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On the Changed Indications as Observed in the Sperm of the Patients Victimized by the Bikini H-Bomb Explosion*

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During the period from March 29, 1954, to August 3, 1954, the sperm of 18 of victims of the Bikini H-bomb explosion was examined 24 times. (See the attached Table.)

Since their hospitalization the patients had had no coitus, nor had they experienced any noctural pollution within a week prior to the examination.

The sperm of each patient was obtained by masturbation, and immediately subjected to microscopy.

2. With respect to the quantity of ejaculation at one time, color, odor, viscosity, PH. specific gravity, etc., the sperm was in normal condition in all cases, nor was there found anything abnormal in the Böttger crystal.

3. Number of spermatozoa per unit volume: The number of spermatozoa per 1 mm^3 of the sperm was calculated in the Thoma Counting Cell from the original fluid, or by diluting it with physiologic saline solution 5 or 10 times by the use of a pipet for white blood corpuscles.

It is generally said that the number of spermatozoa of a healthy Japanese adult is 10,000-100,000 or upwards per 1 mm^3 of sperm, and that in case the number is 5,000-10,000 or thereabouts, the lessening of fertility will occur, and, if below 5,000, fertilization become impossible.

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It is noteworthy that in 16 of the 24 examinations the spermatozoa numbered less than 10,000, especially, in 14 examinations they were below 1,000.

4. The number of spermatozoa at the time of ejaculation: This was calculated from the quantity of ejaculation and the number of spermatozoa per unit volume of their sperm.

The total number of spermatozoa of a healthy Japanese adult is considered to be 3×10^7 -- 5×10^8 or upwards. It was in 7 of the 24 examinations that value was shown to be above 3×10^7.

5. Mobility of spermatozoa.

The mobility of spermatozoa immediately after sperm ejaculation was examined chiefly under the phase contrast microscope. The rate of mobility was calculated in accordance with the Nishikawa method, by dividing the spermatozoa into the following 5 groups and by multiplying the percentages of those groups by 1, 3/4, 1/2, 1/4 and 0 respectively, and putting together the product which resulted.

1st group, moving forward actively	% x 1
2nd group, moving forward slowly	% x 3/4
3rd group, rotating	% x 1/2
4th group, pendulating	% x 1/4
5th group, standing still	% x 0

Rate of mobility	Total	%

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It is considered that, according to the Nishikawa method, the rate of mobility of the sperm for a healthy Japanese adult is 70-100%.

All the examined instances showed that the rate was sub-normal. Especially, the fact that in 17 of the 24 examinations the rate was below 10% indicated a pronounced case of necro-spermia.

6. Deformity of spermatozoa.

With respect to deformity of spermatozoa, examination was made under the microscope by using specimens stained by the Wright, Von tana Method, while some fresh specimens were examined under a phase contrast microscope.

The percentage of spermatozoa deformity for a healthy Japanese adult is less than 15%.

In the examined instances the percentages were above 20%. Deformity was specially noticeable in the heads of the spermatozoa, which were defective, dwarf, giant or dicephalous. Only in the cases where the number of spermatozoa were less than 1,000, it was difficult to calculate the percentage of deformity.

7. Conclusion

a) These Bikini victims showed a notable decrease in the number and mobility of spermatozoa as well as the deformity of spermatozoa, oligozoospermia and necrospermia.

b)

b) The above-mentioned spermatozoal abnormalities were observed also in 6 patients with children under the age of 5. That is to say, the Bikini explosion deprived a number of young men of the normal fertility they had possessed before.

c) The fact that all the men showed a decrease in number and mobility of spermatozoa, an increase in ratio of the deformity of spermatozoa, etc. indicates that they are suffering from the one and same external cause -- namely, radiation injury.

d) The lack of mobility of spermatozoa in many instances, a considerable decrease in number of spermatozoa, and the high percentage in the deformity of spermatozoa, notably in the heads, give rise to grave apprehension about the future of these patients.

e) Of those whose number of spermatozoa was comparatively large at the first examination, 2 showed at the second examination a decrease in not only number but also mobility of spermatozoa, and at the third examination the symptoms were found to have worsened rather than improved. These facts proves that in the testis there was a disturbance affecting the formation of spermatozoa; that in the first examination the already formed spermatozoa had been excreted; and that in the second and subsequent examinations there had taken place a decrease in number of spermatozoa and necrospermia.

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f) With respect to the 6 patients, of whom the number of spermatozoa was round at the first examination to be within the normal range, the second and subsequent examinations were not made. However, if the above-mentioned reasons are taken into account together with another attendant factor -- the decrease of mobility of spermatozoa, it is presumed that they too are suffering from oligozoospermia.

g) Also in the examination which all the patients victimized by the Bikini H-bomb explosion underwent 5 months after their suffering from the bomb ashes, it is noted that their spermatozoal changes were observed to a remarkable extent, and this is the fact which has been giving great anxiety to the patients.

Appendice: 1 Table, 3 graphs.

August 31, 1954.