

DECREASES IN SPERM CONCENTRATION DUE TO TESTICULAR BIOPSY PROCEDURE IN MAN

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Knowledge of the histopathology of the human testes as revealed by testicular biopsy has been valuable in serving as a guide to treatment of patients having hypogonadism and infertility. It has been invaluable in investigating the effects of hormones, drugs and radiation on testicular function and in the investigation of the process of spermatogenesis in man.¹⁻⁴

In most clinical and investigative approaches a parallel and serial observation of the seminal fluid for sperm count, morphology and motility is conducted. Therefore, it is important to know if the procedure of obtaining the biopsy has any influence upon the sperm count. In 1965 Rowley and Heller reported decreases in sperm count following testicular biopsy procedures.⁵ This is not too surprising in view of the profound deleterious effects that the biopsy procedure has in mouse, rat, ram, stallion and bull.^{6, 7} Recently Gordon and associates, describing the effects of obtaining

testicular biopsies upon sperm count in 20 normal men, confirmed our findings.⁸

Thus, it is important to know more precisely in what proportion of men testicular biopsy was followed by a decrease in sperm count, how soon afterwards this occurred, to what extent sperm count fell and the duration of the decrease. When serial sperm counts are an important parameter in following therapy or an experimental procedure, these effects should be taken into account.

Therefore, we are reporting the effects of bilateral testicular biopsies upon 100 normal young men in whom serial sperm counts were measured before and after performance of the testicular biopsy procedure.

METHODS

Following 3 days of abstinence, masturbated seminal fluid specimens were collected once weekly for 4 to 18 weeks prior to and up to 18 weeks after testicular biopsy was obtained in 100 volunteers. Each seminal fluid sample was counted twice while fresh by 2 technicians. The frozen semen was then transported and recounted by another individual.

Each biopsy was obtained and processed as described by Rowley and Heller.⁹ The effects of a second biopsy obtained during the post-treatment control period following the administration of various hormones were also observed in 14 men.

Only reproductively normal subjects were included as judged from normal control values for sperm count, motility and morphology, total urinary pituitary gonadotropins, interstitial-cell-stimulating hormone, follicle-stimulating hormone, total estrogens, testosterone and normal testicular architecture.

Statistical evaluation of the sperm counts was

* Gordon, D. L., Barr, A. B., Herrigel, J. E. and Paulsen, C. A.: Testicular biopsy in man. I. Effect upon sperm concentration. *Fertil. Steril.*, 16: 522, 1965.

* Rowley, M. J. and Heller, C. G.: The testicular biopsy: surgical procedure, fixation and staining techniques. *Fertil. Steril.*, 17: 177, 1966.

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¹ Clermont, Y.: The cycle of the seminiferous epithelium in man. *Amer. J. Anat.*, 112: 35, 1963.

² Heller, C. G. and Clermont, Y.: Kinetics of the germinal epithelium in man. *Recent Progr. Hormone Res.*, 20: 545, 1964.

³ Heller, C. G., Wootton, P., Rowley, M. J., Lalli, M. F. and Brusca, D. R.: Action of radiation upon human spermatogenesis. In: *Proceedings of the Sixth Pan American Congress of Endocrinology*. Mexico City, October 10-15, 1965. New York: Excerpta Medica Foundation, p. 408, 1966.

⁴ Heller, C. G., Flageolle, B. Y. and Matson, L. J.: Histopathology of the human testes as affected by bis(dichloroacetyl)diamines. *Exper. & Molec. Path.*, suppl. 2, p. 107, 1963.

⁵ Rowley, M. J. and Heller, C. G.: An analysis of one or more testicular biopsies upon sperm count. *Prog. Northwest Soc. Clin. Res.*, abstract, 1965.

⁶ Byers, J. H.: The influence of testes biopsy on semen quality. *J. Dairy Sci.*, 36: 1165, 1953.

⁷ Gassner, F. X. and Hill, H. J.: Testicular biopsy in the bull. II. Effect on morphology of testes. *Fertil. Steril.*, 6: 290, 1955.

Subjects responding to testicular biopsy procedure by a fall in sperm concentration

Control Period		Decrease Period		Recovery Period	
Pre-Biopsy Median	Pre-Biopsy Range	0-10 Weeks Post-Biopsy Median	0-10 Weeks Post-Biopsy Range	10-18 Weeks Median	10-18 Weeks Range
<i><50 m/cc</i>					
26	4-48	6	1-28	26	14-56
47	2-101	16	10-35	45	19-69
20	4-34	2	0-8	Not available	
<i>50-150 m/cc</i>					
96	66-156	96	20-124	Not available	
70	64-105	37	13-72	59	25-107
130	66-196	54	36-108	Not available	
84	36-134	51	20-108	52	34-136
100	90-130	38	13-56	65	35-100
54	29-135	28	22-51	Not available	
111	76-133	78	72-82	Not available	
102	59-155	78	46-118	123	69-138
125	41-188	106	51-126	145	110-161
140	93-164	37	22-63	83	71-116*
93	63-142	50	11-98	77	46-102
77	64-196	60	32-160	121	42-265
60	27-130	19	14-76	44	17-56
95	80-120	46	14-98	54	14-84
102	74-136	50	25-154	76	20-98
<i>>150 m/cc</i>					
330	141-517	151	88-377	240	215-259
219	136-292	92	40-236	128	48-160
217	193-264	173	152-284	180	152-265
325	75-499	243	152-393	260	180-308
180	130-240	142	68-263	184	152-310
222	214-402	153	90-376	216	90-342
379	282-306	156	120-202	203	197-218*
320	242-450	68	29-446	352	202-364
256	182-296	178	140-237	186	128-271
166	100-212	81	42-114	Not available	
400	284-528	86	76-214	186	125-234
251	116-464	192	44-516	208	192-218*
236	154-320	130	30-248	Not available	
213	99-239	118	91-157	247	167-291
278	132-510	64	30-156	142	†
202	150-349	128	15-331	182	75-236*
336	229-426	210	146-320	Not available	
205	170-285	165	76-229	Not available	
177	134-220	92	47-188	113	67-249
244	158-253	173	120-196	Not available	
160	84-217	134	74-141	157	93-218

* 3 counts.
† 1 count.

performed using the Mann-Whitney test for a 0.05 level of significance.¹⁰

RESULTS

There was a statistically significant decrease in the sperm count in 39 of the 100 men; only 4 men

had a statistically significant increase in sperm count and the remaining 57 were unchanged. Significant decreases were observed by the end of 3 weeks following biopsy in 18 subjects and after 3 weeks in 21 subjects. The onset of recovery was noted no later than 10 weeks following biopsy in each subject and was complete by 18 weeks.

Does the level of the median pre-biopsy sperm count have any relationship to the effect of obtaining the biopsy? In order to answer this question the 100 subjects were divided into groups: 1) less than 50 million per cc (m per cc), 2) 50 to 150 m per cc and 3) more than 150 m per cc. We

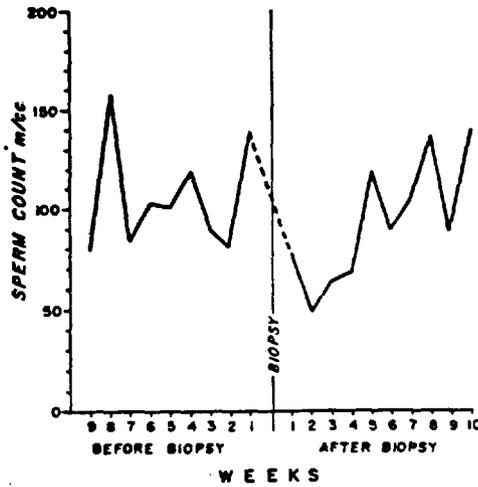


FIG. 1. Subject exhibiting abrupt fall and recovery in sperm concentration following testicular biopsy.

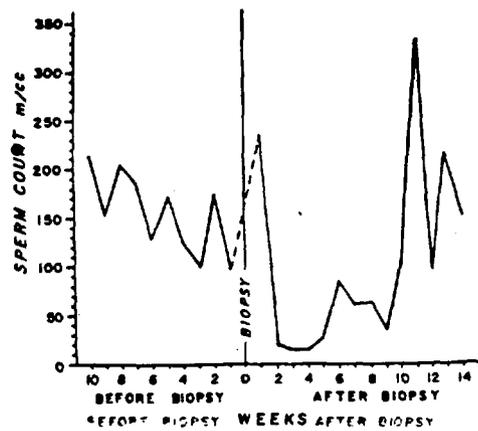


FIG. 2. Subject exhibiting prolonged fall and recovery in sperm concentration following testicular biopsy.

then tested the hypothesis that the percentage having a decrease in each group would be the same as for the entire group of 100, i.e. 39 per cent. In the less than 50 m per cc group 15 per cent had a decrease, in the 50 to 150 m per cc group 34 per cent had a decrease and in the more than 150 m per cc group 58 per cent had a decrease. We concluded that a testicular biopsy procedure has a more profound effect the higher the median sperm count is. This conclusion was reached using the chi square test at the 0.05 level of significance.

The degree of the decrease is illustrated in the table. Note that only in the less than 50 m per cc group was azoospermia attained (1 subject). In those whose control count median is more than 50 m per cc the median sperm count may be reduced as much as 75 per cent or an average of 42 per cent.

Two types of sperm count decreases were observed. The first type had an abrupt decrease followed by an immediate return to normal within the initial 10-week post-biopsy period (fig. 1). The second type had a decrease that continued

for 5 weeks and recovery which began by 10 weeks, but was not completed until 18 weeks had elapsed (fig. 2).

The effect of a second testicular biopsy procedure during a post-treatment control period was to cause a decrease in sperm count in the same 3 men who had a decrease following their first biopsy. The other 11, whose sperm count was unchanged following the initial biopsy, were unaffected following the second biopsy.

SUMMARY

After obtaining a testicular biopsy in 100 normal men a drop in sperm count was observed in 39, a rise in 4 and no change in 57. The decrease occurred before 10 weeks. Recovery began by 10 weeks and was complete in 18 weeks. The average median decrease in sperm count was 42 per cent. The higher the median pre-biopsy count the more subjects had a fall in post-biopsy counts. We conclude that 10 to 18 weeks should elapse after a testicular biopsy is obtained before therapy is administered or an experimental procedure is instituted.

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