.9	19.7	156.4	124.3
S.D.	±14.2	±12.5	±10.7	±110.9	±152.8
S.E.	± 7.1	±6.2	± 5.4	± 55.5	± 76.4
P 16-17 Oct = Base Value		0.68			
P 21-22 Oct = Base Value			0.53		
P Bed Rest = Ambulatory				0.14	
P Recovery = Ambulatory					0.37

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 78. Urine glucose excretion (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	38.9	11.1	23.1	28.5	59.4
FRE	60.7	27.6	--	45.5	--
KEE	55.6	54.3	--	97.7	--
KUL	65.9	44.2	74.7	67.1	113.4
PAR	57.5	60.5	104.1	105.2	181.0
SCH	112.0	54.9	121.1	49.0	108.1
VAN	35.5	39.2	41.2	110.4	116.1
ZIM	37.6	25.6	45.8	68.1	121.8
Mean	58.0	39.7	68.3	71.4	116.6
S.D.	±24.7	±17.2	±38.5	±30.2	±38.8
S.E.	± 8.7	± 6.1	±15.7	±10.7	±15.8
P Bed Rest = Base Value*		0.043*			
P Recovery = Base Value			0.26		
Ambulatory Group					
BEN	52.7	44.9	42.4	85.2	80.5
DEJ	49.0	34.8	60.0	71.0	122.4
PAC	43.8	30.9	32.8	70.5	74.9
QUE	65.3	37.2	57.3	57.0	87.7
Mean	52.7	37.0	48.1	70.9	91.4
S.D.	±9.2	±5.9	±12.8	±11.5	±21.3
S.E.	±4.6	±3.0	± 6.4	± 5.8	±10.7
P 16-17 Oct = Base Value		0.036*			
P 21-22 Oct = Base Value			0.45		
P Bed Rest = Ambulatory				0.98	
P Recovery = Ambulatory					0.27

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 79. Urine citrate excretion (mmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	104	130	128	125.0	123.1
FRE	281	263	--	93.6	--
KEE	226	419	601	185.4	265.9
KUL	208	341	485	163.9	233.2
PAR	416	736	690	176.9	165.9
SCH	425	667	375	156.9	88.2
VAN	226	428	521	189.4	230.5
ZIM	278	415	402	149.3	144.6
Mean	271	425	457	155.1	178.8
S.D.	±107	±198	±182	±32.5	±65.7
S.E.	± 38	± 70	± 69	±11.5	±24.8

P Bed Rest = Base Value* 0.006*

P Recovery = Base Value 0.020*

Ambulatory Group

BEN	287	411	702	143.2	244.6
DEJ	310	365	565	117.7	182.3
PAC	258	601	339	232.9	131.4
QUE	574	736	518	128.2	90.2
Mean	357	528	531	155.5	162.1
S.D.	±146	±172	±150	±52.7	±66.6
S.E.	± 73	± 86	± 75	±26.3	±33.3

P 16-17 Oct = Base Value 0.069

P 21-22 Oct = Base Value 0.19

P Bed Rest = Ambulatory 0.99

P Recovery = Ambulatory 0.70

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 80. Urine 17-OH corticosteroid excretion (μmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Bed-Rest Group

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
CAP	187	124	206	66.3	110.2
FRE	177	857	--	484.2	--
KEE	377	273	891	72.4	236.3
KUL	335	171	144	51.0	43.0
PAR	445	313	151	70.3	33.9
SCH	--	--	--	--	--
VAN	429	187	42	43.6	9.8
ZIM	209	47	152	22.5	72.7
Mean	308	282	264	115.8	84.3
S.D.	±116	±269	±312	±163.4	±82.1
S.E.	± 44	±102	±127	± 61.8	±33.5

P Bed Rest = Base Value* 0.83

P Recovery = Base Value 0.64

Ambulatory Group

BEN	230	100	123	43.5	53.5
DEJ	275	125	242	45.5	88.0
PAC	524	87	91	16.6	17.4
QUE	138	113	213	81.9	154.3
Mean	292	106	167	46.9	78.3
S.D.	±165	±16	±72	±26.8	±58.3
S.E.	± 82	± 8	±36	±13.4	±29.1

P 16-17 Oct = Base Value 0.13

P 21-22 Oct = Base Value 0.34

P Bed Rest = Ambulatory 0.43

P Recovery = Ambulatory 0.90

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

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Table 81. Urine epinephrine excretion (μmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	2.28	1.07	1.78	46.9	78.1
FRE	1.13	1.31	--	115.9	--
KEE	1.00	0.71	3.61	71.0	361.0
KUL	0.52	1.68	3.14	323.1	603.8
PAR	1.73	1.66	2.19	96.0	126.6
SCH	1.02	1.66	3.10	162.7	186.7
VAN	1.00	0.56	1.57	56.0	157.0
ZIM	1.14	0.28	1.51	24.6	132.5
Mean	1.23	1.12	2.41	112.0	235.1
S.D.	±0.54	±0.55	±0.85	±95.7	±185.8
S.E.	±0.19	±0.19	±0.32	±33.8	± 70.2
P Bed Rest = Base Value*		0.70			
P Recovery = Base Value			0.047*		
Ambulatory Group					
BEN	1.96	1.51	1.26	77.0	64.3
DEJ	1.07	1.22	0.98	114.0	91.6
PAC	0.99	0.79	1.02	79.8	103.0
QUE	1.65	0.48	1.57	29.1	95.2
Mean	1.42	1.00	1.21	75.0	88.5
S.D.	±0.47	±0.46	±0.27	±34.9	±16.8
S.E.	±0.23	±0.23	±0.14	±17.5	± 8.4
P 16-17 Oct = Base Value		0.23			
P 21-22 Oct = Base Value			0.29		
P Bed Rest = Ambulatory				0.48	
P Recovery = Ambulatory					0.16

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 82. Urine norepinephrine excretion (μmol/mol creatinine) for the subjects of the 1973 NASA/Ames Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	19.7	14.6	43.4	74.1	220.3
FRE	11.9	10.0	--	84.0	--
KEE	14.4	12.8	73.1	88.9	507.6
KUL	12.8	14.0	28.1	109.4	219.5
PAR	22.1	11.9	34.7	53.8	157.0
SCH	15.3	7.9	29.6	51.6	193.5
VAN	15.6	7.2	21.4	46.2	137.2
ZIM	16.3	11.8	30.1	72.4	184.7
Mean	16.0	11.3	37.2	72.6	231.4
S.D.	±3.4	±2.7	±17.2	±21.5	±125.6
S.E.	±1.2	±1.0	± 6.5	± 7.6	± 47.5
P Bed Rest = Base Value*		0.010*			
P Recovery = Base Value			0.021*		
Ambulatory Group					
BEN	12.7	17.0	29.3	133.9	230.7
DEJ	8.9	13.3	22.1	149.4	248.3
PAC	15.3	10.0	22.5	65.4	147.1
QUE	13.9	12.5	20.3	89.9	146.0
Mean	12.7	13.2	23.6	109.7	193.0
S.D.	±2.7	±2.9	±4.0	±38.8	±54.1
S.E.	±1.4	±1.4	±2.0	±19.4	±27.1
P 16-17 Oct = Base Value		0.85			
P 21-22 Oct = Base Value			0.021*		
P Bed Rest = Ambulatory				0.055	
P Recovery = Ambulatory					0.58

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 83. Urine cyclic-AMP excretion (μmol/mol creatinine) for the subjects of the 1973 NASA/Ames Female Bed-Rest Study.

Subject	23-24 Sep Day -7 Base Value	16-17 Oct Day 17 Bed Rest	21-22 Oct Day 6 Recovery	16-17 Oct / 23-24 Sep	21-22 Oct / 23-24 Sep
Bed-Rest Group					
CAP	185	139	264	75.1	142.7
FRE	135	259	--	191.9	--
KEE	159	395	335	248.4	210.7
KUL	154	164	188	106.5	122.1
PAR	274	400	228	146.0	83.2
SCH	211	266	202	126.1	95.7
VAN	189	191	320	101.1	169.3
ZIM	247	242	145	98.0	58.7
Mean	194	257	240	136.6	126.1
S.D.	±48	±98	±70	±57.6	±52.6
S.E.	±17	±35	±26	±20.4	±19.9
P Bed Rest = Base Value*		0.098			
P Recovery = Base Value			0.35		
Ambulatory Group					
BEN	96	319	180	332.3	187.5
DEJ	139	331	275	238.1	197.8
PAC	197	295	216	149.7	109.6
QUE	264	380	205	143.9	77.7
Mean	174	331	219	216.0	143.2
S.D.	±73	±36	±40	±88.7	±58.8
S.E.	±36	±18	±20	±44.4	±29.4
P 16-17 Oct = Base Value		0.013*			
P 21-22 Oct = Base Value			0.36		
P Bed Rest = Ambulatory				0.087	
P Recovery = Ambulatory					0.63

* Value of P <0.05 indicates a statistically significant difference between the two populations compared.

Table 84. Qualitative recapitulation of the changes observed in 24 urine parameters evaluated during the 1973 NASA/Ames Female Bed-Rest Study, and computed where appropriate on the basis of excretion per unit of urinary creatinine.

	Bed-Rest Group	Ambulatory Group	Bed-Rest vs Ambulatory
† Urine Volume	↓	-	-
† Urine Sp Gr	-	-	-
Urine Osm Act	↓	-	-
† Urine pH	↓	-	-
Urine Chloride	↓	-	-
Urine Sodium	↓	-	-
Urine Potassium	↓	-	*
† Urine Na/K	-	-	-
Urine Magnesium	↑	-	-
Urine Calcium	↑	-	-
Urine Phosphate	↑	-	-
Urine Total N	-	-	-
Urine Ammonia	-	-	-
Urine Urea	↓	↓	-
† Urine Creatinine	↓	-	-
Urine Creatine	-	-	-
Urine Hydroxyproline	-	-	-
Urine Glucose	↓	↓	-
Urine Citrate	↑	-	-
Urine 17-OHCS	-	-	-
Urine Epinephrine	-	-	-
Urine Norepinephrine	↓	-	-
† Urine NE/E	-	-	-
Urine Cyclic-AMP	-	↑	-

† Not recomputed on the basis of creatinine.

↓ Mean value significantly lower ($P < .05$) on day 17 of bed rest than 7 days before.

↑ Mean value significantly higher ($P < .05$) on day 17 of bed rest than 7 days before.

* Mean change on day 17 of bed rest for Bed-Rest Group significantly different ($P < .05$) from Ambulatory Group.