

CANCER SURVIVORS

SYMPOSIA SERIES

Issues & Solutions for Life After Cancer

Long-Term Effects of Cancer and its Treatment **March 19, 2007**

Executive Summary

Late Effects of Radiation Therapy **Mitchell S. Anscher, MD**

Dr. Anscher is Chairman of the Department of Radiation Oncology at VCU Medical Center.

A. Background Information about Radiation

- There are two types of radiation:
 - a) Internal—implants placed directly in an organ or tumor to deliver radiation dose directly
 - b) External—linear accelerator used to deliver radiation beam to patient lying on a treatment table
 - c) External radiation treatment is usually given daily over the course of several weeks.
- Humans are very sensitive to radiation and doses must be carefully calculated.
- Normal tissue and organs are avoided as much as possible, but cannot be completely avoided.
- Some organs are more sensitive (testes, ovaries, kidney, lung, salivary glands) than others (muscles, bone, nerves).
- Normal tissues are protected using customized treatments for each patient.
- New technologies to improve how radiation is given are evolving rapidly (major focus of VCU's radiation oncology department).

B. Types of Side Effects of Radiation

- Acute (early): develop during treatment, usually resolve within three months or so after treatment ends.
- Late: Develop more than three months after treatment has ended; may or may not go away.
- Consequential: Late effects that develop as a consequence of early effects; may or may not go away.

C. Late Effects

- Occur in organs that were exposed to radiation.
- Loss of normal function in the exposed area due to build up of scar tissue and/or death of stem cells.
- Usually do not affect unexposed areas.
- Once felt to be permanent, now researchers are finding ways to reverse the effects of radiation.
- Most severe late effects are rare (major exception is dry mouth with head and neck cancers due to salivary gland damage).
- More people will show physical effects in scans, etc. than will actually experience symptoms or problems.
- Any other health issues that affect the body's ability to heal will increase a patient's risk for late effects from radiation (diabetes, high blood pressure, obesity, rare genetic diseases, etc.).

D. Late Effects Without Symptoms

- Most patients who show late effects will not have symptoms—are they then still a problem?
- They teach researchers about the biology of the problem and the underlying cause that makes the body develop the injury, which can lead to more treatments and preventions.
- Since late effects are rare, they are really orphan diseases and are treated separately.
- Focus of research remains on prevention of late effects, especially as a result of increase perceived threat of nuclear terrorism.
- Few studies have been done to treat established late injury.

E. Current Treatment of Late Effects

- Hyperbaric Oxygen—oxygen delivered under high pressure promotes wound healing and improves circulation to wounded areas; used in skin, head and neck areas.
- Pentoxifylline and Vitamin E—helps reduce the viscosity or thickness of the blood and allows the blood to deliver oxygen better to tissues; has shown to be effective in scar tissue that develops in treatment of breast cancer or other soft tissue areas.
- Steroids—not consistently effective; used for some rectal bleeding issues—often used due to low risk as they are given topically.
- Angiotensin-converting Enzyme (ACE) Inhibitors—blood pressure medications; in trials now for reducing kidney toxicity that can develop after bone marrow transplantation.
- Risk Reduction—healthy lifestyle is important.

F. The Future

- Radiation delivery continues to improve.

- Drug therapies for prevention
 - a) Can be targeted to specific processes or specific molecules that are implicated in the radiation area.
 - b) Can also be more general.
- Drug therapies for Reversal
 - a) Can be targeted to specific molecules that are involved.
 - b) New area of research—Stem Cell replacement therapy or stem cell protective radiation therapy in areas where stem cells reside in a particular organ will be identified and doses of radiation to those sites will be reduced.