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Making Cancer History™

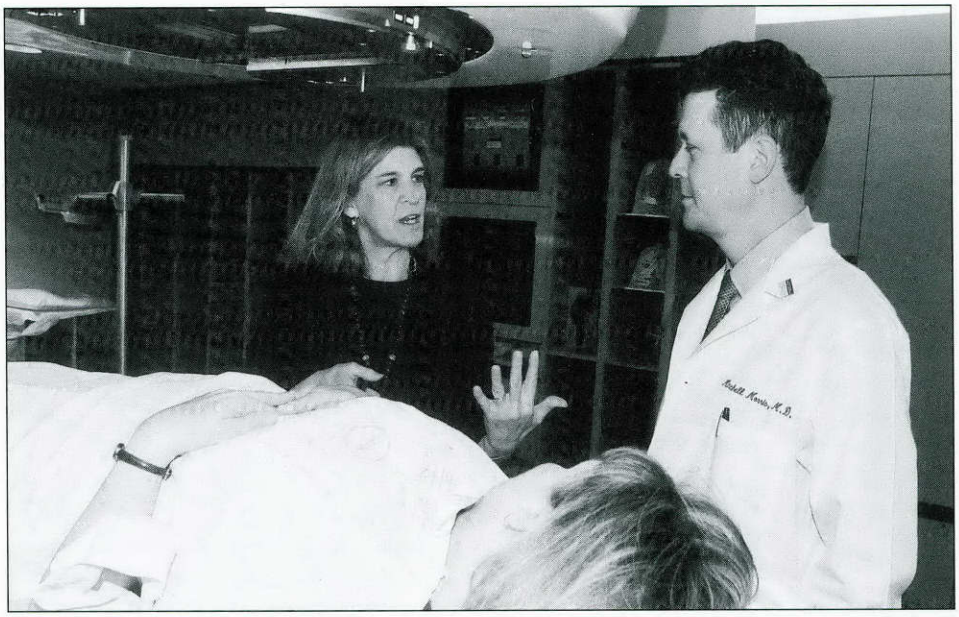
MD Anderson OncoLog

National Cooperation Leads to New Standard of Treatment for Cervical Cancer

by Kerry L. Wright

In 1965, Drs. Felix Rutledge, Gilbert Fletcher, and Julian Smith of The University of Texas M. D. Anderson Hospital and Tumor Institute (now The University of Texas M. D. Anderson Cancer Center) combined chemotherapy and radiation therapy for the first time to treat patients with cervical cancer.

Although their revolutionary therapy did not become widely used because there was no conclusive scientific evidence to prove its benefit, they left a legacy of cooperation between the departments of Gynecologic Oncology and Radiation Oncology. Now, 35 years later, chemoradiation has become the standard of treatment for patients with locally advanced cervical cancer, thanks to five national clinical trials and the legacy of cooperation that still remains.



Patricia Eifel, M.D., *a professor in the Department of Radiation Oncology, and* **Mitchell Morris, M.D.**, *a professor in the Department of Gynecologic Oncology, were co-investigators in a Radiation Therapy Oncology Group trial that helped bring about a change in the standard treatment of patients with locally advanced cervical cancer.*

The five chemoradiation trials were conducted throughout the 1990's by three National Cancer Institute (NCI) Clinical Trials Cooperative Groups, including the Radiation Therapy Oncology Group (RTOG), which worked with more than 20 institutions led by M. D. Anderson. The RTOG trial results, published last April in *The New England Journal of Medicine*, showed that patients treated with cisplatin, fluorouracil (5-FU), and concurrent radiation had a 50% higher five-year survival rate than patients treated with radiation alone.

All five studies used cisplatin-based chemotherapy and low-dose

(Continued on **next page***)*

New Standard of Treatment for Cervical Cancer

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radiation, and all showed overall survival rate increases between 30% and 50%, prompting a rare NCI clinical alert last February.

"It really represented one of the first times that we had powerful, clear-cut evidence of a particular treatment methodology being the appropriate way to go," said Mitchell Morris, M.D., professor in the Department of Gynecologic Oncology at M. D. Anderson and co-principal investigator of the RTOG trial.

Prior to release of the trial results, radiation alone was the primary treatment for locally advanced cervical cancer. Because its normal tissues are highly radioresistant and because radiation sources can be inserted adjacent to it, the cervix is an ideal target for this type of therapy.

"For many years, cervical cancer—even some large cervical cancers—has been treated successfully with a combination of external-beam radiation therapy and low-dose-rate intracavitary radiation, where sources are placed in the uterus and the vagina, that can be delivered over a couple of days," said Patricia Eifel, M.D., professor in the Department of Radiation Oncology and co-principal investigator, alongside Dr. Morris, of the RTOG trial.

Radiation therapy has been successful in treating many types of cervical cancer, and either radiation or surgery alone remains the standard for treatment of small and localized tumors.

"The five-year survival rate for patients with small cervical cancers, less than 2 cm, who are treated with radical surgery or radiation is more than 90%," said Charles Levenback, M.D., associate professor in the Department of Gynecologic Oncology.

Initially, neoadjuvant chemotherapy (chemotherapy and radiation given in sequence) was tested in patients with larger and more advanced tumors. However, those studies did not show a survival advantage, possibly because in some cases the chemotherapy was ineffective and only postponed radiation treatment, said Dr. Levenback.

According to Dr. Eifel, radiation treatment for cervical cancer was already very specialized, and the therapy is even more complicated now that chemotherapy has been added. In addition, there are only about 13,000 new cases of cervical cancer a year in this country, making the disease even more difficult to treat for physicians in smaller institutions who see only a few patients a year.

"To get the best results, I think this is a disease that requires the patient be treated in a place where there is very close cooperation between experienced gynecologic and radiation oncologists," Dr. Eifel said.

The chemoradiation regimen currently used at M. D. Anderson takes seven to eight weeks and involves external radiation given five times a week for four to five weeks, followed by two 72-hour, intracavitary treatments given two weeks apart. Three cycles of chemotherapy are delivered intermittently throughout the entire period.

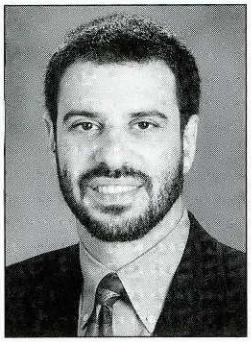
The radiation works by inducing DNA damage to prevent cells from replicating, and the simultaneous chemotherapy enhances the effect.

"The cisplatin binds to the DNA that is damaged by radiation, and then the DNA is not easily repaired anymore, and it enhances cell death," said Dr. Morris. "The other way it works is on a systemic level," he said.

"One of the big issues remaining is finding the most effective chemotherapy regimen with the fewest side effects," said Dr. Levenback. Recent discussions have focused on how often drugs should be delivered and which of the drug treatments—cisplatin and 5-FU together, cisplatin alone, or something entirely different—is the best. New compounds such as oral fluoropyrimidines (oral forms of 5-FU) are also being considered for testing to find new and easier ways to administer the drugs.

While these new studies are being designed, follow-up studies from the initial chemoradiation trials are ongoing, and another major analysis will probably be done in the next year, said Dr. Morris.

"We want to make sure that even though we see an improvement in survival, we're not just shifting the survival curve [by increasing the long-term compli-



"One of the big issues remaining is finding the most effective chemotherapy regimen with the fewest side effects."

– Charles Levenback, M.D., associate professor in the Department of Gynecologic Oncology

Regular Pap Smears Still Key to Preventing Cervical Cancer

by Kerry L. Wright

Technological advances have improved methods of screening for cervical cancer, but whether new devices or traditional procedures are used, the most important message remains: all women should have a Pap smear regularly.

According to Elise Cook, M.D., assistant professor in the Department of Clinical Cancer Prevention at The University of Texas M. D. Anderson Cancer Center, collection, processing, and evaluation of a Pap smear are equally important in obtaining accurate results. She emphasizes that a good collection will sample cells from both the outside of the cervix (the portio) and the inside, particularly the squamocolumnar junction, the area at highest risk for developing cancer.

Recently, automated devices designed to improve the processing and evaluation of the test have become available. While these devices are not routinely offered at M. D. Anderson, they may be helpful in settings where expert pathology is not available.

"The concern about these new Pap smear devices is that they increase cost, and we're not sure that we're getting much for our increase of cost," said Dr. Cook. Many organizations and physicians, including Dr. Cook, feel that money should instead be spent on increasing the number of women who are screened. "That's where you'll get the decrease in cervical cancer," she said.

Unscreened populations often include women who are not well educated or who may have financial, physical, or emotional barriers that prevent them from having regular screening. It is important to encourage these patients to have a Pap smear, said Dr. Cook. Because rates of cervical cancer increase with age, older women who have never had a Pap smear should especially be encouraged to have one.

Once these populations have been screened, it is also important for the patients to receive further care if their test results are abnormal. Michele Follen, M.D., professor in the Department of Gynecologic Oncology at M. D. Anderson, holds a weekly clinic at Lyndon B. Johnson General Hospital in Houston for underprivileged patients who have had abnormal Pap smears. These patients undergo colposcopies and other biopsies to further detect and identify abnormalities.

Since the development of the Pap smear by George Papanicolaou in 1941, U.S. cervical cancer mortality rates have decreased more than 70%. However, about 13,000 American women still develop cervical cancer each year, and 5,000 still die from the disease.

Dr. Cook said that to help prevent these cases, physicians should offer their patients advice from the following list: "Numbers 1, 2, 3, and 4 are 'get a Pap smear,'" she said. ●

FOR MORE INFORMATION, *contact Dr. Cook at (713) 745-8048.*

Cervical Cancer Screening Recommendations

According to the **"American Cancer Society Recommendations for the Early Detection of Cancer in Average Risk, Asymptomatic People,"** all women who are or have been sexually active or have reached age 18 should have an annual Pap test and pelvic examination. After a woman has had 3 or more consecutive satisfactory normal annual examinations, the Pap test may be performed less frequently at the discretion of the physician.

cations of the treatment]," he said. Though no major problems were detected during the studies, radiation injury and other complications may take some time to surface.

Chemoradiation has significantly changed the treatment of cervical cancer, but exciting advances are also being made in the area of tumor vaccines. The highest risk factor for developing cancer of the cervix is infection with specific strains of the human papillomavirus (HPV), and both prophylactic vaccines that would be administered to everyone before they could contract the virus and treatment vaccines that might be of use after infection are being developed.

"HPV vaccines, especially those that produce antibodies to the late envelope proteins, may be important for reducing oncogenic viruses. This could lead to a reduction in cervical cancer over the long term," said Ralph Freedman, M.D., Ph.D., professor in the Department of Gynecologic Oncology.

M. D. Anderson is one of four institutions participating in an international study of a vaccine developed to treat patients with both preinvasive and invasive cervical cancer. In collaboration with Raymond Kaufman, M.D., professor in the Department of Obstetrics and Gynecology at Baylor College of Medicine, Dr. Freedman is evaluating responses at the laboratory level of patients treated at Baylor with the novel treatment vaccine.

Like the influenza virus, there are many strains of HPV, and the number is constantly increasing. Only a few strains are associated with cervical cancer, so these are the ones that must be tracked and targeted for the vaccines.

"There has been a lot of progress made, and some of the early reports of human trials are showing that the vaccines are having a good response," said Dr. Morris.

Only one generation removed from the fathers of chemoradiation and heading into a new millennium, laboratory scientists and physicians are working together to one day eliminate—or at least hold the power to eliminate—cervical cancer.

"I think there's a good chance that an HPV vaccine that effectively prevents infection will be in use sometime in the next decade, and then you could eradicate cervical cancer," said Dr. Morris. "It would be amazing." ●

FOR MORE INFORMATION, *contact Dr. Morris at (713) 745-3000, Dr. Eifel at (713) 792-3444, Dr. Levenback at (713) 745-2563, or Dr. Freedman at (713) 792-2764.*

Turn to page 4 for Cervical Cancer Protocols.

Cervical Cancer Clinical Trials

Clinical trials in progress at The University of Texas M. D. Anderson Cancer Center include the following for patients with cancer of the cervix.

- A limited-access phase II trial of cisplatin and vinorelbine (navelbine) in advanced and recurrent squamous cell carcinoma of the cervix (GOG 76-Z). *Physician: Mitchell Morris, M.D.*

  This study is designed for patients with histologically confirmed advanced, persistent, or recurrent squamous cell carcinoma of the cervix who have documented disease progression after local therapy. Participants must have measurable disease that can be defined in two dimensions by palpation, x-ray, or ultrasonography. If a patient's only measurable site of disease has been irradiated previously, disease progression at the site must be documented before enrollment in this study.

- A randomized, double-blind study of eflornithine (DFMO) versus placebo in patients with grade 2 or 3 cervical intraepithelial neoplasia (CIN) (ID92-026). *Physician: Michele Follen, M.D.*

  This study is designed for women age 18 or older with newly diagnosed or recurrent grade 2 or 3 CIN lesions that are two to three times larger than the biopsy site. Participants must have a life expectancy of at least 12 months and use adequate contraception during the study. Patients who have had a prior malignancy are not eligible.

- Phase I/II study of farnesyl transferase inhibitor (SCH 66336) in combination with paclitaxel in solid tumors (ID98-369). *Physician: Fadlo R. Khuri, M.D.*

  Study participants are patients with histologically confirmed solid tumors for which no treatment that would have a reasonable chance of disease palliation or cure is available. Participants must have measurable disease and no manifestations of malabsorption syndrome. Patients who have received more than two prior chemotherapy regimens, prior wide-field radiation therapy, or prior allogeneic, syngeneic, or autologous bone marrow transplantation or stem cell transplantation are not eligible. Patients who are poor medical risks because of nonmalignant systemic disease or an active infection and patients with a medical condition that prevents them from taking oral medications may not participate.

- Phase I study of 9-nitro-20(S)-camptothecin (rubitecan) in combination with cisplatin in patients with advanced malignancies (ID99-166). *Physician: Claire F. Verschraegen, M.D.*

  Patients 10 years old or older with recurrent or refractory cancers in a variety of sites, including the cervix, in which standard chemotherapy regimens have failed are eligible for this study. Patients with symptomatic brain metastases, pregnant women or nursing mothers, and those receiving other concurrent chemotherapy or radiation therapy are not eligible. Patients of childbearing potential must use adequate contraception.

- A phase II study of intravenous DX-8951f administered daily for five days every three weeks to patients with advanced or recurrent squamous cell cancer of the cervix (DM99-247). *Physician: Andrzej Kudelka, M.D.*

  Women age 18 and older with advanced or recurrent histologically confirmed squamous cell carcinoma of the cervix deemed not curable by surgery or radiation therapy are eligible. Patients may have undergone up to one prior chemotherapy regimen, and at least four weeks must have elapsed since any prior surgery, radiation therapy, or chemotherapy. Participants must have measurable disease and no concurrent serious infection.

- A randomized, double-blind study of N-(4-hydroxyphenyl) retinamide (4-HPR) (fenretinide) versus placebo in patients with grade 2 or 3 cervical intraepithelial neoplasia (CIN) (ID92-027). *Physician: Michele Follen, M.D.*

  This study is open to women age 18 years and older with a newly diagnosed or recurrent CIN grade 2 or 3 lesion involving at least one quadrant of the transformation zone of the cervix. Patients must have a life expectancy of at least 12 months and cannot have had any prior malignancies. An approved form of contraception must be used for the duration of the study.

- Feasibility of combined intraoperative lymphatic mapping and sentinel node identification in patients with cervical cancer (ID99-131). *Physician: Charles F. Levenback, M.D.*

  This pilot study is designed for patients with invasive cervical cancer who are undergoing surgical assessment of pelvic and/or para-aortic lymph nodes. Follow-up depends on the outcome of the surgery, but routine follow-up for low-risk patients is a clinic visit every three to six months for five years. Patients with known allergies to triphenylmethane compounds are not eligible for this study.

- A phase II trial of Taxol (paclitaxel) in patients with advanced adenocarcinoma of the uterine cervix (GYN93-009). *Physician: Mitchell Morris, M.D.*

  Participants must have microscopically confirmed advanced adenocarcinoma of the cervix that is not considered curable by surgery or radiation therapy. Patients must have bidimensionally measurable disease with histologic slides and/or blocks available for review. Patients may have received chemotherapy as a radiosensitizer in conjunction with radiation therapy but cannot have received chemotherapy alone for recurrent or metastatic disease.

- A pilot study to measure optical coherence tomography images of cervical intraepithelial neoplasia (CIN) (GYN98-047). *Physician: Michele Follen, M.D.*

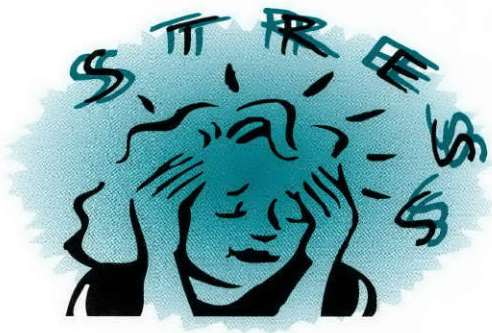
  Study participants will undergo a one-time measurement of the cervix. Participants must be older than 18 and must be referred to the M. D. Anderson Colposcopy Clinic. Pregnant patients are not eligible. ●

For more information *about these clinical trials, physicians or patients may call the M. D. Anderson Information Line. Those within the United States should call (800) 392-1611; those in Houston or outside the United States should call (713) 792-6161. Visit the M. D. Anderson Cancer Center clinical trials web site at http://www.clinicaltrials.org for a broader listing of treatment research protocols.*

HOUSE•CALL

Stress and Cancer: What's the Connection?

An unavoidable fact of modern life, stress has been linked to disorders ranging from headaches to heart disease. But does stress cause cancer? The results of recent research studies show no direct cause-and-effect relationship between stress and an individual's risk of developing cancer, but there may be a link between stress and disease response to cancer therapy.



What does the research tell us about stress and cancer?

Research has shown that stressful life situations such as social isolation or the death of a spouse alter the function of the body's immune system, our defense against infection and disease. But this research has provided no scientific evidence that these stress-induced changes in the immune system directly cause cancer, according to the National Cancer Institute.

One study of 332 women, reported in the *British Medical Journal*, found that women in a group who were diagnosed with breast cancer were no more likely than healthy women to have experienced a severe life event during the previous five years. However, the study only takes into account life events and does not measure stress, which is a person's psychological and physiological response to those events. Some research suggests there is a link between psychological status and the development and progression of cancer, but to determine the true association between stress and the development of cancer, more studies are needed.

Other research has examined the effect of stress on patients already diagnosed with cancer. A study published in the *Journal of the National Cancer Institute* evaluated the anxiety of 116 women who had surgery for breast cancer. The researchers found that the patients with the most anxiety about their medical conditions had the lowest levels of white blood cells, which are critical to immune function, and that the white blood cells that remained functioned at lower than normal levels.

Can patients with cancer benefit from reduced stress?

Being diagnosed with cancer can, of course, be extremely stressful. However, patients who have a good attitude and good coping skills tend to have more successful cancer treatment, possibly because these patients find and then comply with the most effective treatment available.

Scientists are now studying whether stress reduction can improve a cancer patient's prognosis. Several studies seem to indicate that social support groups may enhance survival for cancer patients. These support groups allow patients to share their concerns with other cancer patients and to learn new ways to handle problems.

Other techniques that have been used to help reduce cancer patients' stress include meditation, progressive muscle relaxation, visual imagery, visualizations, and various forms of psychotherapy.

How can we manage stress in our daily lives?

Stress management is an important skill for all of us to master. But how can we change the way we react to stressful modern life? Experts advise that a first step is becoming aware of our own individual stress symptoms. Do you, for instance, get headaches whenever you're stuck in traffic? Identifying the specific triggering situations and our responses can help us manage that stress in better ways.

Stress originates from three general sources: the environment, our bodies, and our thoughts. Although we may have some control over our environments and bodies, we have much more control over the way we think about a stressful situation.

A large part of stress management, according to stress researchers, involves changing our appraisal so that a difficult situation is seen as a challenge instead of a threat.

It is also helpful to identify our thoughts or internal dialogues that are negative, perfectionistic, or rigid. We can challenge these thoughts, asking, for instance, "Why must I do this perfectly?" Then we can begin to replace the negative internal dialogue with more productive thoughts.

We can also minimize stress by exercising, eating a balanced diet, getting enough rest, and making time for pleasurable leisure activities. There is a great deal that all of us can do to help manage the inevitable stress that comes into our lives. ●

For more information, contact your physician or contact the M. D. Anderson Information Line:

(800) 392-1611 *within the United States, or*

(713) 792-6161 *in Houston and outside the United States.*

February 2000

Researchers Study Hormone Intervention Therapy to Prevent Treatment-Induced Sterility

by Mariann Crapanzano

To help young cancer survivors fully live the life that awaits them—a life that, for many, includes having children and raising a family—researchers at The University of Texas M. D. Anderson Cancer Center are exploring the use of hormone interventions to protect fertility from the effects of chemotherapy and radiation therapy. Marvin L. Meistrich, Ph.D., a professor in the Department of Experimental Radiation Oncology, is studying the causes and prevention of chemotherapy-induced and radiation-induced sterility in male laboratory animals.

Conventional doses of radiation and many of the chemotherapeutic agents used to treat diseases such as Hodgkin's disease, lymphoma, bone and soft tissue sarcomas, testicular cancer, and leukemia often impair the production of sperm for prolonged periods. And while the testes may sometimes be shielded from direct radiation (as in the case of some patients with Hodgkin's disease), they cannot be completely shielded from scattered radiation and are exposed to systemically administered chemotherapeutic drugs.

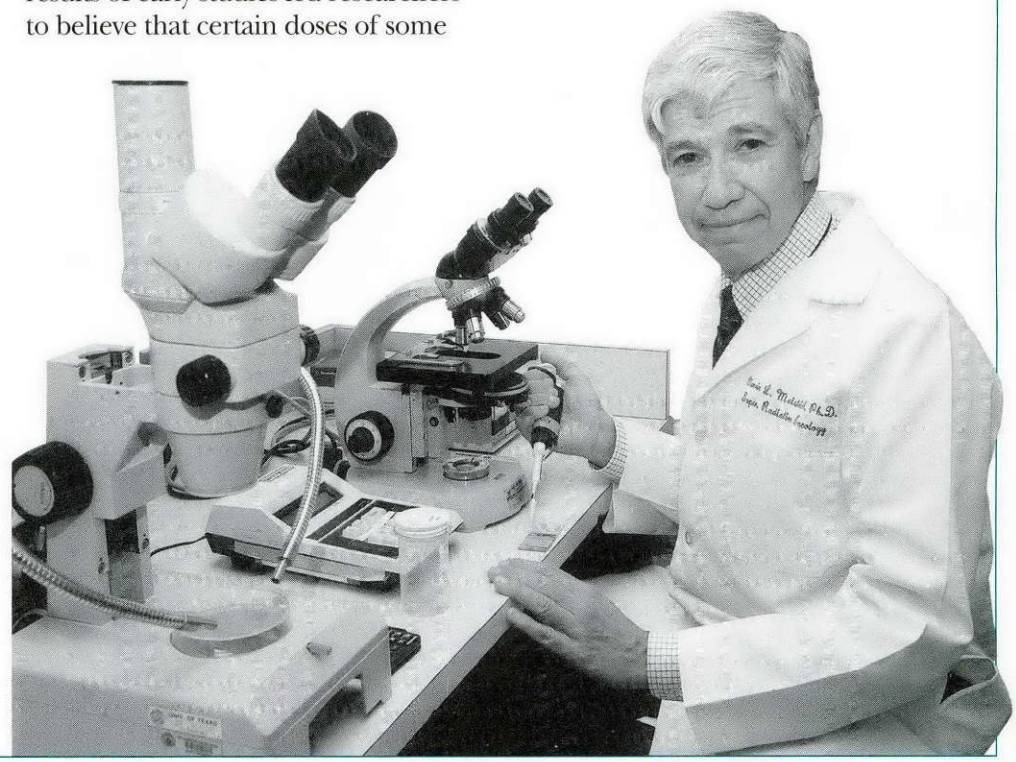
Dr. Meistrich said that Hodgkin's disease brought the problem of infertility to the forefront because it is frequently diagnosed in young patients and was for many years—and, in rare cases of advanced or recurrent disease, still is—effectively treated using chemotherapy related to the highly sterilizing MOPP (mechlorethamine, vincristine, procarbazine, and prednisone) regimen.

Dr. Meistrich believes understanding the mechanisms by which chemotherapy and radiation therapy affect the testes is key to restoring spermatogenesis after cancer treatment. The human testes have a finite number of stem spermatogonia cells—those cells that replicate themselves and differentiate into spermatocytes, which develop into mature sperm. Other cells within the testes support the maturation of sperm. Alkylating agents (including procarbazine, cyclophosphamide, busulfan, and chlorambucil), platinum drugs (including cisplatin), and radiation beyond certain doses have been shown to impede this process of spermatogenesis.

According to Dr. Meistrich, the results of early studies led researchers to believe that certain doses of some chemotherapeutic agents and radiation killed all stem cells, resulting in permanent azoospermia (the absence of sperm in the semen). Now researchers are questioning this hypothesis. Histologic sections of the testes of laboratory rats that failed to produce sperm for a year after being irradiated showed that stem cells were present but were not maturing normally. The same may be true in humans.

"We've seen several patients who were azoospermic for years and then, apparently spontaneously, recovered sperm production and fertility," said Dr. Meistrich.

Fredrick B. Hagemeister, M.D., a professor in the Department of Lymphoma and Myeloma at M. D. Anderson, also said that many patients with cancer who survive at least seven to eight years after therapy recover spermatogenesis within that time. This evidence suggests that after cancer treatment, stem cells may be present in the testes but are dormant. The challenge is to discover a way to jumpstart those cells.



Studies led by **Marvin L. Meistrich, Ph.D.**, *a professor in the Department of Experimental Radiation Oncology, are investigating the effectiveness of hormone manipulation in restoring male fertility after chemotherapy or radiation therapy.*

Testosterone (produced in the testes and normally found in high concentrations there) and follicle-stimulating hormone (FSH) (produced in the pituitary gland) are both necessary for spermatogenesis. Dr. Meistrich said that following treatment with some chemotherapeutic agents or radiation, however, spermatogenesis seems to be inhibited by testosterone. "The hormone that is supposed to help spermatogenesis to go to completion now [after chemotherapy or radiation therapy] actually inhibits the first step," said Dr. Meistrich.

Dr. Meistrich suppressed intratesticular testosterone levels in laboratory rats by administering a gonadotropin-releasing hormone (GnRH) agonist for 10 weeks immediately following treatment of the animals with chemotherapy or radiation therapy. The GnRH agonist treatment overcame the inhibitory effects of the cancer treatment, and spermatogenesis increased. Even after GnRH agonist administration was stopped, the rats continued to produce sperm. Furthermore, Dr. Meistrich's research showed that recovery of spermatogenesis and restoration of fertility was possible when the GnRH agonist treatment was initiated five months after irradiation, but the degree of recovery was less than when the treatment was initiated sooner.

The effect of GnRH agonist in female animals is less clear. In one study of female rats, GnRH agonist given along with cyclophosphamide enhanced the number of developing ovarian follicles several months after treatment. But Dr. Meistrich said the GnRH agonist may have prolonged fertility by inhibiting the normal loss of follicles over an appreciable fraction of the animal's reproductive lifetime. If so, the same treatment in women—whose reproductive lifespan is much longer—may not have a significant impact.

Dr. Meistrich's research has shown that suppression of testosterone and FSH does not protect the stem cells from the effects of chemotherapy and radiation therapy (some stem cells still die), but the hormone manipulation does allow the remaining living cells to differentiate and complete the development to mature spermatozoa.

If the mechanisms that mediate the disruption and potential recovery of spermatogenesis after chemotherapy or radiation therapy are similar in humans and laboratory animals, this hormone manipulation therapy may hold hope for restoring the fertility of young male cancer survivors who do not spontaneously recover spermatogenesis after cancer treatment.

Testicular cancer and its treatment present additional challenges to preserving fertility. Robert J. Amato, M.D., associate professor in the Department of Genitourinary Medical Oncology, said that the chemotherapeutic drugs used to treat testicular cancer cause infertility in approximately one fourth of patients. The disease itself also frequently adversely affects sperm production, according to Christopher G. Wood, M.D., an assistant professor in the Department of Urology. In addition, some patients undergo a retroperitoneal lymph node dissection, which impairs their ability to ejaculate semen. Dr. Wood said that in such cases viable sperm produced in the testis that is not surgically removed can be retrieved using methods such as electroejaculation and epididymal aspiration. "If there are viable sperm," Dr. Wood said, "they can be reached." Therefore, by restoring spermatogenesis, hormone interventions may even benefit patients with testicular cancer whose ejaculatory function is impaired.

For now, however, Drs. Amato, Wood, and Hagemeister recommend semen cryopreservation (sperm banking) to their patients who want to have children after cancer treatment. "I recommend sperm banking for all of my patients with testicular cancer," Dr. Amato said.

Dr. Meistrich said that because genetic alterations can occur in sperm that are produced during chemotherapy or radiation therapy, it is important to collect the semen samples for cryopreservation before treatment begins. Because diagnosis and the commencement of treatment often occur within a very short time frame, Dr. Meistrich urges physicians who suspect that one of their male patients has a cancer that might be treated with radiation or chemotherapy to immediately discuss with the patient the risk of sterility and the option of sperm banking.

This applies even to cases in which the patient is scheduled to undergo a chemotherapy regimen that may not be permanently sterilizing. The reason: the patient may not respond to the initial treatment or may have a relapse and require stronger, more sterilizing agents to treat the disease. At that time, however, collecting an adequate amount of sperm for cryopreservation may not be possible because the patient's sperm count may still be depressed or absent from the initial treatment.

Cryopreservation of a woman's oocytes is still an experimental procedure. Offspring have been born using frozen human oocytes in in vitro fertilization procedures, but the success rate is very low. Also under investigation is cryopreservation of ovarian tissue slices, a technique that has restored ovarian endocrine function and fertility in sheep. Restoration of hormone production and follicular growth following transplantation of cryopreserved ovarian tissue has been reported, but the long-term success of the technique has not been determined. Similarly, clinical trials of GnRH agonist in women with Hodgkin's disease have not yielded conclusive results.

While there are no solid leads in the search for effective methods of preserving fertility in women with cancer, Dr. Meistrich hopes that hormone intervention therapy in men will one day provide an alternative to the use of cryopreserved semen. If clinical trials are undertaken and confirm the results obtained in Dr. Meistrich's studies at M. D. Anderson, the futures of more young cancer survivors may include having children and raising a family. ●

FOR MORE INFORMATION, *contact Dr. Meistrich at (713) 792-3424, Dr. Amato at (713) 792-2830, Dr. Wood at (713) 792-3250, or Dr. Hagemeister at (713) 745-4245.*

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Staff Publications in February

Below is a partial list of staff publications appearing this month.

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