

RADIATION FIBROSIS

Fact Sheet For Professionals

What is Radiation Fibrosis Syndrome (RFS) and when can it occur?

Radiation Fibrosis Syndrome (RFS) is a term used to describe the multiple clinical symptoms associated with the progressive fibrotic tissue sclerosis resulting from radiation exposure. Effects have been described as acute (occurring during/immediately after treatment, early delayed (up to 3 months after completion of treatment), or late delayed (occurring more than 3 months after completion of treatment). RFS is generally a late complication of radiation treatment, and tissue continues to change for months to years following radiation treatment. As people age, and health status changes, tissue remodels. Effects from radiation treatment can also change throughout this time period.

Common Types of Radiation Treatment (Table 1)

| Type of Treatment | How it Works | Examples | Cancers Treated |
|--|--|---|--|
| External Beam Radiation Therapy (EBRT) | Utilizes computer algorithm to create multiple small external “beamlets” to generate highly conformal plans. | 3D conformal: RT-3D-CRT Intensity Modulated: IMRT Stereotactic: Cyberknife/Gmmaknife Proton Beam | Breast Brain (stereotactic) Head and Neck Lymphomas |
| Internal Radiation | Uses radioactive material (seeds) placed in, or near a tumor to deliver highly conformal radiation internally. | Brachytherapy MammoSite | Prostate Uterine/Vaginal/Cervical Thyroid Breast |
| Systemic | Uses radioactive substances given IV, or PO that travels via the bloodstream, and are taken up in the target area. | Radioactive Iodine: Usually admitted to limit exposure to others as patients are considered radioactive. | Thyroid |

Radiation Terminology

- Radiation is measured in gray (Gy) or centigray (cGy).
- Radiation can be delivered in standard fractionation, received daily; hyperfractionation received daily/twice daily in smaller doses than standard; or hypofractionation received daily in larger doses than standard.
- Mantle field describes an area above the diaphragm that contains disease. Mantle field radiation is directed at cervical, mediastinal, and axillary lymph nodes. Patients with Hodgkin’s Lymphoma often receive radiation treatment in this area.
- Inverted-Y describes an area below the diaphragm that contains disease. Inverted-Y radiation is directed at periaortic, and ilioinguinal lymph nodes. Patients with Hodgkin’s Lymphoma, and other lymphomas often receive radiation treatment in this area.

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Systems, Impairments, and Physical Therapy Interventions (Table 2)

| Affected Systems | Impairments | Physical Therapy Interventions* |
|---|---|--|
| Musculoskeletal and Soft Tissue Impairments | Shortened Muscles Pain Inflammation Weakness Severe Spasms Myelopathy Cervical Dystonia Fatigue Axillary Web Syndrome | Multi-planar stretching/soft tissue techniques. Soft tissue mobilization, such as skin rolling, and gentle myofascial release. Use of wedges for sleep, and lumbar rolls while sitting to correct poor posture Stretches combined with strengthening to correct muscle imbalance. |
| Neurological Impairments | Neuropathic pain Sensory loss Radiculopathy/Plexopathy Autonomic Dysfunction Acute Spinal Cord Compression (a medical emergency) L'hermitte's Sign (after radiation to cervical spinal cord) | Teaching joint protection if plexopathy is present. Sensory integration if neuropathic pain, or neuropathy is present. |
| Bone Impairments | Osteoradionecrosis Osteopenia/Osteoporosis Higher risk for fracture Brittle Bones | Weight bearing exercises. Joint protection strategies. |
| Cardiopulmonary Impairments | Stenosis of blood vessels Pericarditis Myocardial Fibrosis Dysrhythmias Valvular Disease Pulmonary Fibrosis | Aerobic exercise. Education on RPE scale (Borg). |
| Integumentary Impairments | Radiation-Induced dermatitis Progressive fibrosis Sclerosis Adherence to underlying tissue Telangiectasia Alopecia Mucositis | Skin care education. Multi-planar stretching. Soft tissue techniques. Gentle Myofascial Release. <i>Techniques should be used over intact skin only.</i> |

*The above are suggestions for treatment as the research is very limited.

Contraindications for Physical Therapy Interventions

- Use of heat over the radiation field is contraindicated. Radiated tissue has a compromised blood supply decreasing the ability to dissipate heat, and may have altered sensation increasing the risk for burns. In addition, ultrasound is potentially carcinogenic in the area of the tumor.
- Deep tissue techniques are not indicated for this population as the skin is fragile, and lacking an adequate blood supply. Techniques that utilize metallic instruments are too intense, and are contraindicated.

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References and Resources

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