

A SEARCH FOR GENETIC EFFECTS OF ATOMIC BOMB RADIATION ON
THE GROWTH AND DEVELOPMENT OF THE F₁ GENERATION
原爆放射線のF₁世代への成長発育に及ぼす遺伝的影響に関する研究

5. STATURE OF 6- TO 11-YEAR-OLD ELEMENTARY SCHOOL PUPILS
IN HIROSHIMA

5. 広島6歳から11歳までの小学生の身長について

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RADIATION EFFECTS RESEARCH FOUNDATION
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In the continued interest of accurately defining the late effects of the atomic bombs, the qualitative and quantitative characteristics of the A-bomb radiation exposure doses are periodically refined. If warranted by future dose assessments, the data reported here will be reanalyzed and subsequently reported.

原爆の後影響を引き続いて正確に究明する目的をもって、原爆放射線被曝線量の質的・量的特質について定期的に改良を加えている。今後線量評価によって、その必要性が起これば、本報の資料を再解析の上、改めて報告する。

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SUMMARY

In a search for possible genetic effects of atomic bomb radiation on the stature of the offspring of A-bomb survivors, a comparative study was made on elementary school pupils 6 to 11 years of age born to exposed and nonexposed parents in Hiroshima.

The mean stature and variance for the offspring were determined, and the covariance and correlation were calculated in a comparison between either the values for one parent or the sum for both parents, and those for the offspring. Only a few of the differences in mean stature between exposed and nonexposed groups were statistically significant, but in all instances the difference tends to be larger in the exposed group than in the nonexposed group. Also, only a few of the differences in variance between the two groups were statistically significant, but the variance value of the exposed group was higher. Concerning the difference in correlation (Z transformation) between the two groups, only a very few were statistically significant, but the values of the exposed group were higher. A few of the regression coefficient of variance values were statistically significant and the signs of these regression coefficients were not always in agreement.

要 約

広島 の 原 爆 被 爆 者 及 び 非 被 爆 者 から 生 ま れ た 6 歳 から 11 歳 まで の 小 学 校 児 童 の 資 料 を 用 い て, 原 爆 放 射 線 が 被 爆 者 の 子 供 の 身 長 に 及 ぼ す 遺 伝 的 影 響 を 調 べ る た め, 比 較 検 討 を 試 み た.

被爆群と非被爆群について, 子の平均身長と分散及び片親と子又は両親と子の間の共分散と相関について比較した. 平均身長で両群間の差が統計的有意水準に達するものはごく一部であるが, いずれも被爆群の方が大きい傾向を示す. また, 分散でも両群間の差が統計的有意水準に達するものはごく一部であるが, 被爆群の方が大きい. 相関(Z変換)でも両群間の差が統計的に有意水準に達するものはごく一部にすぎないが, いずれも被爆群の方が大きい値を示す. 分散値の回帰係数で, 統計的に有意なものはごく一部であり, これらの回帰係数の符号は必ずしも一致しない.

Genetic effects of A-bomb radiation on the stature of survivors' offspring cannot be ruled out by the above-mentioned results. Since analyses of all the data for Hiroshima were completed with the present study, a comparative study was made of the growth curves of the nonexposed group and the 1+rad group with regard to the mean stature and stature variance for all students 6 to 17 years of age. Differences between the two groups were statistically significant for some ages. However, as no specific tendency is observed, it cannot be demonstrated that this is attributable to A-bomb radiation.

INTRODUCTION

The authors have already examined the stature, weight, and chest circumference of 1) senior high school students aged 15 to 17 and 2) junior high school students aged 12 to 14 in Hiroshima, some born to A-bomb survivors and some to nonexposed parents, for possible genetic effects of A-bomb radiation on their growth and development.¹⁻⁴ No statistically significant specific effects of radiation have been noted. In the present study, a similar analysis was made of the stature of elementary school pupils aged 6 to 11 belonging to the same study population.

MATERIALS AND METHODS

The methods of data collection and analysis of stature were described previously.^{1,3} Offspring were confined to those who had resided in Hiroshima City from birth to the time of the survey, excluding those of parents of consanguineous marriage, foreign nationals, twins, adopted children, and those of parents exposed in Nagasaki.

RESULTS

Mean and Variance of Offspring Stature, Parent-Offspring Covariance, and Correlation Coefficient by Parental Dose

Estimates of the mean and variance of offspring stature and of the parent-offspring covariance and correlation coefficient by age and sex of the offspring are shown for the combined parental radiation doses in Tables 1 and 2.

Because of the paucity of data for offspring born to exposed parents, they were divided into two groups and compared with those of nonexposed parents, viz, those with a parental dose of 1+rad and those with <1 rad. The results are shown in Table 3.

以上の結果から、原爆放射線が被爆者の子供の身長に及ぼす遺伝的影響を明確に結論付けることはできなかった。なお、本研究で広島資料のすべての分析が完了したので、6～17歳の平均身長及び身長分散について非被爆群及び1 rad 以上群の発育曲線の比較検討を試みた。ある年齢については両群間の差が統計的有意水準に達した。しかし、特定の傾向は観察されないため、このことが原爆放射線による影響と判定する証拠は現時点ではみられない。

緒言

著者らは、原爆放射線の成長発育に及ぼす遺伝的影響を検討するため、既に広島市の被爆群と非被爆群の子の1)15歳から17歳までの高校生、及び2)12歳から14歳までの中学生の身長、体重及び胸囲を調査したが、¹⁻⁴放射線による特定の有意な影響は統計的に認められなかった。今回は、同じ調査集団の6歳から11歳までの小学生の身長について同様の分析を試みた。

材料及び方法

資料収集及び身長解析の方法は、前回述べたものと同様である。^{1,3}対象者は出生時から調査時点まで広島市内に居住していた者に限定し、そのうち、親が近親婚の者、外国人、双生児、養子並びに親が長崎で被爆した者は除外されている。

結果

親の被曝線量別にみた子の身長の平均と分散及び親子間の共分散と相関係数

両親の相加線量別にみた子の年齢別・性別の平均身長と分散、及び親子間の共分散と相関係数の推定値を表1及び2に示す。

被爆群の資料が少ないため、ここでは、被爆群を両親の線量別に1 rad 以上群と1 rad 未満群に分けて非被爆群と比較した。その結果を表3に示す。

First, compared with the offspring of nonexposed parents, the mean stature of 11-year-old boys born to parents exposed to <1 rad was higher (5% level) by 0.83 cm, but no other statistically significant differences occurred. The variance values for 6- and 7-year-old boys and 6-, 9-, 10-, and 11-year-old girls born to exposed parents were higher, and this difference is significant at the 1% level. No other statistically significant differences were noted. Parent-offspring covariance and correlation changed, according to the father-mother correlation, as described previously.¹ Father-mother correlation of stature in the present data was $r_{FM} = 0.096-0.169$ (average 0.126) in the offspring of nonexposed parents, and $r_{FM} = 0.188-0.283$ (average 0.234) in the offspring of parents exposed to <1 rad, the averages all being statistically significant at the 1% level. The correlation values for 6- and 8-year-old boys born to exposed parents are lower, the differences both being statistically significant at the 5% level. No other differences were statistically significant. The correlation value (Z transformation) for 8-year-old boys born to exposed parents was lower, the difference being statistically significant at the 5% level. No other differences were statistically significant.

Next, compared with the offspring of nonexposed parents, the mean stature of 8-year-old girls born to parents exposed to 1+rad was higher by 0.94 cm (1% level), but no other statistically significant differences occurred. The variance values of 6-, 7-, 8-, 10-, and 11-year-old boys and 6- and 9-year-old girls were larger in the offspring of exposed parents, the differences all being significant at the 1% level. No other differences in variance values were statistically significant. Father-mother correlation was $r_{FM} = 0.113-0.273$ (average 0.166) and statistically significant at the 1% level. No differences of covariance values and correlation values were statistically significant, but the correlation values (Z transformations) of offspring of exposed parents tended to be smaller than those of nonexposed parents.

Two weighted regression analyses were made for the combined parental doses by age and sex of the offspring, one using 0 rad as the dose for the nonexposed group and the other excluding all those of nonexposed parents. Further, because the RERF dose estimates of <1 rad for distally

まず、非被爆群と1 rad 未満群を比較すると、11歳男の平均身長で被爆群の方が0.83cm高いが(5%水準)、そのほかには統計的に有意な差はみられず、分散では男6歳、7歳及び女6歳、9歳、10歳、11歳でいずれも被爆群の方が大きく、1%水準で有意である。その他は統計的有意差はみられない。親子間の共分散及び相関係数は、前報告書¹に記したように、父母間の相関によって変動する。本資料の父母間の身長相関は、非被爆群で $r_{FM} = 0.096 \sim 0.169$ (平均0.126)、1 rad 未満群で $r_{FM} = 0.188 \sim 0.283$ (平均0.234)で、いずれもその平均は1%水準で統計的に有意である。男6歳、8歳いずれも5%水準でその差は統計的に有意であるが、いずれも被爆群の方が小さい。その他の差はいずれも統計的に有意ではない。相関(Z変換)は男8歳でその差は5%水準で統計的に有意であり、被爆群の方が小さい。その他は、いずれもその差は統計的に有意ではない。

次に、非被爆群と1 rad 以上群を比較すると、女8歳の平均身長は被爆群の方が0.94cm高いが(1%水準)、その他はいずれもその差は統計的に有意ではない。分散では、男6歳、7歳、8歳、10歳、11歳及び女6歳、9歳でその差はいずれも被爆群の方が高く、いずれも1%水準で有意である。その他の分散については、統計的有意差はみられない。父母間の相関は $r_{FM} = 0.113 \sim 0.273$ (平均0.166)で、1%水準で統計的に有意である。共分散及び相関とも、その差が統計的に有意なものはみられないが、相関(Z変換)は、被爆群の方が非被爆群に比べ数字の上からは小さい傾向を示す。

子の年齢別、性別に両親の相加線量による加重回帰分析を二つの方法で行った。一つは、非被爆群の被曝線量を0 radとした場合で、もう一つは、非被爆群をすべて除外した場合である。更に、1 rad 未満の遠距離被爆者に対する放影研の線量推定値は0 radと

formations of correlation coefficients of mother to both 7- and 9-year-old boys were significantly different (both being at the 1% level). And when adjusted for the correlation between parents, the correlation values of mother to both 7- and 9-year-old boys were significantly different. The correlation values of mother to 6-year-old girls, and these values when adjusted for the correlation between parents both showed significant differences at the 1% level. With regard to these cases, the correlation values were larger in the exposed group than in the nonexposed.

In a comparison between the 1+rad group and the nonexposed group, the mean stature differences were not statistically significant in boys or girls of any age. The differences between variance values were statistically significant for 6-, 8-, 9-, 10-, and 11-year-old boys, and also for 6- and 8-year-old girls at the 5% level, the variance values being larger in the 1+rad group than in the nonexposed group. Z transformations of correlation coefficients of mother to both 7- and 9-year-old boys were significantly different (both being at the 1% level), and when adjusted for the correlation between parents, the correlation values of mother to both 7- and 9-year-old boys were significantly different (both being at the 5% level). For girls, there were no statistically significant differences.

Exposed Mother Only

In a comparison between the <1 rad group and the nonexposed group, the difference between the mean stature values was statistically significant at the 5% level for 11-year-old boys, but was not significant in boys of other ages. The differences between variance values were statistically significant for 6- and 7-year-old boys (all being at the 5% level) and for 9-, 10-, and 11-year-old girls (all being at the 5% level). These values were larger in the <1 rad group than in the nonexposed group. The differences between Z transformations of correlation coefficients for mothers were statistically significant, with and without adjustment for the correlation between parents, for 7- (5% level) and 9- (1% level) year-old boys. In a comparison between the 1+rad group and the nonexposed group, the mean stature value for 8-year-old girls was statistically significant at the 5% level, and the mean stature of the 1+rad group was higher than that of the nonexposed by 0.92 cm.

係数のZ変換による差は、男7歳(1%水準)、9歳(1%水準)の母-息子、父母間の相関で補正した場合でも、7歳、9歳の母-息子の間は統計的に有意である。女では6歳の母-娘間の相関及び父母間の相関で補正した母-娘間の相関ともに1%水準で統計的に有意である。これらはいずれも非被爆群の相関に比べ被爆群の方が大きい。

1 rad 以上群と非被爆群の比較でも、平均身長は、男女ともいずれの年齢でもその差は統計的に有意ではない。分散についてみると、男6歳、8歳、9歳、10歳、11歳及び女6歳、8歳で、いずれもその差は5%水準で統計的に有意で、いずれも1 rad 以上群の分散が非被爆群のそれに比べて大きい。相関係数のZ変換による差は、男7歳、9歳(いずれも1%水準)の母-息子、父母間の相関で補正した相関の差は7歳、9歳(いずれも5%水準)の母-息子で統計的に有意である。女の場合は、いずれも統計的に有意な差は見られない。

母のみ被爆

1 rad 未満群と非被爆群の比較で、平均身長は男11歳で5%水準で統計的に有意であるが、その他の年齢の男ではすべて、その差は統計的に有意でない。分散は、男6歳、7歳(いずれも5%水準)及び女9歳、10歳、11歳(いずれも5%水準)でその差は統計的に有意で、いずれも1 rad 未満群の方が非被爆群に比べて大きい。相関係数のZ変換による差は、男7歳母-息子(5%水準)、9歳母-息子(1%水準)で、父母間の相関で補正しない場合、補正した場合ともに統計的に有意である。1 rad 以上群と非被爆群の比較で、平均身長は女8歳で5%水準で統計的に有意で、1 rad 以上群の方が非被爆群に比べ

None of the differences in those of other ages were statistically significant. The differences between variance values were statistically significant for 6-, 7-, 8-, and 10-year-old boys and for 6-, 9-, and 10-year-old girls (all being at the 5% level), and the values were larger in the 1+rad group than in the nonexposed group. The differences between Z transformations of correlation coefficients for father and mother to 7-year-old boys, and mother to 10-year-old boys (all being at the 5% level) and, when adjusted for the correlation between parents, mother to 7-year-old boys were statistically significant (5% level). Although these values of correlation coefficients for father to 7-year-old boys, without adjustments for the correlation between parents, were smaller in the 1+rad group, but those of the other cases were larger in the 1+rad group.

Weighted regression analyses by sex and age of offspring were made, where one parent was exposed and the other not (i.e., father exposed \times mother not exposed, or vice versa). Two analyses were made, one using and the other excluding the 0 rad dose component of the both-parents-not-exposed group. The results are shown in Tables 11-14.

Exposed Father \times Nonexposed Mother

When the both-parents-not-exposed group was used, the regression coefficients of mean stature were not significantly different from zero in both boys and girls of all ages. The regression coefficients of variance for 9- and 11-year-old boys were significantly different from zero at the 5% level, and had plus signs. No other differences were statistically significant. The regression coefficients of correlation (Z transformations) were significantly different from zero for father correlated to 6-year-old boys (1% level) and 7-year-old boys (5% level), and when adjusted for the correlation between parents, father correlated to 6-year-old boys (1% level), and 6-year-old girls (5% level). However, the signs of the regression coefficients presented no specific tendency. When the both-parents-not-exposed group was excluded, differences between the regression coefficients of mean stature values were statistically significant for 10-year-old girls (5% level) and 11-year-old girls (1% level), but not for those of other ages. The signs of regression coefficients presented no specific tendency. No differences

0.92cm高い。その他の年齢ではすべてその差は統計的に有意ではない。分散についてみると、男6歳、7歳、8歳、10歳、及び女6歳、9歳、10歳（いずれも5%水準）でその差は統計的に有意で、いずれも1 rad以上群の方が非被爆群に比べ大きい。相関係数のZ変換による差は、男7歳父-息子、母-息子、10歳母-息子（いずれも5%水準）、父母間の相関で補正した場合男7歳母-息子（5%水準）で統計的に有意で、これらの相関係数は7歳父-息子（父母間の相関で補正しない）では1 rad以上群の方が小さいがその他は逆である。

子の年齢別、性別に、片親被爆（父被爆 \times 母非被爆及びその逆）の場合の加重回帰分析を試みた。分析は、両親非被爆群の0 rad被曝線量を用いた場合と除外した場合の二通りの方法で行った。結果を表11-14に示す。

父被爆 \times 母非被爆

まず、両親非被爆群を用いた場合、子の平均身長の間接回帰係数は男女ともいずれの年齢においても0との差は統計的に有意ではない。分散の間接回帰は、男9歳、11歳で0との差は5%水準で有意で、いずれも正の符号をもつ。その他はすべて統計的に有意ではない。相関(Z変換)の間接回帰係数は、男6歳父-息子(1%水準)、7歳父-息子(5%水準)、父母間の相関で補正した場合、男6歳父-息子(1%水準)、女6歳父-娘(5%水準)で、0との差は統計的に有意であるが、間接回帰係数の符号は特定の傾向を示さない。次に両親非被爆群を除いた場合、子の平均身長の間接回帰係数は、女10歳(5%水準)、11歳(1%水準)で0との差は統計的に有意であるが、その他の年齢ではすべて統計的に有意差はみられない。また、間接回帰

of regression coefficients of variance from zero were statistically significant, and the signs presented no specific tendency. The regression coefficients of correlation (Z transformations) were statistically significant between father and 6-year-old boys as well as between mother and 9-year-old boys (both being at the 5% level), and, when adjusted for the correlation between parents, between father and 6-year-old boys (1% level) and father and 6-year-old girls (5% level), but no other differences were statistically significant.

Nonexposed Father × Exposed Mother

When the both-parents-not-exposed group was used, the regression coefficients of mean stature were not significantly different from zero in both boys and girls of all ages, and presented no specific tendency for coefficient signs. The regression coefficients of variance for 8-year-old boys and 7-year-old girls (both being at the 5% level) were significantly different from zero and had plus signs. However, no other differences were statistically significant, and no specific tendency was presented for coefficient signs. The regression coefficients of correlation (Z transformations) between mother and 6-year-old boys (5% level), father and 7-year-old boys (5% level), mother and 7-year-old boys (1% level), mother and 6-year-old girls (5% level), and between father and 7-year-old girls (1% level) were significantly different from zero, but the coefficient signs did not always present a specific tendency. When adjusted for the correlation between parents, the differences from zero were statistically significant at the 5% level for comparisons between mother and 6-year-old boys, father and 7-year-old boys, mother and 6-year-old girls, and father and 7-year-old girls. But the signs presented no specific tendency in this case either. When the both-parents-not-exposed group was excluded, the regression coefficients of mean stature were significantly different from zero for 7-year-old boys (5% level) and the coefficient had a minus sign. Thus no specific tendency was presented. The regression coefficients of variance for 7-year-old girls were significantly different from zero at the 1% level and with a plus sign. The regression coefficients of correlation (Z transformations) between father and 7-year-old boys, mother and 7-year-old boys (both being at the 5% level), as well as father and both 7- and 8-year-old girls (both being at the 1% level) were significantly

係数の符号は特定の傾向を示さない。分散の回帰係数は、いずれも0との差は統計的に有意でなく、符号も特定の傾向を示さない。相関(Z変換)の回帰係数は、男6歳父-息子、9歳母-息子(いずれも5%水準)、父母間の相関で補正した場合、男6歳父-息子(1%水準)、及び女6歳父-娘(5%水準)で統計的に有意であるが、その他はすべて統計的に有意差はみられない。

父非被爆×母被爆

両親非被爆群を用いた場合、子の平均身長の高帰係数は、男女ともいずれの年齢においても0との差は統計的に有意でなく、回帰係数の符号も特定の傾向を示さない。分散の高帰係数については、男8歳及び女7歳(いずれも5%水準)で0との差は統計的に有意でいずれも正の符号をもつ。しかし、その他はすべて統計的に有意ではなく、係数の符号も特定の傾向を示さない。相関(Z変換)の高帰係数は、男6歳母-息子(5%水準)、7歳父-息子(5%水準)、7歳母-息子(1%水準)及び女6歳母-娘(5%水準)、7歳父-娘(1%水準)で0との差は統計的に有意であるが、必ずしも係数の符号は特定の傾向を示さない。父母間の相関で補正した場合、男6歳母-息子、7歳父-息子及び女6歳母-娘、7歳父-娘(いずれも5%水準)で0との差は統計的に有意であるが、この場合も符号は必ずしも特定の傾向を示すとはいえない。次に両親非被爆群を除外した場合、平均身長の高帰係数は、男7歳で0との差は5%水準で統計的に有意で係数の符号は負である。したがって特定の傾向は認められない。分散の高帰係数については、女7歳で0との差は1%水準で統計的に有意であり、正の符号をもつ。相関(Z変換)の高帰係数は、男7歳父-息子及び7歳母-息子(いずれも5%水準)及び女7歳、8歳の父-娘(いずれも1%水準)で0との差は統計的に有意であるが、符号

different from zero. However, the signs were not in agreement. No other differences were statistically significant. When adjusted for the correlation between parents, the differences from zero were statistically significant for comparisons of father and 10-year-old boys (1% level), father and 7-year-old girls (5% level), and father and 8-year-old girls (1% level). But the signs were not all in agreement. No other differences were statistically significant.

DISCUSSION

The data analyzed here were obtained from measurements on Hiroshima City elementary school pupils aged 6-11. Reports have already been completed on possible genetic effects of A-bomb radiation on the stature of senior high school students aged 15-17, and junior high school students aged 12-14 (all in Hiroshima City), but no specific, statistically significant tendency was noted.^{1,3} The heritability of stature as reported by Furusho^{5,6} is $h^2 = 0.66-0.85$, indicating a markedly high heritability of a quantifiable human characteristics. Furthermore, all studies since the report by Galton in 1886 have shown a high correlation between the stature of parents and the attained stature of their offspring, which suggests that genotype contributes largely to stature. In consideration of this, stature was studied in order to estimate the genetic effects of A-bomb radiation on polygenes.

To detect the genetic effects of A-bomb radiation on the growth and development of the F_1 generation, it is necessary to study the following:

- 1) Comparison of mean stature: The results of comparison of stature between the offspring of exposed parents and the offspring of nonexposed parents are influenced by the presence or absence of dominant genes in the genic system governing stature. However, it is believed that the polygenic system governing stature probably has an additive gene action with hardly any dominant effect.^{1,5-9}
- 2) Comparison of variance and correlation between parent and offspring: If all the polygenes governing stature have additive gene actions, it is expected that the variance of stature would be larger in the exposed group than in the nonexposed, while correlation between parent and offspring would be smaller in the exposed group.¹⁰

は一致しない。その他はすべて統計的に有意ではない。父母間の相関で補正した場合、男10歳父-息子(1%水準)及び女7歳父-娘(5%水準)、8歳父-娘(1%水準)で0との差は統計的に有意であるが、符号は必ずしも一致しない。その他はすべて統計的に有意差はみられない。

考 察

ここで分析した資料は、6歳から11歳の広島市の小学校児童から入手したものである。既に広島市の15歳から17歳までの高校生、及び12歳から14歳までの中学生を対象に、原爆放射線が身長に及ぼす遺伝的影響について報告したが、いずれも統計的に有意な特定の傾向はみられなかった。^{1,3} Furusho^{5,6}の報告した身長の遺伝力は $h^2 = 0.66 \sim 0.85$ で、ヒトの量的形質の遺伝力は著しく高い。また、1886年のGaltonの報告以来、あらゆる研究において、親の身長とその子の発育完了時の身長との間に高い相関が示されており、身長に遺伝子座の寄与が大きいことを示唆している。この点を考慮して、原爆放射線がポリジーンに及ぼす遺伝的影響を推定するために、身長を研究対象とした。

原爆放射線が F_1 世代の成長・発育に及ぼす遺伝的影響を検出するには、次の点に関する研究が必要である。

- 1) 平均身長の比較: 身長を支配する遺伝子系に優性遺伝子が存在するかどうかによって、被爆群と非被爆群の子の身長の比較結果が左右される。しかし、身長を支配するポリジーン系は、ほとんど優性効果のない相加的作用をすると考えられている。^{1,5-9}
- 2) 分散及び親子相関の比較: 身長を支配するポリジーンがすべて相加的作用をすれば、非被爆群の子に比べ被爆群の子の身長分散は大きく、親子相関は小さくなることが期待される。¹⁰

As mentioned above, the results of the present study showed some differences of mean stature, variance, covariance between parent and offspring, and correlation between the two groups, but no specific tendency was observed for age, sex, or signs of coefficients. Thus, no compelling evidence of genetic effects ascribable to A-bomb radiation has emerged. The cause for this is that quantitative characteristics, including stature are greatly influenced by the environment. The increase in stature among the Japanese has been especially remarkable since the war.⁹ This is considered to be attributable to the rich food intake of the Japanese and remarkable improvements in other environmental conditions during this period. However, the subjects of the present study have experienced the postwar period of food shortages and aggravating environmental conditions. It is thought that since the effects of these adverse conditions had been much stronger than those of A-bomb radiation, genetic effects of A-bomb radiation on stature could not be demonstrated. This assumption is also based upon a number of studies made of the genetic effects of radiation using experimental animals.¹¹

With the present study, analyses of data on the stature of Hiroshima students aged 6-17 have been completed. Figure 1 shows comparisons of mean stature between the nonexposed group and the 1+rad group by sex and age, using data on the stature of students aged 6-17 which have thus far been studied and analyzed separately for the three age-groups: 15-17, 12-14, and 6-11.

As shown in Figure 1, no tendency demonstrating a great difference in mean stature between the nonexposed group and the 1+rad group could be observed and the growth and development patterns of the two groups were the same for both sexes. On the other hand, the tendency of the variance ratio of the two groups did not show any obvious difference. Thus, a statistical study was made on the tendencies of mean stature and variance for those aged 6 to 17, but no genetic effects of A-bomb radiation could be demonstrated.

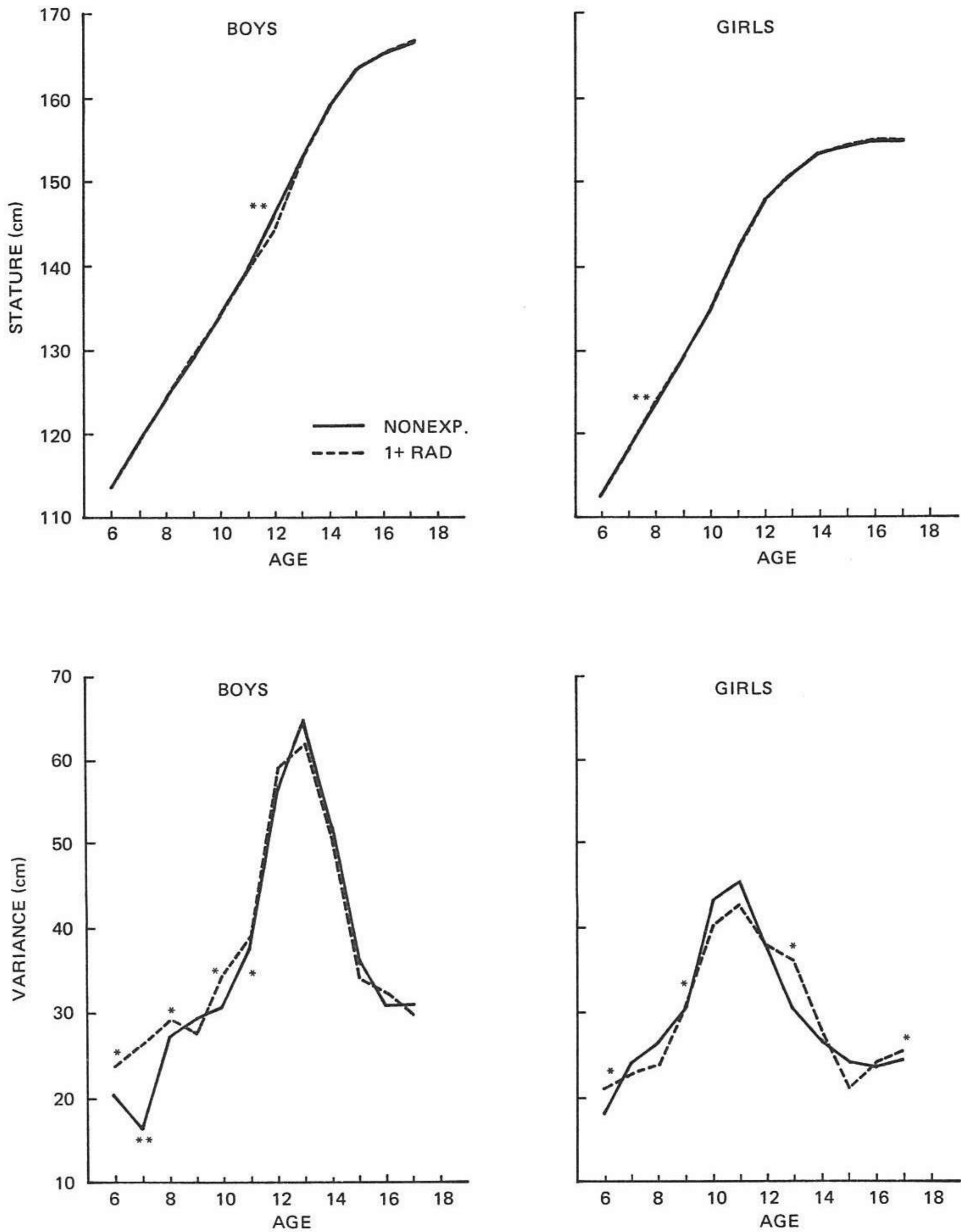
本研究では既に述べたように、身長平均、分散及び親子間の共分散、相関で両群間に差がみられるものもあるが、年齢や性あるいは係数の符号に特定の傾向があるとは言えず、原爆放射線による遺伝的影響を決定付ける証拠は見いだせなかった。この原因として、身長のような量的形質は環境の影響が著しいことがあげられる。特に戦後の日本人の身長増加は著しい。⁹ このことは戦後、日本人の食生活が豊かになり、その他の環境条件も著しく改善された結果と考えられる。しかし、本研究資料の対象者は程度の差こそあれ、戦後の食糧不足、環境の悪条件を経験している。このような発育環境の悪条件による効果が、原爆放射線の効果より著しく強く作用しているため、原爆放射線が身長に及ぼす遺伝的影響を検出できなかったものと推定される。このことは、多くの実験動物による放射線の遺伝的影響に関する研究¹¹からも十分考えられる。

なお、本研究で広島6～17歳までの身長に関する資料分析が完了したが、今まで15～17歳、12～14歳、6～11歳とそれぞれ別個に分析し検討を試みたが、ここで今までの報告をも含めて6～17歳の身長資料を用い、性別、年齢別に、非被爆群と1 rad以上群の平均身長とを比較すると図1のようになる。

図1に示すように、非被爆群と1 rad以上群の平均身長には大きな差異を示す傾向は認められず、両群間の成長・発育パターンも男女とも同じであった。一方、この両群間の分散比の傾向にも明確な差は全く認められなかった。このように、6歳から17歳までの身長の平均及び分散の傾向を統計学的に検討したが、原爆放射線の遺伝的影響を立証することはできなかった。

FIGURE 1 COMPARISON BY SEX AND AGE OF OFFSPRING MEAN STATURES AND VARIANCES BETWEEN NONEXPOSED AND 1+ RAD EXPOSED PARENTS

図1 非被爆両親の子と1 rad 以上被爆両親の子における平均身長及び分散の性・年齢別比較



Significant levels: 有意水準: * P<0.05 and ** P<0.01 .

TABLE 1-1 MEAN, VARIANCE, COVARIANCE AND CORRELATION COEFFICIENT BY PARENTAL RADIATION DOSE (FATHER + MOTHER)

表 1 - 1 平均值, 分散, 共分散及び相関係数, 親の放射線量(父親+母親)別

BOYS									
ITEM	NON EXPOSED	RADIATION DOSE IN RAD							
		< 1	1-9	10-19	20-39	40-99	100-199	200+	1 +
BOYS AGED 6 YEARS									
NO. OF OFFSPRING	873	333	142	42	28	17	14	9	252
MEAN DOSE: M(D)	0.00	0.00	3.46	14.26	26.25	59.88	126.57	421.67	33.37
MEAN : M(O)	113.72	114.03	112.90	114.31	115.41	116.02	111.70	112.58	113.55
VARIANCE : V(O)	20.18	29.19	23.37	18.34	19.75	23.64	36.48	22.99	23.73
COVARIANCE: W(F+M, O)	14.11	11.86	17.26	7.63	15.95	9.08	50.78	1.45	16.58
CORRELA. : R(F+M, O)	0.374	0.258	0.396	0.243	0.352	0.212	0.809	0.027	0.375
R*(F+M, O)	0.333	0.217	0.341	0.235	0.223	0.146	0.671	0.015	0.306
BOYS AGED 7 YEARS									
NO. OF OFFSPRING	934	362	147	45	22	22	14	11	261
MEAN DOSE: M(D)	0.00	0.00	3.67	14.38	27.73	58.64	148.00	419.18	37.43
MEAN : M(O)	118.79	118.55	119.07	118.01	119.28	120.93	117.90	118.59	118.98
VARIANCE : V(O)	22.63	23.38	22.45	29.11	45.88	37.28	14.23	12.52	26.01
COVARIANCE: W(F+M, O)	15.90	17.84	15.27	18.32	25.21	14.76	21.24	20.32	17.36
CORRELA. : R(F+M, O)	0.385	0.412	0.363	0.394	0.499	0.387	0.674	0.625	0.400
R*(F+M, O)	0.347	0.336	0.322	0.348	0.438	0.361	0.671	0.397	0.351
BOYS AGED 8 YEARS									
NO. OF OFFSPRING	890	356	130	37	18	21	13	22	241
MEAN DOSE: M(D)	0.00	0.00	3.95	14.46	25.78	68.38	134.69	484.82	63.76
MEAN : M(O)	124.18	124.32	123.98	125.92	125.91	124.36	124.83	122.62	124.37
VARIANCE : V(O)	27.17	24.49	28.93	28.82	23.46	24.40	41.84	29.29	29.15
COVARIANCE: W(F+M, O)	17.75	11.64	17.45	27.15	4.12	25.81	26.44	7.97	18.73
CORRELA. : R(F+M, O)	0.400	0.274	0.374	0.625	0.115	0.567	0.325	0.205	0.402
R*(F+M, O)	0.365	0.224	0.318	0.594	0.091	0.437	0.289	0.190	0.350
BOYS AGED 9 YEARS									
NO. OF OFFSPRING	919	351	135	43	21	27	20	15	261
MEAN DOSE: M(D)	0.00	0.00	3.55	14.28	26.43	63.52	135.15	387.20	45.49
MEAN : M(O)	129.16	129.48	129.47	129.92	129.61	128.48	129.70	130.89	129.55
VARIANCE : V(O)	29.43	27.15	30.83	22.31	31.00	26.40	18.26	26.24	27.52
COVARIANCE: W(F+M, O)	17.36	19.61	14.94	1.41	32.63	3.78	19.02	29.93	13.99
CORRELA. : R(F+M, O)	0.368	0.420	0.322	0.045	0.592	0.097	0.513	0.561	0.323
R*(F+M, O)	0.330	0.332	0.311	0.042	0.459	0.086	0.391	0.416	0.290
BOYS AGED 10 YEARS									
NO. OF OFFSPRING	894	374	152	48	31	34	24	21	310
MEAN DOSE: M(D)	0.00	0.00	3.68	15.13	27.97	64.03	138.12	496.52	58.29
MEAN : M(O)	134.06	134.20	134.31	132.84	133.89	135.03	133.51	135.84	134.16
VARIANCE : V(O)	30.74	28.86	31.26	38.10	42.47	37.00	27.40	35.59	34.08
COVARIANCE: W(F+M, O)	18.58	20.00	20.91	23.25	39.19	31.24	8.71	19.06	22.50
CORRELA. : R(F+M, O)	0.374	0.413	0.455	0.402	0.619	0.564	0.190	0.379	0.443
R*(F+M, O)	0.334	0.322	0.443	0.298	0.475	0.523	0.149	0.351	0.390
BOYS AGED 11 YEARS									
NO. OF OFFSPRING	982	382	145	54	32	30	18	16	295
MEAN DOSE: M(D)	0.00	0.00	3.85	14.54	29.13	63.70	140.67	430.56	46.13
MEAN : M(O)	139.28	140.11	138.62	139.97	139.65	139.53	139.45	140.93	139.25
VARIANCE : V(O)	38.11	37.17	41.34	31.44	29.44	42.56	34.11	76.04	39.54
COVARIANCE: W(F+M, O)	20.83	16.80	16.60	14.37	14.06	1.98	7.03	56.41	16.00
CORRELA. : R(F+M, O)	0.396	0.315	0.276	0.303	0.303	0.041	0.160	0.607	0.286
R*(F+M, O)	0.354	0.255	0.252	0.240	0.235	0.034	0.126	0.354	0.256

TABLE 1-2 MEAN, VARIANCE, COVARIANCE AND CORRELATION COEFFICIENT BY PARENTAL RADIATION DOSE (FATHER + MOTHER)
 表 1-2 平均值, 分散, 共分散及び相関係数, 親の放射線量(父親+母親)別

GIRLS									
ITEM	NON EXPOSED	RADIATION DOSE IN RAD							
		< 1	1-9	10-19	20-39	40-99	100-199	200+	1 +
GIRLS AGED 6 YEARS									
NO. OF OFFSPRING	904	318	132	46	21	21	11	20	251
MEAN DOSE: M(D)	0.00	0.00	3.59	13.70	27.24	65.95	137.36	521.55	59.77
MEAN : M(O)	112.56	112.73	112.82	113.78	113.41	110.56	112.62	112.27	112.80
VARIANCE : V(O)	18.25	18.62	22.96	18.69	18.86	18.83	8.93	21.62	21.07
COVARIANCE: W(F+M, O)	12.60	11.99	12.87	12.75	19.51	13.24	16.17	14.69	13.83
CORRELA. : R(F+M, O)	0.353	0.349	0.309	0.451	0.693	0.319	0.731	0.390	0.370
R*(F+M, O)	0.315	0.294	0.253	0.402	0.627	0.278	0.682	0.299	0.317
GIRLS AGED 7 YEARS									
NO. OF OFFSPRING	948	317	148	33	23	22	15	10	251
MEAN DOSE: M(D)	0.00	0.00	3.73	13.76	27.61	68.68	140.60	1157.00	67.06
MEAN : M(O)	118.05	117.91	118.04	117.54	117.49	117.04	117.71	119.64	117.88
VARIANCE : V(O)	23.99	22.07	20.61	17.14	36.90	19.54	39.28	43.04	23.18
COVARIANCE: W(F+M, O)	13.76	13.10	16.43	10.11	37.07	6.60	22.12	6.42	16.10
CORRELA. : R(F+M, O)	0.335	0.318	0.394	0.301	0.539	0.215	0.370	0.129	0.370
R*(F+M, O)	0.287	0.256	0.322	0.300	0.363	0.212	0.272	0.125	0.308
GIRLS AGED 8 YEARS									
NO. OF OFFSPRING	952	328	142	38	26	27	16	19	268
MEAN DOSE: M(D)	0.00	0.00	3.90	14.37	26.88	62.93	140.06	538.11	59.56
MEAN : M(O)	123.07	123.43	123.81	123.44	124.75	124.91	123.67	124.66	124.01
VARIANCE : V(O)	26.55	25.99	24.74	20.43	20.51	34.17	25.54	21.18	24.25
COVARIANCE: W(F+M, O)	16.71	15.88	8.87	10.26	17.60	20.10	26.97	9.27	12.47
CORRELA. : R(F+M, O)	0.371	0.371	0.212	0.221	0.339	0.449	0.474	0.247	0.275
R*(F+M, O)	0.326	0.303	0.196	0.194	0.239	0.424	0.313	0.227	0.237
GIRLS AGED 9 YEARS									
NO. OF OFFSPRING	934	329	133	35	26	32	15	14	255
MEAN DOSE: M(D)	0.00	0.00	3.80	14.03	29.69	66.84	148.87	555.00	54.55
MEAN : M(O)	128.72	128.82	128.89	130.60	127.00	131.00	129.35	130.14	129.29
VARIANCE : V(O)	30.93	40.31	33.89	23.36	26.27	34.79	44.85	18.85	32.27
COVARIANCE: W(F+M, O)	17.79	19.84	15.84	16.54	5.24	11.22	32.35	8.79	15.42
CORRELA. : R(F+M, O)	0.387	0.358	0.335	0.398	0.142	0.170	0.605	0.224	0.316
R*(F+M, O)	0.346	0.287	0.292	0.339	0.121	0.129	0.429	0.169	0.270
GIRLS AGED 10 YEARS									
NO. OF OFFSPRING	823	332	133	36	30	29	19	19	266
MEAN DOSE: M(D)	0.00	0.00	3.48	14.83	27.27	66.34	134.95	484.16	58.28
MEAN : M(O)	134.46	134.61	133.97	133.91	135.62	134.76	136.18	135.63	134.51
VARIANCE : V(O)	43.63	47.31	38.72	46.67	47.96	41.60	44.51	29.03	40.72
COVARIANCE: W(F+M, O)	17.40	17.95	19.57	-4.72	11.57	29.82	12.64	10.80	15.20
CORRELA. : R(F+M, O)	0.315	0.276	0.362	-0.092	0.175	0.620	0.219	0.225	0.280
R*(F+M, O)	0.283	0.221	0.300	-0.088	0.166	0.470	0.202	0.199	0.246
GIRLS AGED 11 YEARS									
NO. OF OFFSPRING	988	368	161	45	20	35	21	15	297
MEAN DOSE: M(D)	0.00	0.00	3.47	14.11	27.55	65.00	136.90	455.47	46.22
MEAN : M(O)	141.39	141.73	140.32	143.34	138.73	142.63	141.99	141.72	141.13
VARIANCE : V(O)	45.64	47.79	39.34	43.86	49.69	52.64	36.12	34.39	42.90
COVARIANCE: W(F+M, O)	17.36	17.29	14.55	10.91	14.33	17.21	20.53	5.32	15.00
CORRELA. : R(F+M, O)	0.298	0.288	0.280	0.132	0.244	0.324	0.441	0.119	0.257
R*(F+M, O)	0.256	0.236	0.227	0.097	0.161	0.267	0.384	0.115	0.202

TABLE 2-1 COVARIANCE AND CORRELATION COEFFICIENT OF STATURE BETWEEN PARENTS AND OFFSPRING CORRECTED FOR CORRELATION BETWEEN PARENTS

表 2-1 両親の相関で補正した親子間の身長共分散及び相関係数

BOYS									
ITEM	NON EXPOSED	RADIATION DOSE IN RAD							
		< 1	1-9	10-19	20-39	40-99	100-199	200+	1 +
BOYS AGED 6 YEARS									
VARIANCE : V(F+M)	70.37	72.44	81.42	53.73	103.99	77.82	108.07	126.50	82.23
COVARIANCE:W(F+M,O)	14.11	11.86	17.26	7.63	15.95	9.08	50.78	1.45	16.58
COEFFICI* :R(FM)	0.1242	0.1861	0.1614	0.0328	0.5758	0.4486	0.2059	0.8061	0.2278
W*	12.55	10.00	14.86	7.39	10.12	6.27	42.11	0.80	13.51
W**	11.16	8.43	12.80	7.15	6.42	4.33	34.92	0.44	11.00
MEAN:(W**+W**)/2	11.85	9.21	13.83	7.27	8.27	5.30	38.51	0.62	12.25
BOYS AGED 7 YEARS									
VARIANCE : V(F+M)	75.24	80.12	78.67	74.39	55.73	39.06	69.86	84.37	72.26
COVARIANCE:W(F+M,O)	15.90	17.84	15.27	18.32	25.21	14.76	21.24	20.32	17.36
COEFFICI* :R(FM)	0.1115	0.2248	0.1298	0.1313	0.1388	0.0703	0.0038	0.5760	0.1395
W*	14.30	14.56	13.52	16.19	22.14	13.79	21.16	12.89	15.23
W**	12.87	11.89	11.96	14.31	19.44	12.89	21.08	8.18	13.37
MEAN:(W**+W**)/2	13.59	13.23	12.74	15.25	20.79	13.34	21.12	10.54	14.30
BOYS AGED 8 YEARS									
VARIANCE : V(F+M)	72.42	73.91	75.10	65.56	55.03	84.99	158.44	51.37	74.37
COVARIANCE:W(F+M,O)	17.75	11.64	17.45	27.15	4.12	25.81	26.44	7.97	18.73
COEFFICI* :R(FM)	0.0956	0.2224	0.1783	0.0521	0.2569	0.2971	0.1221	-0.0829	0.1495
W*	16.20	9.52	14.81	25.81	3.28	19.90	23.56	7.36	16.30
W**	14.79	7.79	12.57	24.53	2.61	15.34	21.00	6.79	14.18
MEAN:(W**+W**)/2	15.49	8.66	13.69	25.17	2.95	17.62	22.28	7.07	15.24
BOYS AGED 9 YEARS									
VARIANCE : V(F+M)	75.65	80.43	69.67	43.98	98.11	56.89	75.17	108.52	68.35
COVARIANCE:W(F+M,O)	17.36	19.61	14.94	1.41	32.63	3.78	19.02	29.93	13.99
COEFFICI* :R(FM)	0.1154	0.2635	0.0361	0.0796	0.2904	0.1391	0.3140	0.3479	0.1128
W*	15.56	15.52	14.42	1.30	25.29	3.32	14.48	22.20	12.57
W**	13.95	12.28	13.91	1.21	19.60	2.91	11.02	16.47	11.30
MEAN:(W**+W**)/2	14.76	13.90	14.17	1.26	22.44	3.11	12.75	19.34	11.94
BOYS AGED 10 YEARS									
VARIANCE : V(F+M)	80.22	81.14	67.64	87.79	94.51	82.88	76.85	70.91	75.64
COVARIANCE:W(F+M,O)	18.58	20.00	20.91	23.25	39.19	31.24	8.71	19.06	22.50
COEFFICI* :R(FM)	0.1216	0.2829	0.0275	0.3503	0.3035	0.0792	0.2748	0.0809	0.1356
W*	16.57	15.59	20.35	17.22	30.07	28.95	6.83	17.63	19.81
W**	14.77	12.15	19.81	12.75	23.06	26.83	5.36	16.31	17.45
MEAN:(W**+W**)/2	15.67	13.87	20.08	14.99	26.57	27.89	6.10	16.97	18.63
BOYS AGED 11 YEARS									
VARIANCE : V(F+M)	72.55	76.45	87.69	71.45	73.16	53.96	56.57	113.60	78.90
COVARIANCE:W(F+M,O)	20.83	16.80	16.60	14.37	14.06	1.98	7.03	56.41	16.00
COEFFICI* :R(FM)	0.1186	0.2386	0.0940	0.2661	0.2897	-0.1976	-0.2706	0.7152	0.1193
W*	18.63	13.57	15.17	11.35	10.90	1.65	5.53	32.89	14.29
W**	16.65	10.95	13.87	8.96	8.45	1.38	4.35	19.18	12.77
MEAN:(W**+W**)/2	17.64	12.26	14.52	10.16	9.68	1.52	4.94	26.03	13.53

V(F + M) = Variance of "father + mother" in cm "父親+母親"の分散, 単位cm

W(F + M, O) = Covariance between "father + mother" and "offspring" in cm "父親+母親"と"子"の間の共分散, 単位cm

R(FM) = Correlation coefficient of statures between mother and father in cm 父母間の身長の相関係数, 単位cm

W* = R(F + M, O)√V(O)√V(F + M), W**=W(F + M, O)/(1 + R(FM)) and W̄* = (W* + W**)/2

TABLE 2-2 COVARIANCE AND CORRELATION COEFFICIENT OF STATURE BETWEEN PARENTS AND OFFSPRING CORRECTED FOR CORRELATION BETWEEN PARENTS

表2-2 両親の相関で補正した親子間の身長の共分散及び相関係数

GIRLS		RADIATION DOSE IN RAD							
ITEM	NON EXPOSED								
		< 1	1-9	10-19	20-39	40-99	100-199	200+	1 +
GIRLS AGED 6 YEARS									
VARIANCE : V(F+M)	70.03	63.28	75.50	42.81	41.96	91.56	54.77	65.53	66.44
COVARIANCE:W(F+M,0)	12.60	11.99	12.87	12.75	19.51	13.24	16.17	14.69	13.83
COEFFICI* :R(FM)	0.1202	0.1883	0.2219	-0.1210	0.1065	0.1478	0.0716	0.3047	0.1646
W*	11.25	10.09	10.53	11.37	17.63	11.53	15.09	11.26	11.87
W**	10.04	8.49	8.62	10.15	15.93	10.05	14.08	8.63	10.19
MEAN:(W**+W**)/2	10.65	9.29	9.58	10.76	16.78	10.79	14.59	9.94	11.03
GIRLS AGED 7 YEARS									
VARIANCE : V(F+M)	70.11	76.74	84.54	65.73	128.29	48.33	90.98	57.56	81.53
COVARIANCE:W(F+M,0)	13.76	13.10	16.43	10.11	37.07	6.60	22.12	6.42	16.10
COEFFICI* :R(FM)	0.1691	0.2428	0.2210	0.0051	0.4851	0.0121	0.3587	0.0319	0.2019
W*	11.77	10.54	13.45	10.06	24.96	6.52	16.28	6.22	13.40
W**	10.07	8.48	11.02	10.01	16.81	6.44	11.98	6.03	11.15
MEAN:(W**+W**)/2	10.92	9.51	12.24	10.04	20.89	6.48	14.13	6.13	12.27
GIRLS AGED 8 YEARS									
VARIANCE : V(F+M)	76.40	70.36	70.86	105.53	131.18	58.77	126.96	66.65	85.06
COVARIANCE:W(F+M,0)	16.71	15.88	8.87	10.26	17.60	20.10	26.97	9.27	12.47
COEFFICI* :R(FM)	0.1392	0.2262	0.0833	0.1406	0.4190	-0.0587	0.5126	0.0884	0.1600
W*	14.67	12.95	8.19	8.99	12.40	18.99	17.83	8.51	10.75
W**	12.87	10.56	7.56	7.89	8.74	17.94	11.79	7.82	9.27
MEAN:(W**+W**)/2	13.77	11.76	7.87	8.44	10.57	18.46	14.81	8.17	10.01
GIRLS AGED 9 YEARS									
VARIANCE : V(F+M)	68.39	76.40	65.85	73.75	52.06	124.83	63.74	81.47	73.97
COVARIANCE:W(F+M,0)	17.79	19.84	15.84	16.54	5.24	11.22	32.35	8.79	15.42
COEFFICI* :R(FM)	0.1165	0.2452	0.1463	0.1746	-0.1746	0.3224	0.4104	0.3289	0.1696
W*	15.93	15.93	13.82	14.08	4.46	8.48	22.93	6.61	13.19
W**	14.27	12.80	12.05	11.98	3.79	6.41	16.26	4.98	11.27
MEAN:(W**+W**)/2	15.10	14.36	12.93	13.03	4.13	7.45	19.60	5.79	12.23
GIRLS AGED 10 YEARS									
VARIANCE : V(F+M)	69.82	89.31	75.34	56.64	90.85	55.67	75.01	79.44	72.52
COVARIANCE:W(F+M,0)	17.40	17.95	19.57	-4.72	11.57	29.82	12.64	10.80	15.20
COEFFICI* :R(FM)	0.1122	0.2493	0.2077	-0.0383	0.0563	0.3174	-0.0807	0.1298	0.1369
W*	15.64	14.37	16.20	-4.55	10.95	22.64	11.70	9.56	13.37
W**	14.06	11.50	13.42	-4.38	10.36	17.18	10.83	8.46	11.76
MEAN:(W**+W**)/2	14.85	12.94	14.81	-4.47	10.66	19.91	11.26	9.01	12.56
GIRLS AGED 11 YEARS									
VARIANCE : V(F+M)	74.30	75.35	68.55	156.30	69.22	53.48	59.86	57.64	79.68
COVARIANCE:W(F+M,0)	17.36	17.29	14.55	10.91	14.33	17.21	20.53	5.32	15.00
COEFFICI* :R(FM)	0.1633	0.2191	0.2352	0.3557	0.5132	0.2129	0.1491	0.0416	0.2726
W*	14.92	14.19	11.78	8.05	9.47	14.19	17.86	5.10	11.79
W**	12.83	11.64	9.54	5.94	6.26	11.70	15.55	4.90	9.26
MEAN:(W**+W**)/2	13.88	12.91	10.66	6.99	7.86	12.95	16.70	5.00	10.52

TABLE 3-1 RELATION OF NONEXPOSED VS <1 RAD AND NONEXPOSED VS 1+ RAD

表3-1 非被爆群と1 rad 未満群及び非被爆群と1 rad 以上群の関係

ITEM	NONEXPOSED VS < 1 RAD				NONEXPOSED VS 1 + RAD			
	NONEXPOSED	< 1 RAD	TEST	P	NONEXPOSED	1 + RAD	TEST	P
BOYS AGED 6 YEARS								
MEAN	113.72	114.03	0.94	N.S	113.72	113.55	0.49	N.S
VARIANCE	20.18	29.19	1.45	p<.05	20.18	23.73	1.18	p<.05
COVARIANCE	14.11	11.86			14.11	16.58		
Z-VALUE	0.393	0.264	2.00	p<.05	0.393	0.395	0.02	N.S
W*(F+M,0)	12.55	10.00			12.55	13.51		
Z*(F+M,0)	0.346	0.221	1.94	SUGG	0.346	0.316	0.42	N.S
BOYS AGED 7 YEARS								
MEAN	118.79	118.55	0.79	N.S	118.79	118.98	0.54	N.S
VARIANCE	22.63	23.38	1.03	p<.05	22.63	26.01	1.15	p<.05
COVARIANCE	15.90	17.84			15.90	17.36		
Z-VALUE	0.406	0.438	0.51	N.S	0.406	0.424	0.25	N.S
W*(F+M,0)	14.30	14.56			14.30	15.23		
Z*(F+M,0)	0.362	0.350	0.18	N.S	0.362	0.367	0.08	N.S
BOYS AGED 8 YEARS								
MEAN	124.18	124.32	0.46	N.S	124.18	124.37	0.50	N.S
VARIANCE	27.17	24.49	0.90	N.S	27.17	29.15	1.07	p<.05
COVARIANCE	17.75	11.64			17.75	18.73		
Z-VALUE	0.424	0.281	2.27	p<.05	0.424	0.426	0.04	N.S
W*(F+M,0)	16.20	9.52			16.20	16.30		
Z*(F+M,0)	0.383	0.228	2.47	p<.05	0.383	0.365	0.24	N.S
BOYS AGED 9 YEARS								
MEAN	129.16	129.48	0.95	N.S	129.16	129.55	1.06	N.S
VARIANCE	29.43	27.15	0.92	N.S	29.43	27.52	0.94	N.S
COVARIANCE	17.36	19.61			17.36	13.99		
Z-VALUE	0.386	0.447	0.97	N.S	0.386	0.335	0.73	N.S
W*(F+M,0)	15.56	15.52			15.56	12.57		
Z*(F+M,0)	0.343	0.345	0.04	N.S	0.343	0.299	0.63	N.S
BOYS AGED 10 YEARS								
MEAN	134.06	134.20	0.42	N.S	134.06	134.16	0.26	N.S
VARIANCE	30.74	28.86	0.94	N.S	30.74	34.08	1.11	p<.05
COVARIANCE	18.58	20.00			18.58	22.50		
Z-VALUE	0.393	0.440	0.75	N.S	0.393	0.476	1.25	N.S
W*(F+M,0)	16.57	15.59			16.57	19.81		
Z*(F+M,0)	0.347	0.334	0.21	N.S	0.347	0.412	0.99	N.S
BOYS AGED 11 YEARS								
MEAN	139.28	140.11	2.23	p<.05	139.28	139.25	0.08	N.S
VARIANCE	38.11	37.17	0.98	N.S	38.11	39.54	1.04	p<.05
COVARIANCE	20.83	16.80			20.83	16.00		
Z-VALUE	0.419	0.326	1.53	N.S	0.419	0.295	1.87	SUGG
W*(F+M,0)	18.63	13.57			18.63	14.29		
Z*(F+M,0)	0.370	0.260	1.82	SUGG	0.370	0.262	1.63	N.S

TABLE 3-2 RELATION OF NONEXPOSED VS <1 RAD AND NONEXPOSED VS 1+ RAD

表3-2 非被爆群と1 rad 未満群及び非被爆群と1 rad 以上群の関係

GIRLS								
ITEM	NONEXPOSED VS < 1 RAD				NONEXPOSED VS 1 + RAD			
	NONEXPOSED	< 1 RAD	TEST	P	NONEXPOSED	1 + RAD	TEST	P
GIRLS AGED 6 YEARS								
MEAN	112.56	112.73	0.59	N.S	112.56	112.80	0.75	N.S
VARIANCE	18.25	18.62	1.02	p<.05	18.25	21.07	1.15	p<.05
COVARIANCE	12.60	11.99			12.60	13.83		
Z-VALUE	0.368	0.365	0.05	N.S	0.368	0.388	0.27	N.S
W*(F+M,O)	11.25	10.09			11.25	11.87		
Z*(F+M,O)	0.326	0.303	0.35	N.S	0.326	0.329	0.04	N.S
GIRLS AGED 7 YEARS								
MEAN	118.05	117.91	0.46	N.S	118.05	117.88	0.49	N.S
VARIANCE	23.99	22.07	0.92	N.S	23.99	23.18	0.97	N.S
COVARIANCE	13.76	13.10			13.76	16.10		
Z-VALUE	0.349	0.330	0.29	N.S	0.349	0.389	0.56	N.S
W*(F+M,O)	11.77	10.54			11.77	13.40		
Z*(F+M,O)	0.295	0.262	0.51	N.S	0.295	0.319	0.33	N.S
GIRLS AGED 8 YEARS								
MEAN	123.07	123.43	1.10	N.S	123.07	124.01	2.74	p<.01
VARIANCE	26.55	25.99	0.98	N.S	26.55	24.25	0.91	N.S
COVARIANCE	16.71	15.88			16.71	12.47		
Z-VALUE	0.390	0.390	0.01	N.S	0.390	0.282	1.55	N.S
W*(F+M,O)	14.67	12.95			14.67	10.75		
Z*(F+M,O)	0.338	0.313	0.39	N.S	0.338	0.241	1.39	N.S
GIRLS AGED 9 YEARS								
MEAN	128.72	128.82	0.26	N.S	128.72	129.29	1.44	N.S
VARIANCE	30.93	40.31	1.30	p<.05	30.93	32.27	1.04	p<.05
COVARIANCE	17.79	19.84			17.79	15.42		
Z-VALUE	0.408	0.374	0.53	N.S	0.408	0.327	1.14	N.S
W*(F+M,O)	15.93	15.93			15.93	13.19		
Z*(F+M,O)	0.361	0.295	1.03	N.S	0.361	0.277	1.19	N.S
GIRLS AGED 10 YEARS								
MEAN	134.46	134.61	0.34	N.S	134.46	134.51	0.11	N.S
VARIANCE	43.63	47.31	1.08	p<.05	43.63	40.72	0.93	N.S
COVARIANCE	17.40	17.95			17.40	15.20		
Z-VALUE	0.326	0.284	0.66	N.S	0.326	0.287	0.55	N.S
W*(F+M,O)	15.64	14.37			15.64	13.37		
Z*(F+M,O)	0.291	0.225	1.02	N.S	0.291	0.251	0.57	N.S
GIRLS AGED 11 YEARS								
MEAN	141.39	141.73	0.81	N.S	141.39	141.13	0.60	N.S
VARIANCE	45.64	47.79	1.05	p<.05	45.64	42.90	0.94	N.S
COVARIANCE	17.36	17.29			17.36	15.00		
Z-VALUE	0.307	0.297	0.18	N.S	0.307	0.262	0.68	N.S
W*(F+M,O)	14.92	14.19			14.92	11.79		
Z*(F+M,O)	0.262	0.241	0.35	N.S	0.262	0.204	0.87	N.S

TABLE 4-1 REGRESSION COEFFICIENT OF MEAN, VARIANCE, COVARIANCE AND Z-VALUE OF CORRELATION COEFFICIENT

表4-1 平均値, 分散, 共分散及び相関係数のZ値の回帰係数

BOYS									
ITEM	REGRESSION FOR NONEXPOSED & EXPOSED DATA				REGRESSION FOR EXPOSED DATA				
	CONSTANT	SLOPE	T-VALUE	(DF=5)	CONSTANT	SLOPE	T-VALUE	(DF=4)	
BOYS AGED 6 YEARS									
MEAN ; M(O)	113.7	-0.00150	0.245	N.S	113.7	-0.00142	0.196	N.S	
VARIANCE ; V(O)	20.6	0.02060	0.946		22.4	0.01264	0.545		
COVARIANCE ; W(F+M,O)	14.6	0.00368	0.073		16.4	-0.00442	0.075		
Z-VALUE ; Z(F+M,O)	0.418	0.00011	0.074	N.S	0.427	0.00006	0.036	N.S	
W*(F+M,O)	12.8	-0.00224	0.054		13.7	-0.00644	0.131		
Z*(F+M,O)	0.359	-0.00008	0.071	N.S	0.349	-0.00004	0.027	N.S	
BOYS AGED 7 YEARS									
MEAN ; M(O)	118.8	-0.00084	0.351	N.S	119.0	-0.00131	0.461	N.S	
VARIANCE ; V(O)	23.5	-0.01500	0.362		27.1	-0.03004	0.669		
COVARIANCE ; W(F+M,O)	16.0	0.01515	1.070		16.7	0.01261	0.762		
Z-VALUE ; Z(F+M,O)	0.430	0.00171	2.659	P<.05	0.424	0.00173	2.274	P<.05	
W*(F+M,O)	14.4	0.00482	0.346		15.0	0.00239	0.147		
Z*(F+M,O)	0.379	0.00088	1.098	N.S	0.380	0.00088	0.917	N.S	
BOYS AGED 8 YEARS									
MEAN ; M(O)	124.3	-0.00271	0.978	N.S	124.6	-0.00373	1.223	N.S	
VARIANCE ; V(O)	27.4	0.00731	0.648		28.6	0.00411	0.317		
COVARIANCE ; W(F+M,O)	18.1	-0.01519	0.790		19.5	-0.01921	0.848		
Z-VALUE ; Z(F+M,O)	0.463	-0.00043	0.596	N.S	0.516	-0.00057	0.684	N.S	
W*(F+M,O)	16.3	-0.01441	0.817		16.9	-0.01598	0.753		
Z*(F+M,O)	0.407	-0.00040	0.658	N.S	0.427	-0.00046	0.622	N.S	
BOYS AGED 9 YEARS									
MEAN ; M(O)	129.2	0.00386	1.874	SUGG	129.4	0.00290	1.264	N.S	
VARIANCE ; V(O)	29.3	-0.01991	1.115		28.5	-0.01670	0.780		
COVARIANCE ; W(F+M,O)	16.4	0.02288	0.559		12.3	0.04066	0.908		
Z-VALUE ; Z(F+M,O)	0.388	0.00081	0.770	N.S	0.300	0.00121	1.027	N.S	
W*(F+M,O)	14.8	0.00721	0.214		11.4	0.02167	0.587		
Z*(F+M,O)	0.342	0.00017	0.218	N.S	0.271	0.00049	0.573	N.S	
BOYS AGED 10 YEARS									
MEAN ; M(O)	134.0	0.00297	1.367	N.S	134.0	0.00316	1.208	N.S	
VARIANCE ; V(O)	31.5	0.00965	0.583		34.0	0.00188	0.110		
COVARIANCE ; W(F+M,O)	19.8	0.00020	0.007		23.9	-0.01270	0.444		
Z-VALUE ; Z(F+M,O)	0.449	0.00001	0.014	N.S	0.573	-0.00038	0.556	N.S	
W*(F+M,O)	17.6	0.00029	0.013		21.2	-0.01091	0.479		
Z*(F+M,O)	0.389	-0.00001	0.010	N.S	0.490	-0.00032	0.613	N.S	
BOYS AGED 11 YEARS									
MEAN ; M(O)	139.2	0.00377	1.238	N.S	139.1	0.00453	1.268	N.S	
VARIANCE ; V(O)	37.7	0.07270	2.671		36.2	0.07880	2.469		
COVARIANCE ; W(F+M,O)	19.2	0.05256	1.243		12.4	0.07914	2.122		
Z-VALUE ; Z(F+M,O)	0.410	0.00044	0.496	N.S	0.252	0.00108	1.731	SUGG	
W*(F+M,O)	17.2	0.01063	0.316		11.5	0.03301	1.173		
Z*(F+M,O)	0.358	-0.00039	0.569	N.S	0.229	0.00013	0.324	N.S	

TABLE 4-2 REGRESSION COEFFICIENT OF MEAN, VARIANCE, COVARIANCE AND Z-VALUE OF CORRELATION COEFFICIENT

表4-2 平均値, 分散, 共分散及び相関係数のZ値の回帰係数

GIRLS									
ITEM	REGRESSION FOR NONEXPOSED & EXPOSED DATA					REGRESSION FOR EXPOSED DATA			
	CONSTANT	SLOPE	T-VALUE	(DF=5)		CONSTANT	SLOPE	T-VALUE	(DF=4)
GIRLS AGED 6 YEARS									
MEAN : M(O)	112.6	-0.00089	0.345	N.S		112.9	-0.00173	0.585	N.S
VARIANCE : V(O)	18.8	0.00296	0.256			20.9	-0.00268	0.236	
COVARIANCE: W(F+M, O)	12.8	0.00512	0.841			13.5	0.00315	0.469	
Z-VALUE: Z(F+M, O)	0.404	0.00043	0.399	N.S		0.483	0.00022	0.179	N.S
W*(F+M, O)	11.3	0.00151	0.244			11.6	0.00084	0.114	
Z*(F+M, O)	0.347	0.00019	0.257	N.S		0.385	0.00009	0.105	N.S
GIRLS AGED 7 YEARS									
MEAN : M(O)	118.0	0.00102	0.907	N.S		117.8	0.00131	1.184	N.S
VARIANCE : V(O)	23.6	0.01846	1.520			22.2	0.02021	1.483	
COVARIANCE: W(F+M, O)	14.4	-0.00540	0.353			17.2	-0.00873	0.530	
Z-VALUE: Z(F+M, O)	0.377	-0.00020	0.753	N.S		0.435	-0.00028	1.040	N.S
W*(F+M, O)	12.2	-0.00439	0.494			13.8	-0.00634	0.665	
Z*(F+M, O)	0.311	-0.00016	1.520	SUGG		0.339	-0.00020	2.072	SUGG
GIRLS AGED 8 YEARS									
MEAN : M(O)	123.2	0.00317	1.359	N.S		123.9	0.00149	0.995	N.S
VARIANCE : V(O)	26.2	-0.00791	0.642			24.7	-0.00389	0.285	
COVARIANCE: W(F+M, O)	15.8	-0.00672	0.330			11.9	0.00362	0.184	
Z-VALUE: Z(F+M, O)	0.386	-0.00015	0.290	N.S		0.276	0.00015	0.345	N.S
W*(F+M, O)	13.8	-0.00728	0.456			10.3	0.00228	0.165	
Z*(F+M, O)	0.331	-0.00015	0.369	N.S		0.236	0.00010	0.319	N.S
GIRLS AGED 9 YEARS									
MEAN : M(O)	128.8	0.00289	0.893	N.S		129.2	0.00194	0.527	N.S
VARIANCE : V(O)	31.2	-0.01338	0.708			32.5	-0.01714	0.780	
COVARIANCE: W(F+M, O)	17.3	-0.01161	0.592			15.2	-0.00542	0.243	
Z-VALUE: Z(F+M, O)	0.419	-0.00027	0.444	N.S		0.354	-0.00007	0.106	N.S
W*(F+M, O)	15.4	-0.01566	0.973			12.8	-0.00837	0.512	
Z*(F+M, O)	0.363	-0.00041	0.950	N.S		0.291	-0.00019	0.475	N.S
GIRLS AGED 10 YEARS									
MEAN : M(O)	134.4	0.00310	1.698	SUGG		134.3	0.00353	1.644	SUGG
VARIANCE : V(O)	43.3	-0.02588	1.852			42.2	-0.02226	1.374	
COVARIANCE: W(F+M, O)	17.1	-0.01201	0.377			15.9	-0.00819	0.214	
Z-VALUE: Z(F+M, O)	0.341	-0.00009	0.104	N.S		0.349	-0.00012	0.110	N.S
W*(F+M, O)	15.1	-0.01179	0.446			13.0	-0.00529	0.172	
Z*(F+M, O)	0.293	-0.00016	0.262	N.S		0.264	-0.00007	0.092	N.S
GIRLS AGED 11 YEARS									
MEAN : M(O)	141.3	0.00175	0.355	N.S		140.9	0.00296	0.519	N.S
VARIANCE : V(O)	45.0	-0.02224	0.953			42.4	-0.01254	0.504	
COVARIANCE: W(F+M, O)	16.9	-0.02010	1.403			14.8	-0.01256	0.900	
Z-VALUE: Z(F+M, O)	0.312	-0.00020	0.478	N.S		0.286	-0.00010	0.212	N.S
W*(F+M, O)	14.3	-0.01652	1.077			11.8	-0.00708	0.528	
Z*(F+M, O)	0.260	-0.00016	0.417	N.S		0.224	-0.00002	0.047	N.S

TABLE 5-1 MEAN AND VARIANCE OF OFFSPRING STATURE BY PARENTAL EXPOSURE STATUS

表5-1 子の身長の平均値及び分散, 親の被曝状況別

EXPOSURE STATUS		NO. OF OFFSPRING	MEAN DOSE	STATURE OF OFFSPRING		NO. OF OFFSPRING	MEAN DOSE	STATURE OF OFFSPRING	
FATHER	MOTHER			MEAN	VARIANCE			MEAN	VARIANCE
BOYS									
BOYS AGED 6 YEARS									
NONEXPOSED	NONEXPOSED	873	0.00	113.72	20.18	919	0.00	129.16	29.43
NONEXPOSED	<1 RAD	145	0.00	114.17	39.63	212	0.00	129.84	23.48
NONEXPOSED	1-9	53	3.57	113.57	29.53	75	3.47	129.00	30.03
NONEXPOSED	10-19	15	14.07	114.27	11.70	27	14.26	129.89	18.13
NONEXPOSED	20-99	18	43.72	114.69	22.71	34	48.21	129.50	30.08
NONEXPOSED	100+	8	217.00	112.50	34.53	17	218.76	129.36	10.95
NONEXPOSED	1+	94	31.10	113.80	25.39	153	39.24	129.31	25.52
<1 RAD	NONEXPOSED	148	0.00	113.95	20.43	94	0.00	128.61	30.03
1-9	NONEXPOSED	65	2.92	112.38	20.68	35	3.54	129.78	29.75
10-19	NONEXPOSED	14	14.14	113.94	26.75	8	14.63	126.49	20.86
20-99	NONEXPOSED	15	32.27	116.80	16.74	6	37.50	129.73	30.61
100+	NONEXPOSED	6	357.83	111.90	24.82	11	295.09	130.79	43.24
1+	NONEXPOSED	100	30.19	113.23	23.09	60	61.87	129.52	31.13
NONEXPOSED	1+	194	30.63	113.51	24.16	213	45.61	129.37	26.97
BOYS AGED 7 YEARS									
NONEXPOSED	NONEXPOSED	934	0.00	118.79	22.63	894	0.00	134.06	30.74
NONEXPOSED	<1 RAD	174	0.00	118.70	24.23	213	0.00	134.15	29.94
NONEXPOSED	1-9	60	3.37	119.68	26.05	89	3.19	134.17	29.75
NONEXPOSED	10-19	22	14.55	119.55	33.88	27	15.63	132.76	29.05
NONEXPOSED	20-99	20	46.05	120.60	55.67	36	48.39	134.88	38.94
NONEXPOSED	100+	11	287.82	118.05	7.22	17	268.47	133.08	28.71
NONEXPOSED	1+	113	40.79	119.66	30.58	169	41.49	133.99	31.44
<1 RAD	NONEXPOSED	142	0.00	118.43	20.75	104	0.00	134.41	29.36
1-9	NONEXPOSED	51	3.73	118.67	15.76	33	4.18	134.92	29.10
10-19	NONEXPOSED	11	13.55	115.19	16.72	10	14.40	129.29	60.48
20-99	NONEXPOSED	15	40.60	121.65	28.89	13	47.77	133.79	60.31
100+	NONEXPOSED	9	227.00	118.78	21.98	17	405.12	136.12	34.96
1+	NONEXPOSED	86	34.78	118.76	21.19	73	106.71	134.23	42.80
NONEXPOSED	1+	199	38.19	119.27	26.60	242	61.17	134.06	34.72
BOYS AGED 8 YEARS									
NONEXPOSED	NONEXPOSED	890	0.00	124.18	27.17	982	0.00	139.28	38.11
NONEXPOSED	<1 RAD	165	0.00	124.25	25.52	249	0.00	140.20	35.04
NONEXPOSED	1-9	61	3.69	122.80	25.61	84	3.90	138.00	33.38
NONEXPOSED	10-19	19	14.42	126.26	22.34	33	15.18	139.77	26.11
NONEXPOSED	20-99	19	48.58	124.65	26.18	37	46.41	139.00	35.38
NONEXPOSED	100+	23	315.61	123.40	37.24	16	345.00	140.11	48.78
NONEXPOSED	1+	122	71.16	123.74	28.28	170	47.45	138.76	33.87
<1 RAD	NONEXPOSED	144	0.00	124.44	22.55	81	0.00	139.70	43.56
1-9	NONEXPOSED	48	4.04	124.70	34.82	34	3.41	139.59	49.51
10-19	NONEXPOSED	8	15.00	126.24	35.42	6	14.83	142.25	59.33
20-99	NONEXPOSED	10	54.20	122.87	15.48	5	53.20	138.94	17.42
100+	NONEXPOSED	5	222.80	124.12	66.76	7	255.29	139.44	99.40
1+	NONEXPOSED	71	27.75	124.58	33.48	52	43.42	139.82	51.74
NONEXPOSED	1+	193	55.19	124.05	30.20	222	46.50	139.01	38.04

TABLE 5-2 MEAN AND VARIANCE OF OFFSPRING STATURE BY PARENTAL EXPOSURE STATUS

表5-2 子の身長の平均値及び分散, 親の被爆状況別

EXPOSURE STATUS		NO. OF OFFSPRING	MEAN DOSE	STATURE OF OFFSPRING		NO. OF OFFSPRING	MEAN DOSE	STATURE OF OFFSPRING	
FATHER	MOTHER			MEAN	VARIANCE			MEAN	VARIANCE
GIRLS									

		GIRLS AGED 6 YEARS				GIRLS AGED 9 YEARS			
NONEXPOSED	NONEXPOSED	904	0.00	112.56	18.25	934	0.00	128.72	30.93
NONEXPOSED	<1 RAD	120	0.00	113.06	17.02	190	0.00	129.07	43.74
NONEXPOSED	1-9	48	3.63	113.61	20.32	65	3.66	129.69	36.04
NONEXPOSED	10-19	21	13.76	113.79	15.12	18	13.89	131.47	22.86
NONEXPOSED	20-99	25	43.68	111.97	19.02	35	45.69	128.57	34.50
NONEXPOSED	100+	13	431.08	112.23	22.68	11	262.36	131.17	26.34
NONEXPOSED	1+	107	66.91	113.09	19.34	129	38.55	129.76	33.25
<1 RAD	NONEXPOSED	150	0.00	112.53	20.25	99	0.00	128.37	39.85
1-9	NONEXPOSED	52	3.31	112.95	21.71	43	3.88	127.94	27.95
10-19	NONEXPOSED	16	14.13	113.91	28.47	7	13.14	129.64	39.08
20-99	NONEXPOSED	9	49.78	111.98	42.50	9	67.78	129.40	42.93
100+	NONEXPOSED	13	335.08	112.85	11.86	5	293.00	128.90	32.96
1+	NONEXPOSED	90	57.80	113.01	22.92	64	36.47	128.40	30.38
NONEXPOSED	1+								
1+	NONEXPOSED	197	62.75	113.05	20.87	193	37.86	129.31	32.55

		GIRLS AGED 7 YEARS				GIRLS AGED 10 YEARS			
NONEXPOSED	NONEXPOSED	948	0.00	118.05	23.99	823	0.00	134.46	43.63
NONEXPOSED	<1 RAD	137	0.00	118.03	23.96	199	0.00	134.79	47.71
NONEXPOSED	1-9	53	3.55	117.75	21.36	68	3.41	133.55	46.35
NONEXPOSED	10-19	22	13.64	117.61	18.45	21	14.62	134.68	56.86
NONEXPOSED	20-99	17	49.24	118.44	22.68	37	42.59	134.62	45.40
NONEXPOSED	100+	8	1260.25	118.47	52.20	14	240.29	133.04	23.18
NONEXPOSED	1+	100	114.07	117.90	22.59	140	39.14	133.95	44.81
<1 RAD	NONEXPOSED	137	0.00	117.70	22.99	94	0.00	134.78	48.24
1-9	NONEXPOSED	69	3.55	118.36	17.05	37	3.46	133.64	31.27
10-19	NONEXPOSED	5	16.40	118.26	8.15	9	15.00	132.97	34.19
20-99	NONEXPOSED	16	40.19	115.09	23.00	8	64.25	135.50	60.67
100+	NONEXPOSED	10	196.80	116.60	33.59	9	503.67	136.77	35.79
1+	NONEXPOSED	100	29.38	117.66	20.12	63	84.29	134.23	35.62
NONEXPOSED	1+								
1+	NONEXPOSED	200	71.72	117.78	21.26	203	53.15	134.04	41.78

		GIRLS AGED 8 YEARS				GIRLS AGED 11 YEARS			
NONEXPOSED	NONEXPOSED	952	0.00	123.07	26.55	988	0.00	141.39	45.64
NONEXPOSED	<1 RAD	177	0.00	123.87	24.96	232	0.00	142.18	45.90
NONEXPOSED	1-9	60	3.63	123.70	18.34	84	3.07	140.55	36.80
NONEXPOSED	10-19	22	14.09	123.35	13.26	25	14.72	145.93	38.79
NONEXPOSED	20-99	28	44.43	125.05	30.02	37	52.03	140.83	54.93
NONEXPOSED	100+	10	251.80	124.12	19.40	19	255.11	142.04	41.98
NONEXPOSED	1+	120	35.75	123.99	20.10	165	44.84	141.60	44.55
<1 RAD	NONEXPOSED	115	0.00	122.53	25.94	81	0.00	140.12	49.80
1-9	NONEXPOSED	51	3.78	123.68	28.57	34	3.00	139.16	41.68
10-19	NONEXPOSED	5	15.80	123.62	71.85	7	14.14	139.67	36.56
20-99	NONEXPOSED	11	45.55	124.09	26.14	7	48.29	140.23	88.80
100+	NONEXPOSED	16	325.06	124.05	16.91	7	180.71	142.87	22.54
1+	NONEXPOSED	83	71.98	123.80	27.24	55	32.80	139.83	43.41
NONEXPOSED	1+								
1+	NONEXPOSED	203	50.56	123.91	22.91	220	41.83	141.16	44.65

TABLE 6-1 COVARIANCE AND CORRELATION COEFFICIENT MODIFIED BY CORRELATION BETWEEN PARENTS

表6-1 両親の相関で補正した共分散及び相関係数

EXPOSURE STATUS		CORRELATION COEFFICIENT	RELATION OF FATHER AND OFFSPRING				RELATION OF MOTHER AND OFFSPRING				
FATHER	MOTHER		NO. CASE	R(FM)	W(FO)	R(FO)	W*(FO)	R*(FO)	W(MO)	R(MO)	W*(MO)
BOYS											
BOYS AGED 6 YEARS											
NONEXPOSED	NONEXPOSED	873	0.124	6.804	0.255	6.052	0.227	7.603	0.204	6.763	0.182
NONEXPOSED	<1 RAD	145	0.140	3.070	0.091	2.693	0.080	4.952	0.150	4.345	0.132
NONEXPOSED	1-9	53	0.159	14.065	0.434	12.136	0.374	5.770	0.219	4.978	0.189
NONEXPOSED	10-19	15	-0.004	8.510	0.368	8.477	0.367	0.895	0.080	0.892	0.079
NONEXPOSED	20-99	18	0.517	6.272	0.238	4.134	0.157	7.148	0.299	4.712	0.197
NONEXPOSED	100+	8	0.844	29.386	0.814	15.934	0.442	35.443	0.932	19.218	0.505
NONEXPOSED	1+	94	0.223	12.735	0.419	10.414	0.343	7.178	0.291	5.870	0.238
<1 RAD	NONEXPOSED	148	0.271	9.321	0.313	7.335	0.246	6.325	0.307	4.977	0.242
1-9	NONEXPOSED	65	0.217	9.609	0.280	7.894	0.230	9.380	0.389	7.705	0.320
10-19	NONEXPOSED	14	0.341	6.425	0.228	4.793	0.170	-0.470	-0.017	-0.351	-0.013
20-99	NONEXPOSED	15	0.407	9.893	0.303	7.033	0.215	-2.129	-0.136	-1.513	-0.097
100+	NONEXPOSED	6	0.542	-11.900	-0.461	-7.717	-0.299	-10.780	-0.289	-6.991	-0.187
1+	NONEXPOSED	100	0.290	8.290	0.236	6.426	0.183	6.291	0.248	4.876	0.192
NONEXPOSED	1+										
1+	NONEXPOSED	194	0.257	10.130	0.305	8.061	0.243	6.714	0.269	5.343	0.214
BOYS AGED 7 YEARS											
NONEXPOSED	NONEXPOSED	934	0.111	9.254	0.328	8.326	0.295	5.177	0.118	4.658	0.106
NONEXPOSED	<1 RAD	174	0.082	4.835	0.191	4.470	0.177	8.004	0.315	7.399	0.292
NONEXPOSED	1-9	60	0.009	7.480	0.273	7.411	0.270	6.072	0.257	6.016	0.255
NONEXPOSED	10-19	22	0.188	5.280	0.155	4.444	0.131	13.639	0.476	11.480	0.401
NONEXPOSED	20-99	20	-0.267	-3.043	-0.083	-2.401	-0.065	8.818	0.321	6.959	0.254
NONEXPOSED	100+	11	-0.356	-6.742	-0.465	-4.971	-0.343	9.293	0.757	6.852	0.558
NONEXPOSED	1+	113	-0.033	4.204	0.141	4.071	0.137	7.900	0.316	7.650	0.306
<1 RAD	NONEXPOSED	142	0.377	13.607	0.403	9.884	0.292	9.518	0.414	6.914	0.301
1-9	NONEXPOSED	51	0.107	11.740	0.442	10.606	0.399	9.544	0.316	8.622	0.285
10-19	NONEXPOSED	11	0.250	9.384	0.308	7.504	0.246	12.403	0.644	9.919	0.515
20-99	NONEXPOSED	15	0.349	15.859	0.560	11.753	0.415	8.330	0.487	6.174	0.361
100+	NONEXPOSED	9	0.630	26.918	0.845	16.519	0.518	13.196	0.523	8.098	0.321
1+	NONEXPOSED	86	0.204	15.286	0.501	12.693	0.416	11.725	0.391	9.736	0.325
NONEXPOSED	1+										
1+	NONEXPOSED	199	0.107	9.084	0.296	8.205	0.268	9.712	0.344	8.772	0.311
BOYS AGED 8 YEARS											
NONEXPOSED	NONEXPOSED	890	0.096	10.092	0.332	9.211	0.303	8.962	0.208	8.181	0.189
NONEXPOSED	<1 RAD	165	0.283	7.795	0.241	6.077	0.188	6.823	0.273	5.319	0.213
NONEXPOSED	1-9	61	-0.062	8.235	0.274	7.756	0.258	5.045	0.204	4.752	0.192
NONEXPOSED	10-19	19	-0.149	13.475	0.449	11.727	0.391	8.175	0.311	7.115	0.271
NONEXPOSED	20-99	19	-0.070	5.648	0.246	5.280	0.230	12.130	0.517	11.340	0.483
NONEXPOSED	100+	23	0.117	19.277	0.380	17.260	0.340	2.605	0.071	2.332	0.064
NONEXPOSED	1+	122	0.005	11.745	0.347	11.682	0.345	7.021	0.255	6.984	0.254
<1 RAD	NONEXPOSED	144	0.155	4.742	0.173	4.107	0.150	4.700	0.217	4.070	0.188
1-9	NONEXPOSED	48	0.270	8.983	0.247	7.072	0.195	5.715	0.194	4.499	0.153
10-19	NONEXPOSED	8	0.440	31.498	0.817	21.873	0.567	18.604	0.561	12.919	0.389
20-99	NONEXPOSED	10	0.290	14.274	0.621	11.062	0.482	2.438	0.134	1.889	0.104
100+	NONEXPOSED	5	-0.571	-4.020	-0.066	-2.559	-0.042	2.990	0.071	1.904	0.045
1+	NONEXPOSED	71	0.226	10.905	0.309	8.893	0.252	6.093	0.212	4.969	0.173
NONEXPOSED	1+										
1+	NONEXPOSED	193	0.098	11.644	0.337	10.601	0.307	7.004	0.247	6.377	0.225

TABLE 6-2 COVARIANCE AND CORRELATION COEFFICIENT MODIFIED BY CORRELATION BETWEEN PARENTS

表6-2 両親の相関で補正した共分散及び相関係数

EXPOSURE STATUS		CORRELATION COEFFICIENT		RELATION OF FATHER AND OFFSPRING				RELATION OF MOTHER AND OFFSPRING			
FATHER	MOTHER	NO. CASE	R (FM)	W (FO)	R (FO)	W* (FO)	R* (FO)	W (MO)	R (MO)	W* (MO)	R* (MO)
BOYS											
BOYS AGED 9 YEARS											
NONEXPOSED	NONEXPOSED	919	0.115	9.310	0.288	8.347	0.258	8.719	0.141	7.817	0.126
NONEXPOSED	<1 RAD	212	0.258	4.603	0.164	3.658	0.131	10.411	0.400	8.274	0.318
NONEXPOSED	1-9	75	-0.094	6.050	0.170	5.530	0.156	2.487	0.082	2.273	0.075
NONEXPOSED	10-19	27	0.315	2.446	0.118	1.860	0.089	-1.026	-0.061	-0.780	-0.046
NONEXPOSED	20-99	34	0.021	9.060	0.292	8.874	0.286	4.796	0.181	4.697	0.178
NONEXPOSED	100+	17	0.162	6.897	0.428	5.933	0.368	6.243	0.345	5.371	0.297
NONEXPOSED	1+	153	0.004	6.236	0.209	6.213	0.208	2.583	0.100	2.573	0.100
<1 RAD	NONEXPOSED	94	0.306	15.435	0.444	11.821	0.340	15.513	0.498	11.881	0.382
1-9	NONEXPOSED	35	-0.005	6.256	0.244	6.224	0.242	10.589	0.452	10.535	0.450
10-19	NONEXPOSED	8	-0.398	-2.810	-0.136	-2.009	-0.097	7.879	0.473	5.635	0.338
20-99	NONEXPOSED	6	0.250	10.460	0.363	8.365	0.290	12.760	0.628	10.204	0.502
100+	NONEXPOSED	11	0.618	10.640	0.230	6.574	0.142	29.617	0.673	18.300	0.416
1+	NONEXPOSED	60	0.178	6.921	0.240	5.875	0.203	12.350	0.465	10.483	0.395
NONEXPOSED	1+										
1+	NONEXPOSED	213	0.046	6.413	0.217	6.133	0.207	5.287	0.203	5.057	0.194
BOYS AGED 10 YEARS											
NONEXPOSED	NONEXPOSED	894	0.122	9.025	0.280	8.047	0.249	12.324	0.259	10.988	0.231
NONEXPOSED	<1 RAD	213	0.306	12.664	0.403	9.697	0.308	9.981	0.362	7.642	0.277
NONEXPOSED	1-9	89	0.104	9.402	0.337	8.514	0.305	12.678	0.493	11.481	0.447
NONEXPOSED	10-19	27	0.481	14.913	0.478	10.068	0.323	16.027	0.534	10.820	0.361
NONEXPOSED	20-99	36	0.065	11.692	0.307	10.973	0.289	11.531	0.317	10.823	0.298
NONEXPOSED	100+	17	0.461	6.441	0.170	4.410	0.117	4.811	0.185	3.294	0.127
NONEXPOSED	1+	169	0.198	10.681	0.336	8.918	0.281	12.298	0.429	10.269	0.358
<1 RAD	NONEXPOSED	104	0.214	9.062	0.264	7.463	0.217	9.832	0.415	8.097	0.342
1-9	NONEXPOSED	33	-0.123	10.431	0.259	9.289	0.230	0.617	0.015	0.549	0.014
10-19	NONEXPOSED	10	-0.065	-18.165	-0.379	-17.055	-0.356	10.816	0.434	10.155	0.407
20-99	NONEXPOSED	13	0.323	29.635	0.663	22.404	0.501	40.287	0.632	30.458	0.478
100+	NONEXPOSED	17	0.158	4.633	0.116	4.001	0.100	10.581	0.371	9.138	0.321
1+	NONEXPOSED	73	0.005	8.236	0.186	8.191	0.185	9.974	0.232	9.920	0.231
NONEXPOSED	1+										
1+	NONEXPOSED	242	0.119	9.922	0.281	8.868	0.251	11.500	0.349	10.278	0.312
BOYS AGED 11 YEARS											
NONEXPOSED	NONEXPOSED	982	0.119	10.341	0.275	9.244	0.246	10.744	0.259	9.605	0.231
NONEXPOSED	<1 RAD	249	0.256	7.961	0.229	6.337	0.182	5.119	0.165	4.075	0.132
NONEXPOSED	1-9	84	-0.084	5.011	0.128	4.621	0.118	8.624	0.276	7.954	0.254
NONEXPOSED	10-19	33	0.455	-1.515	-0.064	-1.041	-0.044	3.264	0.129	2.243	0.088
NONEXPOSED	20-99	37	0.053	3.603	0.117	3.422	0.111	5.777	0.200	5.486	0.190
NONEXPOSED	100+	16	0.408	12.431	0.279	8.827	0.198	11.090	0.325	7.875	0.231
NONEXPOSED	1+	170	0.058	4.503	0.129	4.256	0.122	6.933	0.233	6.553	0.220
<1 RAD	NONEXPOSED	81	0.168	13.028	0.359	11.151	0.308	11.772	0.359	10.076	0.308
1-9	NONEXPOSED	34	0.430	4.265	0.079	2.981	0.056	6.754	0.145	4.722	0.101
10-19	NONEXPOSED	6	0.242	49.250	0.795	39.652	0.640	10.110	0.172	8.140	0.138
20-99	NONEXPOSED	5	-0.145	-12.160	-0.535	-10.622	-0.467	7.215	0.758	6.302	0.662
100+	NONEXPOSED	7	0.123	62.560	0.770	55.689	0.685	14.112	0.334	12.562	0.297
1+	NONEXPOSED	52	0.350	14.364	0.266	10.642	0.197	7.987	0.180	5.917	0.133
NONEXPOSED	1+										
1+	NONEXPOSED	222	0.149	6.742	0.171	5.870	0.149	7.279	0.219	6.338	0.191

TABLE 6-3 COVARIANCE AND CORRELATION COEFFICIENT MODIFIED BY CORRELATION BETWEEN PARENTS

表6-3 両親の相関で補正した共分散及び相関係数

EXPOSURE STATUS		CORRELATION COEFFICIENT		RELATION OF FATHER AND OFFSPRING				RELATION OF MOTHER AND OFFSPRING			
FATHER	MOTHER	NO. CASE	R(FM)	W(FO)	R(FO)	W*(FO)	R*(FO)	W(MO)	R(MO)	W*(MO)	R*(MO)
GIRLS											
GIRLS AGED 6 YEARS											
NONEXPOSED	NONEXPOSED	904	0.120	7.204	0.287	6.431	0.257	5.280	0.132	4.713	0.118
NONEXPOSED	<1 RAD	120	0.096	4.328	0.194	3.950	0.177	4.105	0.233	3.746	0.213
NONEXPOSED	1-9	48	-0.040	11.354	0.461	10.915	0.443	2.257	0.106	2.169	0.102
NONEXPOSED	10-19	21	-0.285	4.465	0.185	3.475	0.144	1.524	0.095	1.187	0.074
NONEXPOSED	20-99	25	0.271	9.024	0.437	7.097	0.344	8.110	0.378	6.379	0.298
NONEXPOSED	100+	13	0.362	1.882	0.062	1.382	0.045	13.741	0.591	10.092	0.434
NONEXPOSED	1+	107	0.042	8.556	0.350	8.212	0.336	5.146	0.251	4.939	0.241
<1 RAD	NONEXPOSED	150	0.201	3.542	0.139	2.950	0.116	10.227	0.465	8.517	0.387
1-9	NONEXPOSED	52	0.329	2.601	0.104	1.958	0.078	1.448	0.054	1.090	0.041
10-19	NONEXPOSED	16	0.098	13.550	0.424	12.339	0.386	10.943	0.583	9.964	0.530
20-99	NONEXPOSED	9	0.117	15.546	0.325	13.920	0.291	9.835	0.341	8.806	0.305
100+	NONEXPOSED	13	-0.193	14.545	0.716	12.189	0.600	-2.719	-0.293	-2.278	-0.245
1+	NONEXPOSED	90	0.189	7.403	0.268	6.225	0.226	3.207	0.135	2.696	0.113
NONEXPOSED	1+										
1+	NONEXPOSED	197	0.111	7.993	0.310	7.196	0.279	4.220	0.192	3.799	0.173
GIRLS AGED 7 YEARS											
NONEXPOSED	NONEXPOSED	948	0.169	7.792	0.278	6.666	0.237	5.328	0.136	4.558	0.116
NONEXPOSED	<1 RAD	137	0.232	8.764	0.300	7.116	0.244	6.507	0.244	5.283	0.198
NONEXPOSED	1-9	53	0.115	3.753	0.119	3.366	0.107	6.288	0.263	5.640	0.236
NONEXPOSED	10-19	22	0.039	7.645	0.268	7.358	0.258	10.167	0.480	9.785	0.462
NONEXPOSED	20-99	17	0.534	10.855	0.272	7.075	0.177	9.656	0.407	6.294	0.265
NONEXPOSED	100+	8	-0.167	32.496	0.751	27.855	0.644	-9.525	-0.313	-8.165	-0.269
NONEXPOSED	1+	100	0.181	7.753	0.233	6.562	0.197	6.391	0.270	5.409	0.228
<1 RAD	NONEXPOSED	137	0.280	8.013	0.275	6.261	0.215	5.537	0.222	4.326	0.173
1-9	NONEXPOSED	69	0.263	9.326	0.360	7.386	0.285	5.423	0.303	4.295	0.240
10-19	NONEXPOSED	5	0.121	-1.745	-0.151	-1.556	-0.135	-22.495	-0.848	-20.061	-0.756
20-99	NONEXPOSED	16	0.328	12.353	0.455	9.304	0.343	9.716	0.393	7.317	0.296
100+	NONEXPOSED	10	0.268	4.011	0.129	3.164	0.102	24.400	0.589	19.245	0.464
1+	NONEXPOSED	100	0.220	9.490	0.352	7.782	0.288	5.835	0.256	4.785	0.210
NONEXPOSED	1+										
1+	NONEXPOSED	200	0.199	8.535	0.284	7.116	0.237	6.068	0.262	5.059	0.219
GIRLS AGED 8 YEARS											
NONEXPOSED	NONEXPOSED	952	0.139	8.681	0.279	7.621	0.245	7.795	0.221	6.843	0.194
NONEXPOSED	<1 RAD	177	0.256	6.401	0.228	5.096	0.182	7.629	0.317	6.074	0.253
NONEXPOSED	1-9	60	0.215	4.665	0.183	3.839	0.150	-1.213	-0.046	-0.999	-0.038
NONEXPOSED	10-19	22	0.265	2.966	0.146	2.344	0.115	-5.194	-0.177	-4.105	-0.140
NONEXPOSED	20-99	28	0.136	10.068	0.253	8.860	0.223	6.573	0.262	5.784	0.231
NONEXPOSED	100+	10	0.140	12.158	0.570	10.661	0.500	15.989	0.577	14.020	0.506
NONEXPOSED	1+	120	0.230	6.903	0.246	5.614	0.200	1.667	0.059	1.356	0.048
<1 RAD	NONEXPOSED	115	0.176	11.307	0.357	9.617	0.304	5.473	0.247	4.655	0.210
1-9	NONEXPOSED	51	-0.070	4.965	0.161	4.641	0.151	9.359	0.295	8.748	0.276
10-19	NONEXPOSED	5	0.193	42.640	0.517	35.735	0.433	28.825	0.673	24.157	0.564
20-99	NONEXPOSED	11	-0.339	10.372	0.556	7.744	0.415	1.746	0.065	1.304	0.049
100+	NONEXPOSED	16	0.460	-3.300	-0.144	-2.260	-0.098	3.697	0.170	2.532	0.116
1+	NONEXPOSED	83	0.019	5.809	0.192	5.699	0.188	7.821	0.260	7.673	0.255
NONEXPOSED	1+										
1+	NONEXPOSED	203	0.152	6.408	0.221	5.560	0.192	4.141	0.143	3.593	0.124

TABLE 6-4 COVARIANCE AND CORRELATION COEFFICIENT MODIFIED BY CORRELATION BETWEEN PARENTS

表6-4 両親の相関で補正した共分散及び相関係数

GIRLS

EXPOSURE STATUS		CORRELATION COEFFICIENT		RELATION OF FATHER AND OFFSPRING				RELATION OF MOTHER AND OFFSPRING			
FATHER	MOTHER	NO. CASE	R (FM)	W (FO)	R (FO)	W* (FO)	R* (FO)	W (MO)	R (MO)	W* (MO)	R* (MO)
GIRLS AGED 9 YEARS											
NONEXPOSED	NONEXPOSED	934	0.116	10.057	0.318	9.007	0.284	8.502	0.189	7.614	0.169
NONEXPOSED	<1 RAD	190	0.180	11.690	0.325	9.905	0.275	10.437	0.286	8.843	0.242
NONEXPOSED	1-9	65	0.158	7.680	0.236	6.633	0.204	10.647	0.306	9.195	0.264
NONEXPOSED	10-19	18	0.408	12.648	0.380	8.985	0.270	5.584	0.280	3.966	0.199
NONEXPOSED	20-99	35	-0.174	6.496	0.192	5.532	0.164	9.402	0.297	8.006	0.253
NONEXPOSED	100+	11	0.469	3.795	0.205	2.584	0.140	4.967	0.332	3.382	0.226
NONEXPOSED	1+	129	0.092	7.564	0.233	6.926	0.213	9.215	0.298	8.437	0.273
<1 RAD	NONEXPOSED	99	0.400	11.509	0.308	8.222	0.220	8.146	0.221	5.820	0.158
1-9	NONEXPOSED	43	0.028	9.735	0.398	9.474	0.387	10.285	0.361	10.010	0.351
10-19	NONEXPOSED	7	-0.236	-1.443	-0.028	-1.168	-0.023	12.355	0.359	9.999	0.291
20-99	NONEXPOSED	9	0.754	-6.530	-0.098	-3.723	-0.056	-8.150	-0.157	-4.646	-0.089
100+	NONEXPOSED	5	0.459	37.675	0.822	25.818	0.563	22.450	0.458	15.384	0.314
1+	NONEXPOSED	64	0.249	7.715	0.223	6.177	0.178	9.116	0.273	7.299	0.218
NONEXPOSED	1+										
1+	NONEXPOSED	193	0.154	7.420	0.222	6.432	0.193	8.980	0.281	7.784	0.244
GIRLS AGED 10 YEARS											
NONEXPOSED	NONEXPOSED	823	0.112	7.569	0.191	6.805	0.171	10.349	0.231	9.304	0.208
NONEXPOSED	<1 RAD	199	0.174	4.825	0.099	4.111	0.084	9.232	0.243	7.866	0.207
NONEXPOSED	1-9	68	0.283	11.233	0.259	8.758	0.202	14.026	0.405	10.935	0.316
NONEXPOSED	10-19	21	-0.014	-8.051	-0.165	-7.942	-0.163	-10.448	-0.250	-10.308	-0.246
NONEXPOSED	20-99	37	0.325	6.053	0.169	4.568	0.127	17.435	0.427	13.157	0.322
NONEXPOSED	100+	14	-0.129	12.757	0.346	11.302	0.306	-2.055	-0.133	-1.821	-0.118
NONEXPOSED	1+	140	0.215	6.862	0.163	5.647	0.134	9.581	0.271	7.884	0.223
<1 RAD	NONEXPOSED	94	0.412	15.395	0.329	10.901	0.233	12.482	0.395	8.838	0.280
1-9	NONEXPOSED	37	0.161	7.068	0.204	6.088	0.176	6.763	0.258	5.825	0.222
10-19	NONEXPOSED	9	-0.414	11.812	0.328	8.356	0.232	7.700	0.507	5.447	0.359
20-99	NONEXPOSED	8	-0.468	33.171	0.891	22.603	0.607	-9.443	-0.259	-6.434	-0.176
100+	NONEXPOSED	9	-0.536	-12.696	-0.301	-8.267	-0.196	5.675	0.258	3.695	0.168
1+	NONEXPOSED	63	-0.072	6.470	0.175	6.034	0.163	5.353	0.210	4.992	0.196
NONEXPOSED	1+										
1+	NONEXPOSED	203	0.129	6.779	0.168	6.005	0.149	8.171	0.252	7.238	0.224
GIRLS AGED 11 YEARS											
NONEXPOSED	NONEXPOSED	988	0.163	9.833	0.239	8.452	0.205	7.528	0.215	6.471	0.185
NONEXPOSED	<1 RAD	232	0.196	4.145	0.101	3.466	0.084	7.597	0.233	6.351	0.194
NONEXPOSED	1-9	84	0.061	4.836	0.150	4.560	0.142	9.480	0.339	8.938	0.320
NONEXPOSED	10-19	25	0.373	2.342	0.050	1.706	0.037	-9.134	-0.171	-6.654	-0.124
NONEXPOSED	20-99	37	-0.178	3.997	0.171	3.392	0.145	0.001	0.000	0.001	0.000
NONEXPOSED	100+	19	0.302	6.170	0.150	4.740	0.115	3.119	0.163	2.396	0.125
NONEXPOSED	1+	165	0.204	5.802	0.158	4.818	0.131	5.663	0.164	4.703	0.137
<1 RAD	NONEXPOSED	81	0.278	11.602	0.239	9.081	0.187	12.871	0.352	10.074	0.276
1-9	NONEXPOSED	34	0.268	7.801	0.169	6.154	0.133	0.696	0.027	0.549	0.021
10-19	NONEXPOSED	7	0.753	30.930	0.613	17.648	0.350	1.724	0.079	0.984	0.045
20-99	NONEXPOSED	7	0.434	38.000	0.646	26.504	0.450	32.600	0.625	22.738	0.436
100+	NONEXPOSED	7	0.631	11.583	0.451	7.103	0.276	-4.450	-0.274	-2.729	-0.168
1+	NONEXPOSED	55	0.320	12.759	0.275	9.664	0.209	4.600	0.161	3.484	0.122
NONEXPOSED	1+										
1+	NONEXPOSED	220	0.239	8.289	0.207	6.690	0.167	5.651	0.170	4.560	0.137

TABLE 7 COMPARISON OF ESTIMATED VALUES BETWEEN OFFSPRING AND AN EXPOSED FATHER AND NONEXPOSED MOTHER - BOYS

表7 父被爆・母非被爆と子(男)の間の推定値の比較

ITEM	FATHER.....NONEXPOSED	<1 RAD	TEST		1+ RAD	TEST	
	MOTHER.....NONEXPOSED	NONEXPOSED	(1):(2)	P	NONEXPOSED	(1):(3)	P
	(1)	(2)			(3)		
BOYS AGED 6 YEARS							
MEAN	113.72	113.95	0.59	N.S	113.23	0.96	N.S
VARIANCE	20.18	20.43	1.01	p<.05	23.09	1.14	p<.05
COVARIANCE:W(FO)	6.80	9.32			8.29		
COVARIANCE:W(MO)	7.60	6.32			6.29		
Z-VALUE:Z(FO)	0.261	0.323	0.70	N.S	0.241	0.19	N.S
Z-VALUE:Z(MO)	0.207	0.317	1.23	N.S	0.253	0.43	N.S
Z*(FO)	0.231	0.251	0.22	N.S	0.185	0.43	N.S
Z*(MO)	0.184	0.247	0.70	N.S	0.194	0.10	N.S
BOYS AGED 7 YEARS							
MEAN	118.79	118.43	0.86	N.S	118.76	0.06	N.S
VARIANCE	22.63	20.75	0.92	N.S	21.19	0.94	N.S
COVARIANCE:W(FO)	9.25	13.61			15.29		
COVARIANCE:W(MO)	5.18	9.52			11.72		
Z-VALUE:Z(FO)	0.341	0.427	0.95	N.S	0.550	1.83	SUGG
Z-VALUE:Z(MO)	0.119	0.441	3.55	p<.01	0.413	2.57	p<.01
Z*(FO)	0.304	0.301	0.03	N.S	0.442	1.21	N.S
Z*(MO)	0.107	0.311	2.24	p<.05	0.337	2.01	p<.05
BOYS AGED 8 YEARS							
MEAN	124.18	124.44	0.61	N.S	124.58	0.56	N.S
VARIANCE	27.17	22.55	0.83	N.S	33.48	1.23	p<.05
COVARIANCE:W(FO)	10.09	4.74			10.90		
COVARIANCE:W(MO)	8.96	4.70			6.09		
Z-VALUE:Z(FO)	0.346	0.175	1.88	SUGG	0.319	0.21	N.S
Z-VALUE:Z(MO)	0.211	0.221	0.11	N.S	0.215	0.03	N.S
Z*(FO)	0.313	0.151	1.79	SUGG	0.257	0.45	N.S
Z*(MO)	0.192	0.190	0.01	N.S	0.174	0.14	N.S
BOYS AGED 9 YEARS							
MEAN	129.16	128.61	0.94	N.S	129.52	0.48	N.S
VARIANCE	29.43	30.03	1.02	p<.05	31.13	1.06	p<.05
COVARIANCE:W(FO)	9.31	15.44			6.92		
COVARIANCE:W(MO)	8.72	15.51			12.35		
Z-VALUE:Z(FO)	0.296	0.478	1.65	N.S	0.244	0.38	N.S
Z-VALUE:Z(MO)	0.142	0.547	3.69	p<.01	0.504	2.65	p<.01
Z*(FO)	0.264	0.354	0.82	N.S	0.206	0.42	N.S
Z*(MO)	0.127	0.402	2.50	p<.05	0.417	2.13	p<.05
BOYS AGED 10 YEARS							
MEAN	134.06	134.41	0.61	N.S	134.23	0.21	N.S
VARIANCE	30.74	29.36	0.96	N.S	42.80	1.39	p<.05
COVARIANCE:W(FO)	9.03	9.06			8.24		
COVARIANCE:W(MO)	12.32	9.83			9.97		
Z-VALUE:Z(FO)	0.287	0.270	0.16	N.S	0.188	0.80	N.S
Z-VALUE:Z(MO)	0.265	0.442	1.69	SUGG	0.237	0.23	N.S
Z*(FO)	0.255	0.221	0.32	N.S	0.187	0.54	N.S
Z*(MO)	0.235	0.356	1.15	N.S	0.235	0.00	N.S
BOYS AGED 11 YEARS							
MEAN	139.28	139.70	0.55	N.S	139.82	0.52	N.S
VARIANCE	38.11	43.56	1.14	p<.05	51.74	1.36	p<.05
COVARIANCE:W(FO)	10.34	13.03			14.36		
COVARIANCE:W(MO)	10.74	11.77			7.99		
Z-VALUE:Z(FO)	0.283	0.376	0.80	N.S	0.273	0.06	N.S
Z-VALUE:Z(MO)	0.265	0.376	0.95	N.S	0.182	0.57	N.S
Z*(FO)	0.251	0.318	0.57	N.S	0.200	0.35	N.S
Z*(MO)	0.236	0.318	0.70	N.S	0.134	0.70	N.S

TABLE 8 COMPARISON OF ESTIMATED VALUES BETWEEN OFFSPRING AND A NONEXPOSED FATHER AND EXPOSED MOTHER - BOYS
 表8 父非被爆・母被爆と子(男)の間の推定値の比較

ITEM	FATHER...NONEXPOSED	NONEXPOSED	TEST		NONEXPOSED	TEST	
	MOTHER...NONEXPOSED	<1 RAD	(1):(2)	P	1+ RAD	(1):(3)	P
	(1)	(2)			(3)		
BOYS AGED 6 YEARS							
MEAN	113.72	114.17	0.83	N.S	113.80	0.16	N.S
VARIANCE	20.18	39.63	1.96	p<.05	25.39	1.26	p<.05
COVARIANCE;W(FD)	6.80	3.07			12.73		
COVARIANCE;W(MD)	7.60	4.95			7.18		
Z-VALUE:Z(FD)	0.261	0.091	1.88	SUGG	0.447	1.69	SUGG
Z-VALUE:Z(MD)	0.207	0.151	0.62	N.S	0.300	0.84	N.S
Z*(FD)	0.231	0.080	1.67	SUGG	0.358	1.15	N.S
Z*(MD)	0.184	0.133	0.57	N.S	0.243	0.53	N.S
BOYS AGED 7 YEARS							
MEAN	118.79	118.70	0.21	N.S	119.66	1.61	N.S
VARIANCE	22.63	24.23	1.07	p<.05	30.58	1.35	p<.05
COVARIANCE;W(FD)	9.25	4.84			4.20		
COVARIANCE;W(MD)	5.18	8.00			7.90		
Z-VALUE:Z(FD)	0.341	0.193	1.77	SUGG	0.142	1.97	p<.05
Z-VALUE:Z(MD)	0.119	0.327	2.50	p<.05	0.327	2.07	p<.05
Z*(FD)	0.304	0.178	1.51	N.S	0.138	1.65	SUGG
Z*(MD)	0.107	0.300	2.33	p<.05	0.316	2.07	p<.05
BOYS AGED 8 YEARS							
MEAN	124.18	124.25	0.17	N.S	123.74	0.86	N.S
VARIANCE	27.17	25.52	0.94	N.S	28.28	1.04	p<.05
COVARIANCE;W(FD)	10.09	7.80			11.74		
COVARIANCE;W(MD)	8.96	6.82			7.02		
Z-VALUE:Z(FD)	0.346	0.246	1.17	N.S	0.362	0.17	N.S
Z-VALUE:Z(MD)	0.211	0.280	0.81	N.S	0.261	0.51	N.S
Z*(FD)	0.313	0.190	1.44	N.S	0.360	0.48	N.S
Z*(MD)	0.192	0.216	0.28	N.S	0.259	0.69	N.S
BOYS AGED 9 YEARS							
MEAN	129.16	129.84	1.80	SUGG	129.31	0.33	N.S
VARIANCE	29.43	23.48	0.80	N.S	25.52	0.87	N.S
COVARIANCE;W(FD)	9.31	4.60			6.24		
COVARIANCE;W(MD)	8.72	10.41			2.58		
Z-VALUE:Z(FD)	0.296	0.166	1.70	SUGG	0.212	0.96	N.S
Z-VALUE:Z(MD)	0.142	0.424	3.68	p<.01	0.100	0.47	N.S
Z*(FD)	0.264	0.131	1.73	SUGG	0.211	0.60	N.S
Z*(MD)	0.127	0.330	2.64	p<.01	0.100	0.31	N.S
BOYS AGED 10 YEARS							
MEAN	134.06	134.15	0.20	N.S	133.99	0.16	N.S
VARIANCE	30.74	29.94	0.97	N.S	31.44	1.02	p<.05
COVARIANCE;W(FD)	9.03	12.66			10.68		
COVARIANCE;W(MD)	12.32	9.98			12.30		
Z-VALUE:Z(FD)	0.287	0.427	1.82	SUGG	0.350	0.74	N.S
Z-VALUE:Z(MD)	0.265	0.379	1.49	N.S	0.458	2.29	p<.05
Z*(FD)	0.255	0.319	0.84	N.S	0.289	0.40	N.S
Z*(MD)	0.235	0.284	0.65	N.S	0.375	1.65	SUGG
BOYS AGED 11 YEARS							
MEAN	139.28	140.20	2.15	p<.05	138.76	1.07	N.S
VARIANCE	38.11	35.04	0.92	N.S	33.87	0.89	N.S
COVARIANCE;W(FD)	10.34	7.96			4.50		
COVARIANCE;W(MD)	10.74	5.12			6.93		
Z-VALUE:Z(FD)	0.283	0.233	0.69	N.S	0.129	1.83	SUGG
Z-VALUE:Z(MD)	0.265	0.167	1.37	N.S	0.237	0.33	N.S
Z*(FD)	0.251	0.185	0.94	N.S	0.122	1.54	N.S
Z*(MD)	0.236	0.132	1.45	N.S	0.224	0.14	N.S

TABLE 9 COMPARISON OF ESTIMATED VALUES BETWEEN OFFSPRING AND AN EXPOSED FATHER AND NONEXPOSED MOTHER - GIRLS

表9 父被爆・母非被爆と子(女)の間の推定値の比較

ITEM	FATHER.....NONEXPOSED	<1 RAD	TEST		1+ RAD	TEST	
	MOTHER.....NONEXPOSED (1)	NONEXPOSED (2)	(1):(2)	P	NONEXPOSED (3)	(1):(3)	P
GIRLS AGED 6 YEARS							
MEAN	112.56	112.53	0.08	N.S	113.01	0.85	N.S
VARIANCE	18.25	20.25	1.11	p<.05	22.92	1.26	p<.05
COVARIANCE:W(FO)	7.20	3.54			7.40		
COVARIANCE:W(MO)	5.28	10.23			3.21		
Z-VALUE:Z(FO)	0.296	0.140	1.75	SUGG	0.275	0.18	N.S
Z-VALUE:Z(MO)	0.132	0.504	4.17	p<.01	0.135	0.03	N.S
Z*(FO)	0.262	0.116	1.64	N.S	0.230	0.29	N.S
Z*(MO)	0.118	0.409	3.27	p<.01	0.114	0.04	N.S
GIRLS AGED 7 YEARS							
MEAN	118.05	117.70	0.80	N.S	117.66	0.83	N.S
VARIANCE	23.99	22.99	0.96	N.S	20.12	0.84	N.S
COVARIANCE:W(FO)	7.79	8.01			9.49		
COVARIANCE:W(MO)	5.33	5.54			5.83		
Z-VALUE:Z(FO)	0.285	0.282	0.03	N.S	0.367	0.77	N.S
Z-VALUE:Z(MO)	0.137	0.225	0.96	N.S	0.262	1.18	N.S
Z*(FO)	0.242	0.218	0.26	N.S	0.297	0.51	N.S
Z*(MO)	0.117	0.175	0.63	N.S	0.213	0.91	N.S
GIRLS AGED 8 YEARS							
MEAN	123.07	122.53	1.07	N.S	123.80	1.23	N.S
VARIANCE	26.55	25.94	0.98	N.S	27.24	1.03	p<.05
COVARIANCE:W(FO)	8.68	11.31			5.81		
COVARIANCE:W(MO)	7.79	5.47			7.82		
Z-VALUE:Z(FO)	0.286	0.374	0.88	N.S	0.194	0.79	N.S
Z-VALUE:Z(MO)	0.225	0.253	0.28	N.S	0.266	0.35	N.S
Z*(FO)	0.250	0.314	0.64	N.S	0.190	0.51	N.S
Z*(MO)	0.197	0.214	0.17	N.S	0.261	0.55	N.S
GIRLS AGED 9 YEARS							
MEAN	128.72	128.37	0.53	N.S	128.40	0.44	N.S
VARIANCE	30.93	39.85	1.29	p<.05	30.38	0.98	N.S
COVARIANCE:W(FO)	10.06	11.51			7.71		
COVARIANCE:W(MO)	8.50	8.15			9.12		
Z-VALUE:Z(FO)	0.329	0.318	0.10	N.S	0.227	0.77	N.S
Z-VALUE:Z(MO)	0.191	0.225	0.32	N.S	0.280	0.67	N.S
Z*(FO)	0.293	0.224	0.64	N.S	0.180	0.85	N.S
Z*(MO)	0.170	0.159	0.10	N.S	0.222	0.39	N.S
GIRLS AGED 10 YEARS							
MEAN	134.46	134.78	0.43	N.S	134.23	0.30	N.S
VARIANCE	43.63	48.24	1.11	p<.05	35.62	0.82	N.S
COVARIANCE:W(FO)	7.57	15.40			6.47		
COVARIANCE:W(MO)	10.35	12.48			5.35		
Z-VALUE:Z(FO)	0.193	0.342	1.35	N.S	0.177	0.12	N.S
Z-VALUE:Z(MO)	0.236	0.418	1.65	N.S	0.213	0.17	N.S
Z*(FO)	0.173	0.237	0.58	N.S	0.165	0.06	N.S
Z*(MO)	0.211	0.287	0.69	N.S	0.198	0.10	N.S
GIRLS AGED 11 YEARS							
MEAN	141.39	140.12	1.57	N.S	139.83	1.71	SUGG
VARIANCE	45.64	49.80	1.09	p<.05	43.41	0.95	N.S
COVARIANCE:W(FO)	9.83	11.60			12.76		
COVARIANCE:W(MO)	7.53	12.87			4.60		
Z-VALUE:Z(FO)	0.243	0.244	0.01	N.S	0.283	0.28	N.S
Z-VALUE:Z(MO)	0.219	0.368	1.27	N.S	0.163	0.39	N.S
Z*(FO)	0.208	0.190	0.16	N.S	0.212	0.03	N.S
Z*(MO)	0.187	0.283	0.82	N.S	0.123	0.45	N.S

TABLE 10 COMPARISON OF ESTIMATED VALUES BETWEEN OFFSPRING AND A NONEXPOSED FATHER AND EXPOSED MOTHER - GIRLS

表10 父非被爆・母被爆と子(女)の間の推定値の比較

ITEM	FATHER.....NONEXPOSED	NONEXPOSED	TEST		NONEXPOSED	TEST	
	MOTHER.....NONEXPOSED	<1 RAD	(1):(2)	P	1+ RAD	(1):(3)	P
	(1)	(2)			(3)		
GIRLS AGED 6 YEARS							
MEAN	112.56	113.06	1.24	N.S	113.09	1.19	N.S
VARIANCE	18.25	17.02	0.93	N.S	19.34	1.06	p<.05
COVARIANCE:W(FO)	7.20	4.33			8.56		
COVARIANCE:W(MO)	5.28	4.11			5.15		
Z-VALUE:Z(FO)	0.296	0.196	1.01	N.S	0.365	0.67	N.S
Z-VALUE:Z(MO)	0.132	0.238	1.07	N.S	0.256	1.19	N.S
Z*(FO)	0.262	0.178	0.85	N.S	0.349	0.84	N.S
Z*(MO)	0.118	0.216	1.00	N.S	0.245	1.23	N.S
GIRLS AGED 7 YEARS							
MEAN	118.05	118.03	0.05	N.S	117.90	0.31	N.S
VARIANCE	23.99	23.96	1.00	N.S	22.59	0.94	N.S
COVARIANCE:W(FO)	7.79	8.76			7.75		
COVARIANCE:W(MO)	5.33	6.51			6.39		
Z-VALUE:Z(FO)	0.285	0.310	0.27	N.S	0.237	0.45	N.S
Z-VALUE:Z(MO)	0.137	0.249	1.22	N.S	0.277	1.31	N.S
Z*(FO)	0.242	0.249	0.07	N.S	0.200	0.40	N.S
Z*(MO)	0.117	0.201	0.91	N.S	0.232	1.08	N.S
GIRLS AGED 8 YEARS							
MEAN	123.07	123.87	1.95	SUGG	123.99	2.07	p<.05
VARIANCE	26.55	24.96	0.94	N.S	20.10	0.76	N.S
COVARIANCE:W(FO)	8.68	6.40			6.90		
COVARIANCE:W(MO)	7.79	7.63			1.67		
Z-VALUE:Z(FO)	0.286	0.232	0.66	N.S	0.252	0.35	N.S
Z-VALUE:Z(MO)	0.225	0.329	1.26	N.S	0.059	1.69	SUGG
Z*(FO)	0.250	0.184	0.80	N.S	0.203	0.47	N.S
Z*(MO)	0.197	0.258	0.75	N.S	0.048	1.51	N.S
GIRLS AGED 9 YEARS							
MEAN	128.72	129.07	0.68	N.S	129.76	1.93	SUGG
VARIANCE	30.93	43.74	1.41	p<.05	33.25	1.08	p<.05
COVARIANCE:W(FO)	10.06	11.69			7.56		
COVARIANCE:W(MO)	8.50	10.44			9.22		
Z-VALUE:Z(FO)	0.329	0.337	0.10	N.S	0.237	0.97	N.S
Z-VALUE:Z(MO)	0.191	0.294	1.29	N.S	0.307	1.23	N.S
Z*(FO)	0.293	0.283	0.13	N.S	0.216	0.80	N.S
Z*(MO)	0.170	0.247	0.96	N.S	0.280	1.15	N.S
GIRLS AGED 10 YEARS							
MEAN	134.46	134.79	0.62	N.S	133.95	0.84	N.S
VARIANCE	43.63	47.71	1.09	p<.05	44.81	1.03	p<.05
COVARIANCE:W(FO)	7.57	4.83			6.86		
COVARIANCE:W(MO)	10.35	9.23			9.58		
Z-VALUE:Z(FO)	0.193	0.099	1.18	N.S	0.165	0.30	N.S
Z-VALUE:Z(MO)	0.236	0.248	0.16	N.S	0.278	0.46	N.S
Z*(FO)	0.173	0.085	1.11	N.S	0.135	0.41	N.S
Z*(MO)	0.211	0.210	0.01	N.S	0.227	0.17	N.S
GIRLS AGED 11 YEARS							
MEAN	141.39	142.18	1.60	N.S	141.60	0.37	N.S
VARIANCE	45.64	45.90	1.01	p<.05	44.55	0.98	N.S
COVARIANCE:W(FO)	9.83	4.15			5.80		
COVARIANCE:W(MO)	7.53	7.60			5.66		
Z-VALUE:Z(FO)	0.243	0.101	1.94	SUGG	0.159	0.99	N.S
Z-VALUE:Z(MO)	0.219	0.237	0.25	N.S	0.166	0.62	N.S
Z*(FO)	0.208	0.085	1.68	SUGG	0.132	0.90	N.S
Z*(MO)	0.187	0.197	0.13	N.S	0.137	0.59	N.S

TABLE 11 REGRESSION COEFFICIENT FOR THE RELATION BETWEEN EXPOSED FATHER AND NONEXPOSED MOTHER

表11 父被爆群と母非被爆群間に関連した回帰係数

ITEM	NONEXPOSED & EXPOSED FATHER & NONEXPOSED MOTHER				EXPOSED FATHER & NONEXPOSED MOTHER			
	CONSTANT	SLOPE	T-VALUE	(DF=3)	CONSTANT	SLOPE	T-VALUE	(DF=2)
BOYS AGED 6 YEARS								
MEAN	113.7	-0.00233	0.187	N.S	113.4	-0.00105	0.066	N.S
VARIANCE	20.2	0.01206	0.650	N.S	20.9	0.00957	0.409	N.S
COVARIANCE:W(FO)	7.1	-0.04956	2.623		9.7	-0.05970	5.736	
COVARIANCE:W(MO)	7.5	-0.05740	1.993		10.9	-0.01132	0.800	
Z-VALUE:Z(FO)	0.271	-0.00215	4.608	P<.01	0.311	-0.00233	5.768	P<.05
Z-VALUE:Z(MO)	0.220	-0.00176	0.878	N.S	0.322	-0.00221	0.962	N.S
Z*(FO)	0.236	-0.00153	8.619	P<.01	0.241	-0.00155	7.042	P<.01
Z*(MO)	0.192	-0.00132	0.880	N.S	0.254	-0.00160	0.891	N.S
BOYS AGED 7 YEARS								
MEAN	118.8	0.00137	0.098	N.S	118.4	0.00334	0.183	N.S
VARIANCE	22.3	0.00258	0.054	N.S	17.8	0.03017	0.629	N.S
COVARIANCE:W(FO)	9.4	0.08181	4.905		11.3	0.07017	5.280	
COVARIANCE:W(MO)	5.5	0.03933	1.286		11.0	-0.01771	1.067	
Z-VALUE:Z(FO)	0.364	0.00375	2.821	P<.05	0.499	0.00288	2.824	SUGG
Z-VALUE:Z(MO)	0.139	0.00322	1.060	N.S	0.443	0.00125	0.523	N.S
Z*(FO)	0.321	0.00165	1.686	SUGG	0.421	0.00100	1.369	N.S
Z*(MO)	0.122	0.00159	0.757	N.S	0.356	0.00008	0.067	N.S
BOYS AGED 8 YEARS								
MEAN	124.2	-0.00672	0.588	N.S	124.6	-0.01113	0.735	N.S
VARIANCE	27.4	0.14190	1.575	N.S	31.2	0.11515	1.012	N.S
COVARIANCE:W(FO)	10.3	-0.04086	0.559		13.0	-0.06021	0.642	
COVARIANCE:W(MO)	8.9	-0.03370	0.790		11.2	-0.01939	1.033	
Z-VALUE:Z(FO)	0.363	0.00062	0.133	N.S	0.415	0.00016	0.026	N.S
Z-VALUE:Z(MO)	0.216	-0.00048	0.235	N.S	0.248	-0.00076	0.287	N.S
Z*(FO)	0.322	-0.00043	0.168	N.S	0.287	-0.00012	0.035	N.S
Z*(MO)	0.193	-0.00073	0.694	N.S	0.180	-0.00061	0.444	N.S
BOYS AGED 9 YEARS								
MEAN	129.2	0.00509	0.720	N.S	129.0	0.00567	0.596	N.S
VARIANCE	29.4	0.04585	2.971	P<.05	28.0	0.05123	2.570	SUGG
COVARIANCE:W(FO)	9.1	0.00364	0.160		5.1	0.01903	0.870	
COVARIANCE:W(MO)	8.8	0.07093	10.574		10.9	-0.01293	1.260	
Z-VALUE:Z(FO)	0.302	-0.00025	0.350	N.S	0.216	0.00008	0.093	N.S
Z-VALUE:Z(MO)	0.159	0.00354	2.026	SUGG	0.550	0.00206	3.808	P<.05
Z*(FO)	0.268	-0.00045	0.799	N.S	0.215	-0.00025	0.355	N.S
Z*(MO)	0.143	0.00128	0.776	N.S	0.517	-0.00014	0.370	N.S
BOYS AGED 10 YEARS								
MEAN	134.1	0.00491	1.097	N.S	134.1	0.00477	0.743	N.S
VARIANCE	31.3	0.01661	0.344	N.S	41.6	-0.01163	0.199	N.S
COVARIANCE:W(FO)	9.1	-0.00758	0.190		9.5	-0.00891	0.155	
COVARIANCE:W(MO)	12.2	0.00148	0.035		10.7	-0.00864	1.262	
Z-VALUE:Z(FO)	0.297	-0.00031	0.252	N.S	0.334	-0.00041	0.233	N.S
Z-VALUE:Z(MO)	0.271	0.00048	0.482	N.S	0.265	0.00050	0.347	N.S
Z*(FO)	0.259	-0.00034	0.426	N.S	0.223	-0.00024	0.212	N.S
Z*(MO)	0.237	0.00033	0.510	N.S	0.183	0.00048	0.522	N.S
BOYS AGED 11 YEARS								
MEAN	139.3	0.00041	0.052	N.S	139.7	-0.00259	0.265	N.S
VARIANCE	38.4	0.22563	2.536	P<.05	46.1	0.18914	1.765	N.S
COVARIANCE:W(FO)	10.2	0.19155	1.867		6.7	0.20837	1.512	
COVARIANCE:W(MO)	10.6	0.01039	0.495		11.1	-0.01599	1.264	
Z-VALUE:Z(FO)	0.285	0.00754	2.144	SUGG	0.113	0.00836	1.894	SUGG
Z-VALUE:Z(MO)	0.271	0.00127	0.322	N.S	0.258	0.00133	0.255	N.S
Z*(FO)	0.251	0.00341	1.393	N.S	0.076	0.00425	1.485	N.S
Z*(MO)	0.237	0.00057	0.363	N.S	0.143	0.00102	0.531	N.S

TABLE 12 REGRESSION COEFFICIENT FOR THE RELATION BETWEEN NONEXPOSED FATHER AND EXPOSED MOTHER

表12 父非被爆群と母被爆群間に関連した回帰係数

ITEM	NONEXPOSED FATHER & NONEXPOSED & EXPOSED MOTHER				NONEXPOSED FATHER & EXPOSED MOTHER			
	CONSTANT	SLOPE	T-VALUE	(DF=3)	CONSTANT	SLOPE	T-VALUE	(DF=2)
	BOYS AGED 6 YEARS							
MEAN	113.7	-0.00163	0.259	N.S	114.1	-0.00440	0.579	N.S
VARIANCE	20.5	0.06225	0.917	N.S	24.8	0.03223	0.402	N.S
COVARIANCE:W(FO)	7.1	0.09548	1.966		10.8	0.06926	1.324	
COVARIANCE:W(MO)	7.3	0.11371	2.951		5.4	-0.00105	0.054	
Z-VALUE:Z(FO)	0.277	0.00458	2.283	SUGG	0.403	0.00359	1.645	N.S
Z-VALUE:Z(MO)	0.209	0.00216	3.408	P<.05	0.192	0.00229	2.768	SUGG
Z*(FO)	0.245	0.00111	0.694	N.S	0.370	0.00013	0.087	N.S
Z*(MO)	0.184	0.00179	3.028	P<.05	0.153	0.00203	2.900	SUGG
	BOYS AGED 7 YEARS							
MEAN	118.9	-0.00244	0.801	N.S	119.8	-0.00595	3.539	P<.05
VARIANCE	23.6	-0.01941	0.199	N.S	33.8	-0.06817	0.660	N.S
COVARIANCE:W(FO)	9.0	-0.06486	2.396		5.8	-0.04991	1.870	
COVARIANCE:W(MO)	5.4	0.01885	0.786		5.6	-0.00056	0.039	
Z-VALUE:Z(FO)	0.345	-0.00351	3.697	P<.05	0.238	-0.00297	3.495	P<.05
Z-VALUE:Z(MO)	0.129	0.00847	6.739	P<.01	0.245	0.00788	5.897	P<.05
Z*(FO)	0.307	-0.00272	3.165	P<.05	0.226	-0.00231	2.568	SUGG
Z*(MO)	0.122	0.00236	1.961	SUGG	0.285	0.00153	2.167	SUGG
	BOYS AGED 8 YEARS							
MEAN	124.1	-0.00179	0.265	N.S	123.8	-0.00062	0.068	N.S
VARIANCE	26.9	0.03100	2.925	P<.05	24.5	0.03985	5.227	P<.05
COVARIANCE:W(FO)	9.9	0.02754	2.250		8.4	0.03340	2.232	
COVARIANCE:W(MO)	8.8	-0.01827	1.377		5.5	0.00042	0.045	
Z-VALUE:Z(FO)	0.357	0.00018	0.457	N.S	0.322	0.00031	0.595	N.S
Z-VALUE:Z(MO)	0.222	-0.00029	0.380	N.S	0.309	-0.00061	0.636	N.S
Z*(FO)	0.322	0.00013	0.442	N.S	0.292	0.00024	0.629	N.S
Z*(MO)	0.202	-0.00027	0.397	N.S	0.281	-0.00056	0.663	N.S
	BOYS AGED 9 YEARS							
MEAN	129.2	0.00119	0.582	N.S	129.4	0.00028	0.100	N.S
VARIANCE	29.4	-0.07943	2.149	SUGG	28.8	-0.07562	1.471	N.S
COVARIANCE:W(FO)	8.9	-0.01177	0.443		5.8	0.00894	0.415	
COVARIANCE:W(MO)	8.0	-0.01841	0.418		5.5	-0.00139	0.076	
Z-VALUE:Z(FO)	0.291	0.00075	0.767	N.S	0.168	0.00160	3.267	P<.05
Z-VALUE:Z(MO)	0.134	0.00099	1.260	N.S	0.054	0.00154	2.122	SUGG
Z*(FO)	0.259	0.00059	0.671	N.S	0.156	0.00129	2.130	SUGG
Z*(MO)	0.120	0.00083	1.231	N.S	0.055	0.00128	1.926	SUGG
	BOYS AGED 10 YEARS							
MEAN	134.1	-0.00306	0.715	N.S	134.1	-0.00305	0.526	N.S
VARIANCE	30.8	0.00250	0.095	N.S	31.5	-0.00121	0.034	N.S
COVARIANCE:W(FO)	9.3	-0.00486	0.270		11.1	-0.01433	0.748	
COVARIANCE:W(MO)	12.5	-0.02663	2.420		5.4	-0.00036	0.024	
Z-VALUE:Z(FO)	0.309	-0.00033	0.385	N.S	0.407	-0.00087	1.153	N.S
Z-VALUE:Z(MO)	0.310	-0.00017	0.084	N.S	0.590	-0.00170	1.920	SUGG
Z*(FO)	0.270	-0.00043	0.932	N.S	0.338	-0.00080	7.227	P<.01
Z*(MO)	0.269	-0.00031	0.206	N.S	0.482	-0.00148	2.530	SUGG
	BOYS AGED 11 YEARS							
MEAN	139.2	0.00230	0.387	N.S	138.6	0.00504	0.838	N.S
VARIANCE	37.3	0.02671	0.775	N.S	31.5	0.05029	2.274	SUGG
COVARIANCE:W(FO)	9.4	-0.00017	0.005		2.9	0.02629	1.412	
COVARIANCE:W(MO)	10.2	-0.00353	0.161		5.5	-0.00033	0.026	
Z-VALUE:Z(FO)	0.266	-0.00018	0.162	N.S	0.078	0.00061	1.048	N.S
Z-VALUE:Z(MO)	0.267	0.00014	0.333	N.S	0.235	0.00027	0.541	N.S
Z*(FO)	0.236	-0.00031	0.329	N.S	0.079	0.00035	0.719	N.S
Z*(MO)	0.237	-0.00007	0.172	N.S	0.214	0.00003	0.054	N.S

TABLE 13 REGRESSION COEFFICIENT FOR THE RELATION BETWEEN EXPOSED FATHER AND NONEXPOSED MOTHER

表13 父被爆群と母非被爆群間に関連した回帰係数

ITEM	NONEXPOSED & EXPOSED FATHER & NONEXPOSED MOTHER				EXPOSED FATHER & NONEXPOSED MOTHER			
	CONSTANT	SLOPE	T-VALUE	(DF=3)	CONSTANT	SLOPE	T-VALUE	(DF=2)
GIRLS AGED 6 YEARS								
MEAN	112.6	0.00084	0.429	N.S	113.1	-0.00067	0.341	N.S
VARIANCE	18.8	-0.01135	0.271	N.S	25.6	-0.03521	0.846	N.S
COVARIANCE:W(F0)	7.1	0.02481	1.113		5.9	0.02909	0.987	
COVARIANCE:W(M0)	5.2	-0.02145	1.124		10.7	-0.01080	0.969	
Z-VALUE:Z(F0)	0.295	0.00347	4.088	P<.05	0.161	0.00394	4.936	P<.05
Z-VALUE:Z(M0)	0.140	-0.00117	0.816	N.S	0.233	-0.00150	0.814	N.S
Z*(F0)	0.260	0.00176	2.243	SUGG	0.144	0.00217	2.774	SUGG
Z*(M0)	0.124	-0.00098	0.813	N.S	0.194	-0.00123	0.784	N.S
GIRLS AGED 7 YEARS								
MEAN	118.1	-0.01257	1.082	N.S	118.1	-0.01304	0.845	N.S
VARIANCE	23.4	0.04073	0.662	N.S	16.6	0.08903	2.895	SUGG
COVARIANCE:W(F0)	7.9	-0.01272	0.440		9.4	-0.02327	0.656	
COVARIANCE:W(M0)	5.2	0.09269	1.562		11.5	-0.02307	1.801	
Z-VALUE:Z(F0)	0.302	-0.00036	0.237	N.S	0.413	-0.00118	0.812	N.S
Z-VALUE:Z(M0)	0.148	0.00368	1.455	N.S	0.282	0.00270	0.915	N.S
Z*(F0)	0.251	-0.00048	0.511	N.S	0.310	-0.00091	0.884	N.S
Z*(M0)	0.122	0.00218	0.513	N.S	0.176	0.00177	0.313	N.S
GIRLS AGED 8 YEARS								
MEAN	123.1	0.00310	1.747	SUGG	123.7	0.00102	1.701	N.S
VARIANCE	26.9	-0.02817	0.615	N.S	31.9	-0.04564	0.774	N.S
COVARIANCE:W(F0)	8.7	-0.03474	0.951		8.9	-0.03549	0.694	
COVARIANCE:W(M0)	7.9	-0.01350	0.583		11.3	-0.01288	1.949	
Z-VALUE:Z(F0)	0.293	-0.00122	1.422	N.S	0.261	-0.00111	0.942	N.S
Z-VALUE:Z(M0)	0.233	-0.00020	0.266	N.S	0.317	-0.00048	0.521	N.S
Z*(F0)	0.253	-0.00102	1.910	SUGG	0.212	-0.00088	1.239	N.S
Z*(M0)	0.204	-0.00028	0.520	N.S	0.283	-0.00055	0.887	N.S
GIRLS AGED 9 YEARS								
MEAN	128.7	0.00123	0.234	N.S	128.2	0.00363	0.681	N.S
VARIANCE	30.9	0.02235	0.603	N.S	30.8	0.02278	0.457	N.S
COVARIANCE:W(F0)	9.8	0.06312	1.022		5.3	0.08540	1.157	
COVARIANCE:W(M0)	8.5	0.02329	0.469		11.2	-0.01419	1.040	
Z-VALUE:Z(F0)	0.342	0.00188	0.804	N.S	0.338	0.00191	0.618	N.S
Z-VALUE:Z(M0)	0.200	0.00048	0.223	N.S	0.348	-0.00041	0.185	N.S
Z*(F0)	0.303	0.00060	0.312	N.S	0.347	0.00034	0.138	N.S
Z*(M0)	0.180	0.00011	0.054	N.S	0.342	-0.00087	0.498	N.S
GIRLS AGED 10 YEARS								
MEAN	134.4	0.00467	1.685	SUGG	133.6	0.00643	3.187	P<.05
VARIANCE	43.2	-0.01172	0.328	N.S	35.6	0.00562	0.144	N.S
COVARIANCE:W(F0)	7.8	-0.03430	1.122		11.9	-0.04369	1.138	
COVARIANCE:W(M0)	10.0	-0.01313	0.596		10.8	-0.00738	1.074	
Z-VALUE:Z(F0)	0.201	-0.00087	1.107	N.S	0.307	-0.00112	1.175	N.S
Z-VALUE:Z(M0)	0.241	-0.00002	0.035	N.S	0.265	-0.00008	0.086	N.S
Z*(F0)	0.179	-0.00060	0.765	N.S	0.266	-0.00079	0.818	N.S
Z*(M0)	0.214	-0.00015	0.338	N.S	0.213	-0.00015	0.248	N.S
GIRLS AGED 11 YEARS								
MEAN	141.3	0.00720	0.578	N.S	139.2	0.02064	22.230	P<.01
VARIANCE	45.7	-0.06503	0.428	N.S	47.0	-0.07494	0.354	N.S
COVARIANCE:W(F0)	10.0	0.05387	0.513		14.3	0.02224	0.160	
COVARIANCE:W(M0)	7.4	-0.03136	0.321		11.1	-0.02264	1.204	
Z-VALUE:Z(F0)	0.250	0.00269	0.933	N.S	0.292	0.00237	0.613	N.S
Z-VALUE:Z(M0)	0.218	-0.00180	0.596	N.S	0.112	-0.00100	0.258	N.S
Z*(F0)	0.210	0.00087	0.717	N.S	0.182	0.00109	0.674	N.S
Z*(M0)	0.185	-0.00155	0.819	N.S	0.067	-0.00066	0.316	N.S

TABLE 14 REGRESSION COEFFICIENT FOR THE RELATION BETWEEN NONEXPOSED FATHER AND EXPOSED MOTHER

表14 父非被爆群と母被爆群間に関連した回帰係数

ITEM	NONEXPOSED FATHER & NONEXPOSED & EXPOSED MOTHER				NONEXPOSED FATHER & EXPOSED MOTHER			
	CONSTANT	SLOPE	T-VALUE	(DF=3)	CONSTANT	SLOPE	T-VALUE	(DF=2)
GIRLS AGED 6 YEARS								
MEAN	112.6	-0.00095	0.244	N.S	113.3	-0.00303	0.804	N.S
VARIANCE	18.3	0.01007	1.317	N.S	18.7	0.00892	0.879	N.S
COVARIANCE:W(FO)	7.4	-0.01189	0.975		9.5	-0.01800	1.396	
COVARIANCE:W(MO)	5.1	0.02035	1.866		5.4	0.00014	0.015	
Z-VALUE:Z(FO)	0.318	-0.00048	0.583	N.S	0.477	-0.00095	1.285	N.S
Z-VALUE:Z(MO)	0.135	0.00170	3.788	P<.05	0.155	0.00164	2.770	SUGG
Z*(FO)	0.281	-0.00048	0.628	N.S	0.418	-0.00089	1.210	N.S
Z*(MO)	0.120	0.00096	2.880	P<.05	0.134	0.00092	2.084	SUGG
GIRLS AGED 7 YEARS								
MEAN	118.0	0.00038	0.439	N.S	117.8	0.00059	0.701	N.S
VARIANCE	23.7	0.02231	4.052	P<.05	20.5	0.02513	9.183	P<.01
COVARIANCE:W(FO)	7.6	0.01984	3.986		5.7	0.02158	4.353	
COVARIANCE:W(MO)	5.6	-0.01154	2.300		5.6	0.00003	0.008	
Z-VALUE:Z(FO)	0.283	0.00152	5.847	P<.01	0.163	0.00163	11.006	P<.01
Z-VALUE:Z(MO)	0.157	-0.00035	0.688	N.S	0.384	-0.00056	1.739	N.S
Z*(FO)	0.239	0.00060	2.828	P<.05	0.148	0.00069	4.558	P<.05
Z*(MO)	0.134	-0.00030	0.683	N.S	0.327	-0.00048	1.598	N.S
GIRLS AGED 8 YEARS								
MEAN	123.2	0.00615	1.005	N.S	123.8	0.00261	0.477	N.S
VARIANCE	25.9	-0.02444	0.394	N.S	19.7	0.01396	0.234	N.S
COVARIANCE:W(FO)	8.4	0.01330	0.465		5.0	0.03384	1.536	
COVARIANCE:W(MO)	7.0	0.02397	0.374		5.4	-0.00129	0.071	
Z-VALUE:Z(FO)	0.283	0.00157	1.590	N.S	0.162	0.00239	8.760	P<.01
Z-VALUE:Z(MO)	0.205	0.00191	0.835	N.S	-0.055	0.00366	2.802	SUGG
Z*(FO)	0.245	0.00118	1.314	N.S	0.135	0.00192	7.701	P<.01
Z*(MO)	0.179	0.00146	0.756	N.S	-0.040	0.00294	2.627	SUGG
GIRLS AGED 9 YEARS								
MEAN	128.8	0.00909	1.030	N.S	129.7	0.00390	0.416	N.S
VARIANCE	31.2	-0.01178	0.317	N.S	34.1	-0.02863	0.650	N.S
COVARIANCE:W(FO)	9.9	-0.02745	1.659		8.4	-0.01877	1.023	
COVARIANCE:W(MO)	8.6	-0.01153	0.801		5.2	-0.00062	0.038	
Z-VALUE:Z(FO)	0.335	-0.00074	0.977	N.S	0.262	-0.00028	0.375	N.S
Z-VALUE:Z(MO)	0.204	0.00087	1.021	N.S	0.318	0.00014	1.065	N.S
Z*(FO)	0.294	-0.00085	1.314	N.S	0.214	-0.00033	0.950	N.S
Z*(MO)	0.181	0.00042	0.640	N.S	0.266	-0.00013	0.493	N.S
GIRLS AGED 10 YEARS								
MEAN	134.4	-0.00536	1.527	N.S	134.1	-0.00347	0.800	N.S
VARIANCE	44.3	-0.07379	1.594	N.S	49.5	-0.10623	2.609	SUGG
COVARIANCE:W(FO)	7.4	0.01350	0.271		6.3	0.02035	0.298	
COVARIANCE:W(MO)	10.5	-0.04182	0.597		5.2	-0.00028	0.017	
Z-VALUE:Z(FO)	0.192	0.00055	0.455	N.S	0.167	0.00071	0.435	N.S
Z-VALUE:Z(MO)	0.256	-0.00111	0.493	N.S	0.386	-0.00196	0.696	N.S
Z*(FO)	0.169	0.00040	0.375	N.S	0.119	0.00073	0.525	N.S
Z*(MO)	0.220	-0.00116	0.680	N.S	0.271	-0.00149	0.651	N.S
GIRLS AGED 11 YEARS								
MEAN	141.4	0.00282	0.219	N.S	141.5	0.00219	0.126	N.S
VARIANCE	45.1	-0.00041	0.008	N.S	40.7	0.02374	0.374	N.S
COVARIANCE:W(FO)	9.2	-0.02108	0.679		4.1	0.00691	0.833	
COVARIANCE:W(MO)	7.2	-0.02898	0.627		5.3	-0.00050	0.034	
Z-VALUE:Z(FO)	0.237	-0.00047	0.706	N.S	0.139	0.00008	0.220	N.S
Z-VALUE:Z(MO)	0.221	-0.00062	0.444	N.S	0.211	-0.00057	0.293	N.S
Z*(FO)	0.202	-0.00045	0.846	N.S	0.128	-0.00003	0.088	N.S
Z*(MO)	0.191	-0.00058	0.474	N.S	0.205	-0.00066	0.392	N.S