Normal semen parameters in cancer patients presenting for cryopreservation before gonadotoxic therapy

Similar sperm qualities in men with and without cancer were found. Patient and physician awareness and early referral for sperm banking are essential in preserving fertility potential in men with malignancies. (Fertil Steril® 2004;82:505-6. ©2004 by American Society for Reproductive Medicine.)

Prior investigators have reported that more than half of the men of reproductive age with malignancies, such as testicular cancer and lymphoma, have impaired semen quality (1, 2). Chemotherapy or radiotherapy can further damage spermatogenesis, with lasting effects of up to 5 years (3). With increased awareness of the need for sperm banking, men have been presenting for cryopreservation soon after diagnosis. However, physicians might fail to offer cryopreservation to men with cancer, assuming that the semen quality is too impaired and that the fertility potential will further be decreased by the process of cryopreservation (4). With sophisticated assisted reproductive techniques, pregnancies and deliveries have been reported with cryopreserved spermatozoa from cancer patients, without increased risk of congenital anomalies (5, 6). In addition, with excellent cure rates for testicular cancer and increased survival in many urologic and nonurologic malignancies, most cancer survivors want to have children. We present a comparative analysis of sperm quality and postthaw survival in men with and without malignancies.

The statistical database of all men seeking sperm cryopreservation at a single licensed and accredited sperm bank was reviewed from 1997 to 2001. Two hundred fourteen men with cancer and 22 men without cancer were evaluated. Two patients with azoospermia were excluded. One of these patients had azoospermia after a unilateral orchiectomy for seminoma, whereas the other had acute myelogenous leukemia. All specimens were collected by masturbation into a sterile container before the initiation of cancer treatment. A single technician performed semen analysis within 1 hour of collection. The parameters compared were patients’ age, sperm volume, concentration, total count, motility, motile fraction, postthaw motility, and viability. Postthaw parameters were obtained after specimens were frozen for 24 hours and then thawed. All cancer patients, cancer patients with a total sperm count of $5 \times 10^{6}$ or greater, and those with acute leukemia were compared with men without cancer. Mann-Whitney rank sum test and t-test were used for data analysis. This study was issued a waiver of authorization by the North Shore-Long Island Jewish Health System institutional review board.

Of the cancer patients, 22.6% had nonseminomatous primary testicular cancer, 20.8% had Hodgkin’s lymphoma, 18.8% had testicular seminoma, 12.3% had non-Hodgkin’s lymphoma, 5.2% had prostate cancer, 4.3% had acute leukemia, and 16.0% had other types of cancer. Of the 22 men without cancer, 36.4% requested cryopreservation before vasectomy, and the remainder sought cryopreservation for other benign conditions. The mean age of men without cancer was 35.23 years (range, 19–55 years), and for cancer patients the mean age was 30.10 years (range, 14–67 years). Patients’ age was the only statistically significant difference between any of the cancer groups compared with men without cancer ($P<.05$). None of the prefreeze or postthaw semen parameters were significantly different between patients with cancer compared with those without malignancies (Table 1).

Cryopreservation is often the only chance for fertility in men diagnosed with cancer who need urgent cancer treatments. Initially, the treatment of malignancy is the primary goal, but surviving men do not have to suffer the agony and disappointment of infertility that follow such therapy. Return of spermatogenesis after radiotherapy depends on the radiation dose. At doses of >400 cGy, 5 years or more is needed for spermatogenesis to resume and 9–18 months if <100 cGy is administered (7). Up to 25% of men might remain permanently infertile after infradiaphragmatic radiotherapy (8). The majority of men treated with commonly used platinum-based chemotherapeutic agents develop azoospermia that can last up to 4 years (9). Permanent sterility has been reported in almost all men with Hodgkin’s lymphoma treated with COPP (cyclophosphamide, vincristine, procarbazine, prednisone) (10), with return of spermatogenesis in 50% of those treated with other agents, such as cisplatin.

As mentioned earlier, multiple studies have shown the inferior sperm quality of some cancer patients, such as those with testicular cancer and lymphoma. Hallak et al. (11) demonstrated that the motile sperm count of
patients with testicular cancer was lower prefreeze and postthaw compared with normal donors. In another study, the percent change in motility was greater after thawing for cancer patients compared with normal donors, although not statistically significant (12). However, other studies have not demonstrated a significant decline in sperm quality of cancer patients after cryopreservation compared with normal donors (13, 14). In our study, the semen quality of patients with cancer did not differ significantly from that of men without cancer. This change from prior investigations might be related to more rapid diagnosis and referral for sperm banking in cancer patients. Although a recent survey showed that 91% of oncologists agree that cryopreservation should be offered to all eligible men, only 10% always offered it, and 27% offered it only half the time (15). Lack of discussion time, presumed high cost, and unavailability of adequate facilities were reported as the most common reasons that sperm banking was not suggested. Another survey by the same investigators revealed that only 51% of eligible men diagnosed with cancer remembered being offered to bank sperm, and only 24% cryopreserved their semen (16).

We suggest that cryopreservation should be offered to patients diagnosed with cancer as soon as possible and before initiation of any therapy, such as orchietomy. Petersen et al. (17) demonstrated that semen quality significantly decreases after orchietomy for testicular cancer. Hospitalized men who present critically ill and need urgent chemotherapy, such as those with acute leukemia, should also be encouraged to cryopreserve sperm before beginning gonadotoxic therapy. Misconceptions and inaccurate information regarding infertility and sperm banking in men with cancer can lead to permanent impairment of fertility. The importance of educating health care professionals and counseling patients before surgical intervention or the start of gonadotoxic therapy cannot be overemphasized.

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**References**