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**COMPARATIVE INTERNATIONAL STUDIES OF OSTEOPOROSIS USING ISOTOPE TECHNIQUES**

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# COMPARATIVE INTERNATIONAL STUDIES OF OSTEOPOROSIS USING ISOTOPE TECHNIQUES.

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## ABSTRACT

Over 200 volunteers were recruited through Newspaper advertisements and other means to measure the BMD of the Lumbar Spine and Femoral Neck of normal healthy Canadians from the Toronto Area. All these people were carefully interviewed by trained scientists or medical personnel with respect to their medical history, life style and habits. Persons with histories that will affect bone mineral status were excluded from the study. The resulting study population consisted of 162 persons.

The data was used to determine the age or the range of ages at which peak BMD is attained in this normal population. The Measurements were made using a DEXA instrument made by Hologic Inc., Model 1000W.

### 1. BACKGROUND

Osteoporosis is a major public health problem around the world especially among the western countries. It is particularly common among post-menopausal white women. Among the variables which determine low bone mass among the elderly are the age, sex, ethnicity/race and the geographical origin of the subjects.

According to the decision made at the Second CRP at San Diego, USA during 7-10 October 1996, the objective of this study is the collection of BMD data of lumbar spine and femoral neck of the study population. In this work Urban Canadian population for the Toronto area was chosen as the subjects. Both males and females were studied in the age group from 15 to over 50 years. As discussed in the previous CRP it was not practical or possible to obtain subjects through truly random sampling. The subjects were derived by a variety of means but mainly through advertisements in the Media, newspapers and hospital and university bulletin boards. All the subjects were critically interviewed and those with certain exclusion criteria were removed from the study. The exclusion criteria used included the following:

- .. Moderate or severe scoliosis (as found visually or in the DEXA scan)
- .. Known chronic illness for greater than 3 months duration
- .. Known chronic use of any medication other than dietary/vitamin supplements
- .. Previous low trauma fractures
- .. Greater than one month immobilization
- .. Over-exposure to toxic metals or irradiation

Excessive consumption of alcohol or cigarettes was not an exclusion criteria but it was noted.

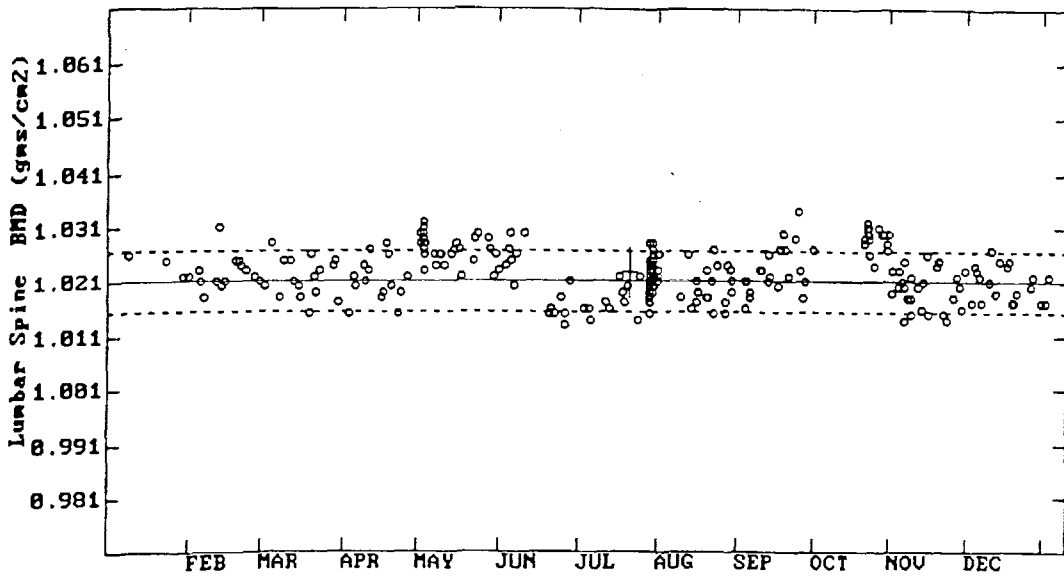
### QC/QA

Routine QC/QA procedures were followed throughout this study. The spine phantom was measured everyday and ensured that the BMD measured was within accepted limits. The ESP phantom was measured to enable cross comparison of data with other country groups in this study.

### RESULTS

The data obtained are given in the following tables and figures. For Canadian females, it appears that the peak bone mass is reached around 33.5 years of age for the lumbar spine and the femoral neck. With males the peak BMD appears at two ages for both measurements. The first peak is around 23 years and the second peak appears at around 44.7 years .

FIGURE 1. DAILY SPINE PHANTOM MEASUREMENT OVER ONE YEAR.



Reference Values	Plot Statistics
spine phantom #284	n = 261
mean = 1.0218 gms/cm <sup>2</sup>	mean = 1.0227 gms/cm <sup>2</sup>
S.D. = 0.0038 gms/cm <sup>2</sup>	S.D. = 0.0046 gms/cm <sup>2</sup>
limits = ±1.5 S.D.	cv = 0.45%

TORONTO GENERAL HOSPITAL



**TABLE 1. BMD MEASUREMENT OF ESP PHANTOM**

	16-Oct-96	
		0.953
		0.946
		0.948
		0.942
		0.948
		0.95
		0.949
		0.943
		0.947
		0.948
Mean		0.947
SD		0.003

**TABLE 2. BMD MEASUREMENT OF FEMALES**

<b><u>AGE GROUP</u></b>	<b><u>AGE</u></b>	<b><u>n</u></b>	<b><u>LS BMD</u></b>	<b><u>FN BMD</u></b>
15-19 years	17.3 (0.883)	17	1.03 (0.094)	0.888 (0.064)
20-24 years	23.3 (1.762)	3	0.96 (0.077)	0.861 (0.18)
25-29 years	27.8 (1.548)	8	1.097 (0.123)	0.894 (0.128)
30-34 years	33.5 (1.27)	7	1.136 (0.13)	0.891 (0.044)
35-39 years	37.7 (1.96)	7	1.104 (0.216)	0.861 (0.164)
40-44 years	43.6 (1.283)	19	1.022 (0.103)	0.792 (0.109)
45-49 years	47.9 (1.493)	23	1.014 (0.129)	0.785 (0.135)
50-54 years	52.9 (1.576)	12	0.997 (0.133)	0.757 (0.081)
55-59 years	57.8 (1.738)	23	0.892 (0.155)	0.706 (0.114)

**TABLE 3. BMD MEASUREMENT OF MALES**

<u>AGE GROUP</u>	<u>AGE</u>	<u>n</u>	<u>LS BMD</u>	<u>FN BMD</u>
15-19 years	17.5 (0.729)	22	0.993 (0.156)	0.978 (0.173)
20-24 years	23 (0.716)	7	1.038 (0.13)	0.995 (0.186)
25-29 years	25.3	1	0.989	0.847
35-39 years	36.8	1	0.784	0.814
40-44 years	44.7 (1.697)	2	1.147 (0.047)	0.868 (0.036)
45-49 years	46.7 (1.662)	5	1.029 (0.153)	0.782 (0.165)
50-54 years	52.6 (1.061)	2	0.996 (0.07)	0.724 (0.117)
55-59 years	58.2 (2.54)	3	0.93 (0.06)	0.748 (0.017)

FIGURE 2. VARIATION OF BMD WITH AGE IN FEMALES

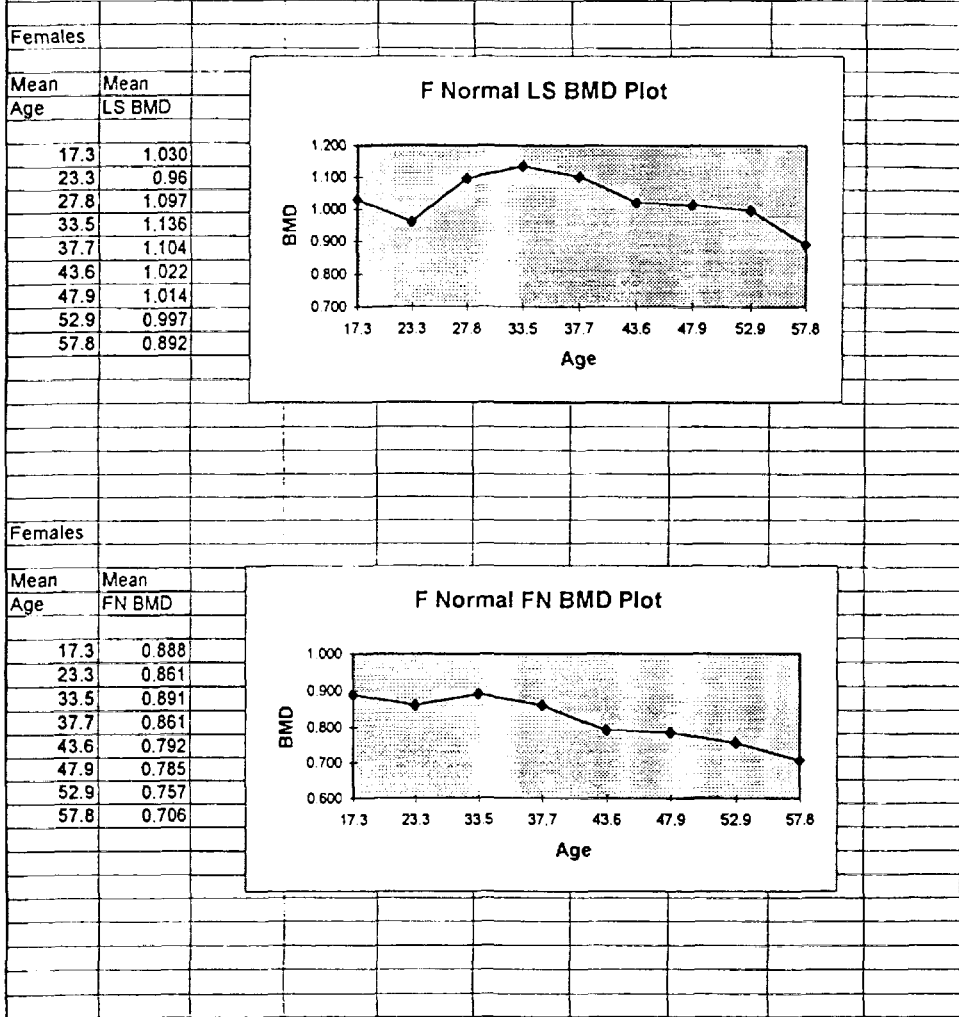
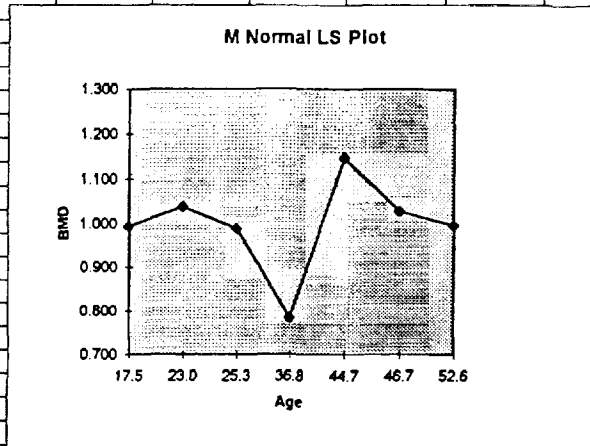




FIGURE 3. VARIATION OF BMD WITH AGE IN MALES.

Mean Age	Mean LS BMD
17.5	0.993
23.0	1.038
25.3	0.989
36.8	0.784
44.7	1.147
46.7	1.029
52.6	0.996



Mean Age	Mean FN BMD
17.5	0.978
23.0	0.995
25.3	0.847
36.8	0.814
44.7	0.868
46.7	0.782
52.6	0.724

