Advanced Oncology Certified Nurse Practitioner

REVIEW COURSE 2024

October 10-12, 2024 | Houston, TX

THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Making Cancer History®

AOCNP Review: Radiation Oncology

Cheryl Pfennig

MSN, RN, NP-C, AOCNP

Department of GI Radiation Oncology

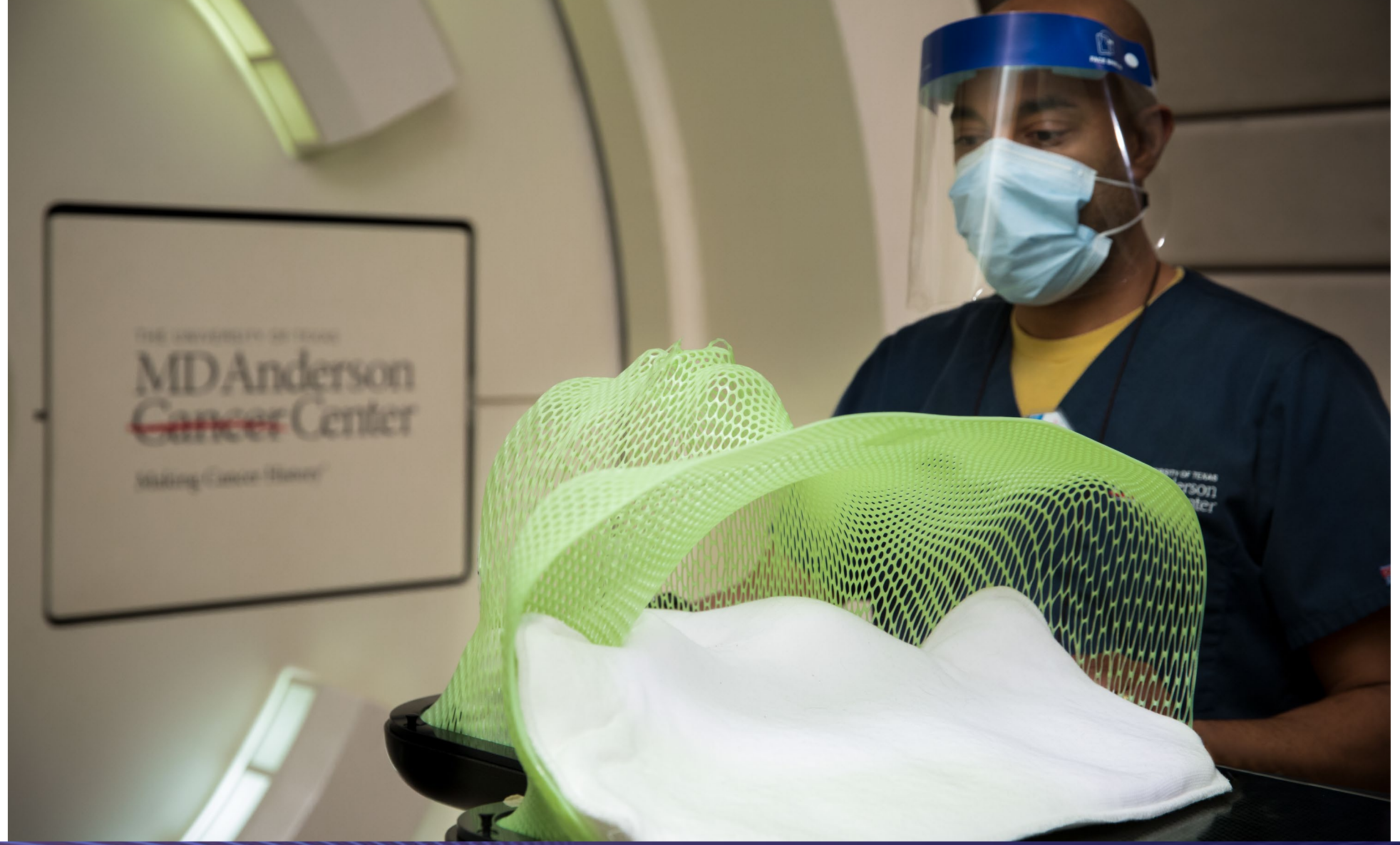
MD Anderson Cancer Center

What is radiation therapy

- High energy X-rays
- Damages DNA of all cells
- Healthy cells can repair, tumor cannot
- Focused target
- Dose constraints to healthy tissue

Treatment planning

- Define the treatment target
- Simulation
- Immobilization
- Imaging delineated target volumes, dose and schedule
- Conformal—when volumes are defined on CT


MD Anderson
Cancer Center

Types of Radiation Therapy

- External beam (EBRT)
- IMRT
- IGRT
- Brachy
- IORT
- Stereotactic radiosurgery SRS
- Stereotactic body radiation SBRT
- TBI
- Proton
- Electron

Who do we use it on

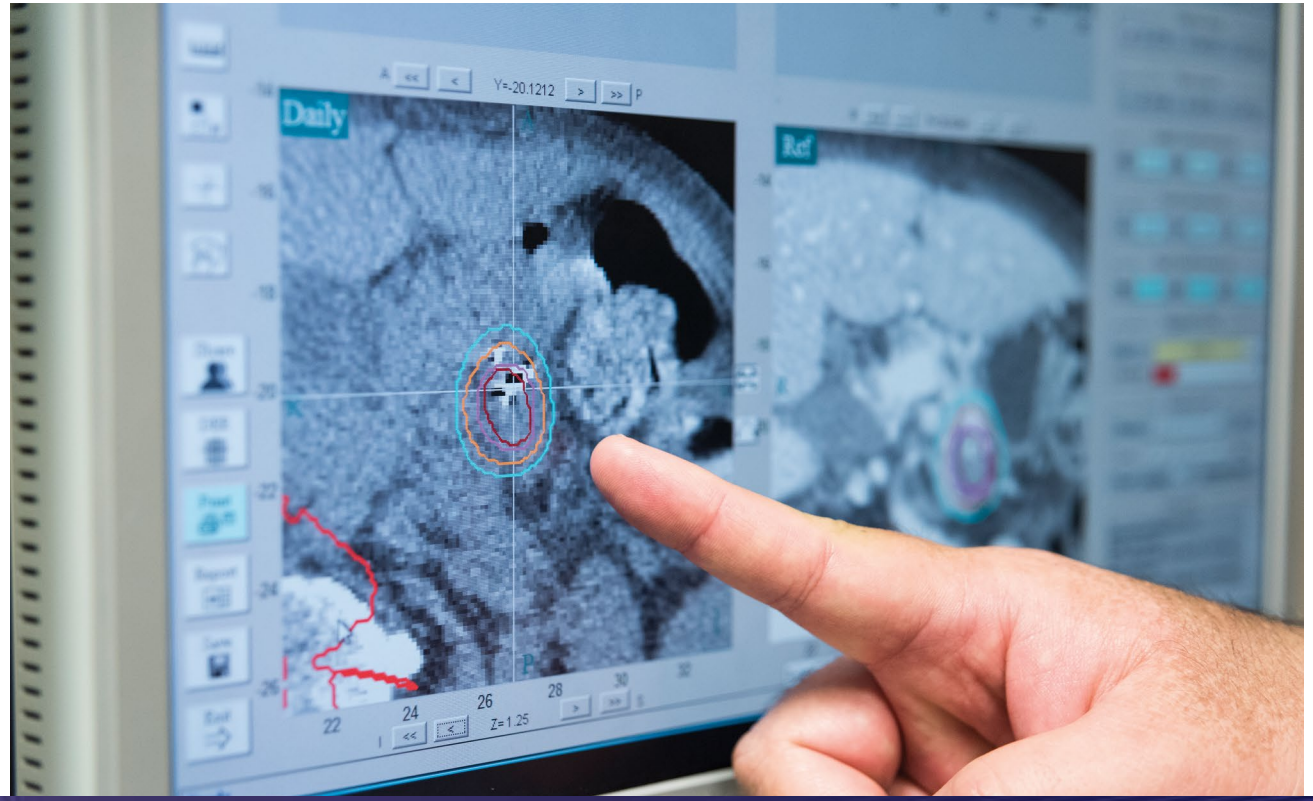
- Radiosensitive—can be treated with relatively low doses
  - Lymphoma
  - Head & neck
  - Cervical
- Radioresistant require much higher doses
  - Melanoma
  - Sarcoma
  - Renal cell

How and when?

- Definitive/ablative
- Neoadjuvant
- Adjuvant
- Palliative
- Oligometastatic disease
- Prophylaxis: PCI
- Emergent
- Intraoperatively
- Brachytherapy
- Reirradiation

EBRT/IMRT/IGRT

- External beam (EBRT)
- Most common radiation delivery techniques
- Surface anatomy markers to infer internal anatomy in conjunction with immobilzatino device, not great for mobile internal targets
- Kv imaging—built in xray on treatment machine
- Cone beam, CT on rails MR

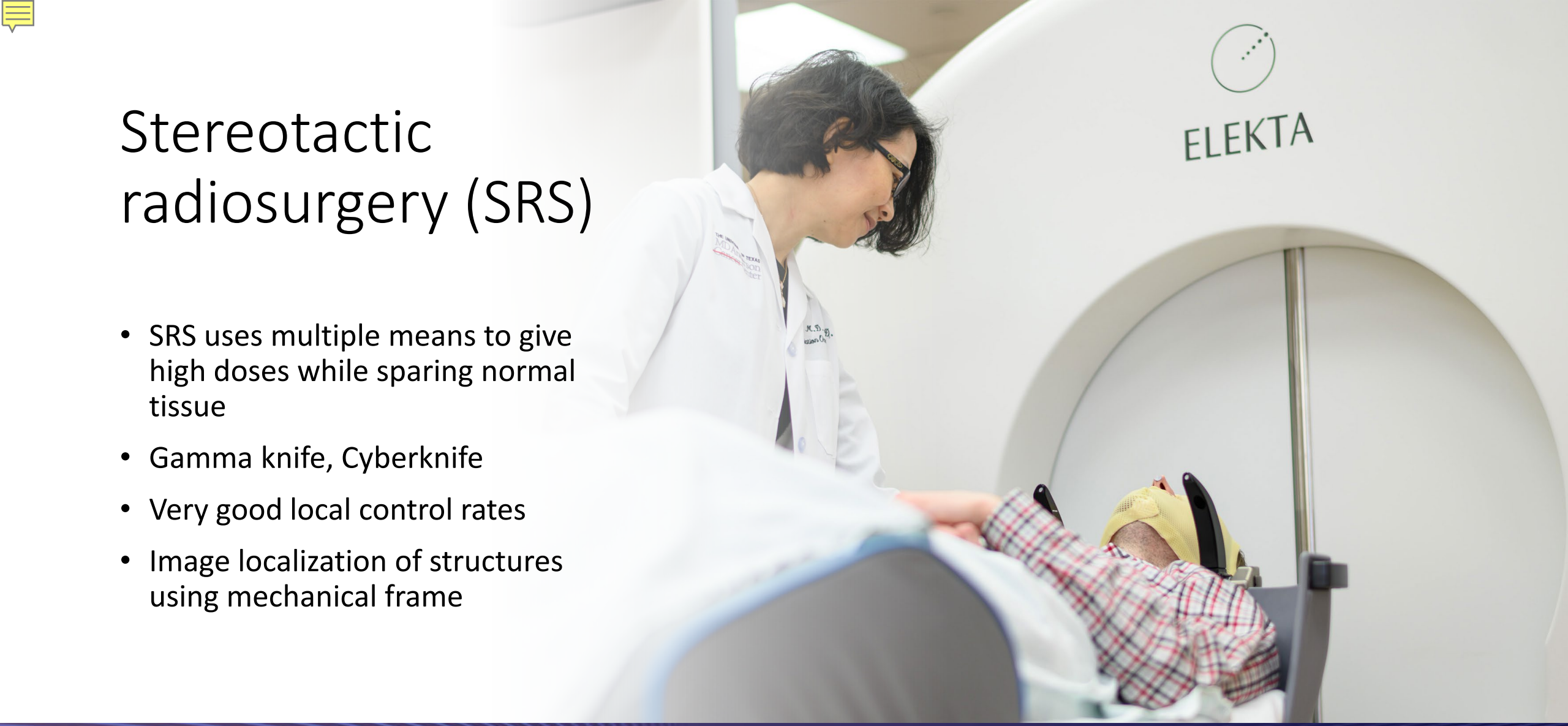


Brachytherapy

- Radioactive sources are place in or near the target giving ablative doses while sparing adjacent uninvolved structures
- Prostate
- Cervical
- Breast
- Rectal?

Stereotactic radiosurgery (SRS)

- SRS uses multiple means to give high doses while sparing normal tissue
- Gamma knife, Cyberknife
- Very good local control rates
- Image localization of structures using mechanical frame



Stereotactic Body Radiation Therapy (SBRT)

- “stereotactic ablative radiotherapy”
- SRS technology in extracranial sites
- Typically greater than 5Gy per fraction
- Usually less than 5 fractions
- unique radiobio considerations cause dramatic tumor response

Palliative

QOL over OS

Pain

Bleeding tumor

IORT

- Intraoperatively
- Single fraction
- Decision made intraoperatively
- Sites of high risk of recurrence, local control, close or involved margins

Superficial/electron

- Used for superficial targets, skin involvement
- Mucoses fungoides
- Basal cell carcinoma
- Better organ sparing

Total Body Irradiation (TBI)

- Preparation for stem cell transplant with leukemias and lymphomas
- Eradicates tumor cells
- Immunosuppression to allow engraftment
  - Can be advantageous over chemo
  - Ability to penetrate disease sites despite blood supply

Proton

- Particle therapy
- Special form of EBRT
- Reduces dose to normal tissues with dose penetrating to variable dpeths
- More precise dose delivery in some sites
- More research ongoing

Concurrent Chemotherapy

- Synergistic with radiation
  - Gemcitabine
  - Cisplatin
  - Bleomycin
  - 5-FU/capecitabine
  - Bevacizumab
  - Mitomycin
  - Cetuximab
  - Decarbazine
- Associated with earlier toxicities
- Not used with stereotactic

Involved team

- Radiation oncologists
- Physicists
- Dosimetrists
- Therapists
- Nurses
- APRN
- SW
- Consult services
  - Nutrition
  - Gynecology/fertility
  - Urology
  - Dental
  - Body image counseling

APN role

- Patient selection
- Education
- Set expectations
- Benefits vs. potential risks
- Consent
- Manage side effects
- Referrals
- Long term follow up

Consult to completion

- Clinical evaluation
- Establish reatment goals
- Risks vs. benefits
- Informed consent
- Patient education
- Simulation
- Treatment planning
- Physics
- Quality assurance
- Beam on
- Weekly see
- Treatment summary
- Follow up

Side effects and Adverse reactions

- Acute, subacute or late
- Side effects are site specific
- Can be worse with chemo
- Treatment breaks contraindicated
- Symptom management
- Response to therapy

Short term side effects

- Radiation causes inflammation in the treatment field causing acute side side effects related to swelling in the tissue area
- Fatigue

Long term side effects

- Long term sequelae are related to formation of scar tissue and are related to the organs and tissues exposed to radiation dose

Dermatitis

- One of the most common radiation associated side effects
  - Acute and chronic stages
- “Sun burn” chafing, blistering, desquamation
- Fibrosis, scarring, discoloration, retraction
- Hair loss in field
  - Usually temporary

Radiation specific special considerations

- Radiosensitizers
- Devices: Pacemaker, glucose monitor, nerve stimulator
- Connective tissue disorders: autoimmune
- Prior radiation
- NPO, cardiac, breathing, tumor or anatomy changes, tumor or normal tissue response

The Future in Radiation

- Shorter courses
- More precision: more effective, less toxic
- Abscopal effect: radiation could elicit immune mediated antitumor responses
- Combination radiation and immunotherapy

References

- Behroozian, T., et. Al, & Multinational Association of Supportive Care in Cancer (MASCC) Oncodermatology Study Group Radiation Dermatitis Guidelines Working Group (2023). Multinational Association of Supportive Care in Cancer (MASCC) clinical practice guidelines for the prevention and management of acute radiation dermatitis: international Delphi consensus-based recommendations. The Lancet. Oncology, 24(4), e172–e185.
- Bernard, V., & Herman, J. M. (2020). Pancreas SBRT: Who, What, When, Where, and How…. Practical radiation oncology, 10(3), 183–185.
- Celeste, B. C. C. (Ed.). (2023). *Advanced oncology nursing certification review and resource manual (third edition)*. Oncology Nursing Society.
- Conroy, T., et., al (2024). Total neoadjuvant therapy with mFOLFIRINOX versus preoperative chemoradiotherapy in patients with locally advanced rectal cancer: long-term results of the UNICANCER-PRODIGE 23 trial. Annals of Oncology.
- Holschneider, C. H., et al, (2019). Brachytherapy: A critical component of primary radiation therapy for cervical cancer: From the Society of Gynecologic Oncology (SGO) and the American Brachytherapy Society (ABS). Gynecologic oncology, 152(3), 540–547. https://doi.org/10.1016/j.ygyno.2018.10.016
- Mitin, T. Radiation therapy techniques in cancer treatment. In: UpToDate, Shih, H. A (Ed), UpToDate, Waltham, MA (accessed August 26, 2024).
- Tang, C. (Ed.) (2020). *Pocket Radiation Oncology: the MD Anderson Cancer Center Handbook of Radiation Oncology.* Wolters Kluwer.

Thank you!

Cheryl Pfennig
cpfennig@mdanderson.org