Radiation dose and time of onset for skin injuries

Single-site Skin Dose Range (Gy)	Prompt < 14 days	Early 14 – 40 days	Mid term 40 – 400 days	Long term > 400 days
0-2	No observable effects expected			
2-5	• Transient erythema	• Transient hair thinning	• Hair recovery	• None expected
5-10	• Transient erythema	• Erythema, epilation	• Recovery from previous effects; at higher doses, possible prolonged erythema. • Permanent partial epilation	• Recovery, with possible permanent skin changes at higher doses in this range.
10-15	• Transient erythema	• Epilation, erythema. • Possible moist desquamation at higher doses, with subsequent healing	• Permanent total epilation. • Prolonged erythema	• Telangiectasia, induration. • Skin likely to be weak and more susceptible to secondary injury.
> 15 *	• Transient erythema and possibly pain. • Edema and acute ulceration after very high doses (> 80 Gy)	• Epilation, erythema, moist desquamation. • Possible healing of acute ulceration.	• Dermal atrophy. • Secondary ulceration in areas of prolonged moist desquamation after higher doses. • Dermal necrosis. • Surgical intervention likely required; should be delayed until viable tissues are defined.	• Telangiectasia, dermal atrophy/induration. • Depending on dose and patient characteristics, any persistent wound might progress into a deeper lesion. Healing in absence of surgical correction likely to result in some or all of the following: scarred tissues, weak skin susceptible to injury, skin breakdown reoccurring at later dates.
* Some effects may occur sooner than noted and be more pronounced as dose increases above 20 Gy.				

Source: CRCPD Publication # E-10-7 Technical White Paper: Monitoring and Tracking of Fluoroscopic Dose. See also this handout.

Simplified terminology:

- Erythema: superficial reddening of the skin
- Epilation: hair loss
- Desquamation: outer layer of the skin peels and flakes off
- Ulceration: break in skin or mucous membrane with loss of surface tissue, disintegration and necrosis of epithelial tissue, and often pus
- Dermal necrosis: skin death
- Dermal atrophy: thinning or depression of an areas of skin due to loss of underlying tissue
- Telangiectasia: small dilated blood vessels near the surface of the skin. Also known as spider veins.
- Induration: deep thickening of the skin

For more fluoroscopy safety resources, refer to the online training course “Fluoroscopy Operator X-Ray Safety” in the Learning Exchange and see the Radiation Safety Links on the Office of Clinical and Research Safety web site.