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Use of Electron Beam Therapy in the Treatment of Basal Cell Carcinoma

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Introduction

- Radiation therapy is a type of noninvasive cancer treatment.
- Radioactive energy is delivered through a linear accelerator to kill or shrink cancer cells.
- A plan is created with precise angles and dose to effectively and safely treat the cancer.
- Radiation can be used as a therapeutic or palliative treatment.

Electron Beam Radiation

- Electron beam radiotherapy (EBRT); type of treatment that uses electrons.
- Produces a lower and shorter energy range, that creates a lower dose (Pashazadeh, Boese, & Friebe, 2019).
- Use of electrons for any type of skin cancer allows the underlying structures to be protected.
- EBRT is ideal for tumors in complex areas that can not be surgically removed or for cutaneous malignances <5mm in thickness.
- In EBRT a bolus is typically used which will aid in sparing the underlying tissue beneath the tumor (Wilmas, Garner, Ballo, McGovern, & MacFarlane, 2021a).

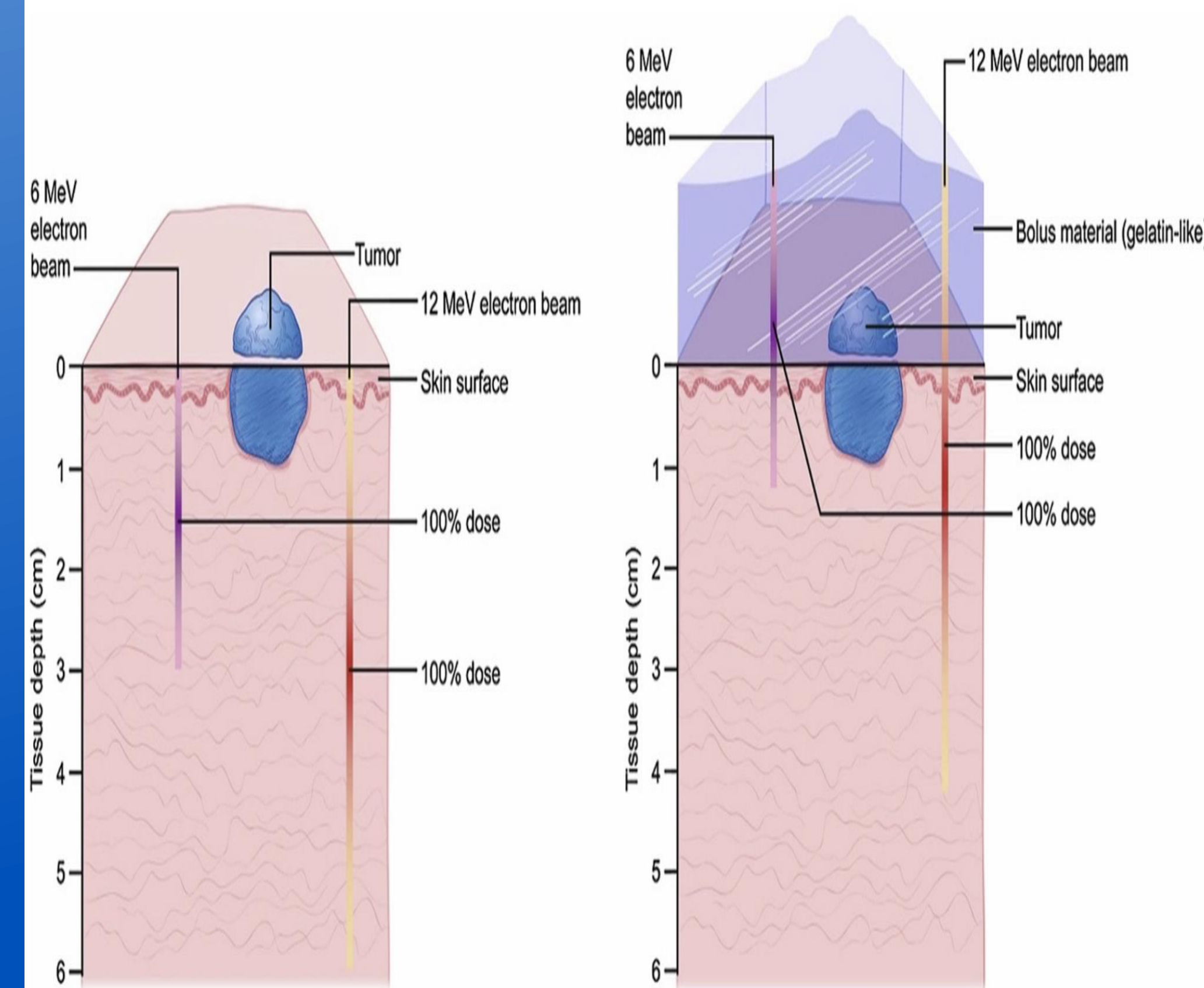


Image shows what happens to the electron energy when bolus is placed. (Wilmas et al., 2021a)



Image shows affects of radiation therapy to basal cell carcinoma. The left image: pre-treatment to lower leg. Right image: four weeks into treatment and shows some reddening to the treatment site. Full response expected four weeks after completing treatment. (Wilmas et al., 2021b)

How can Basal Cell Carcinoma Develop?

- Chronic sun exposure
 - Radiation
 - Increasing age
 - Family history of skin cancer
 - Exposure to arsenic
 - Fair skin
- (Halperin, Wazer, Perez, & Brady, 2019)

How can Basal Cell Carcinoma Look?

- White, skin colored or pink bump
 - Brown, black or blue lesion
 - Flat scaly, reddish patch
 - White, waxy, scar like lesion
- (Halperin et al., 2019)

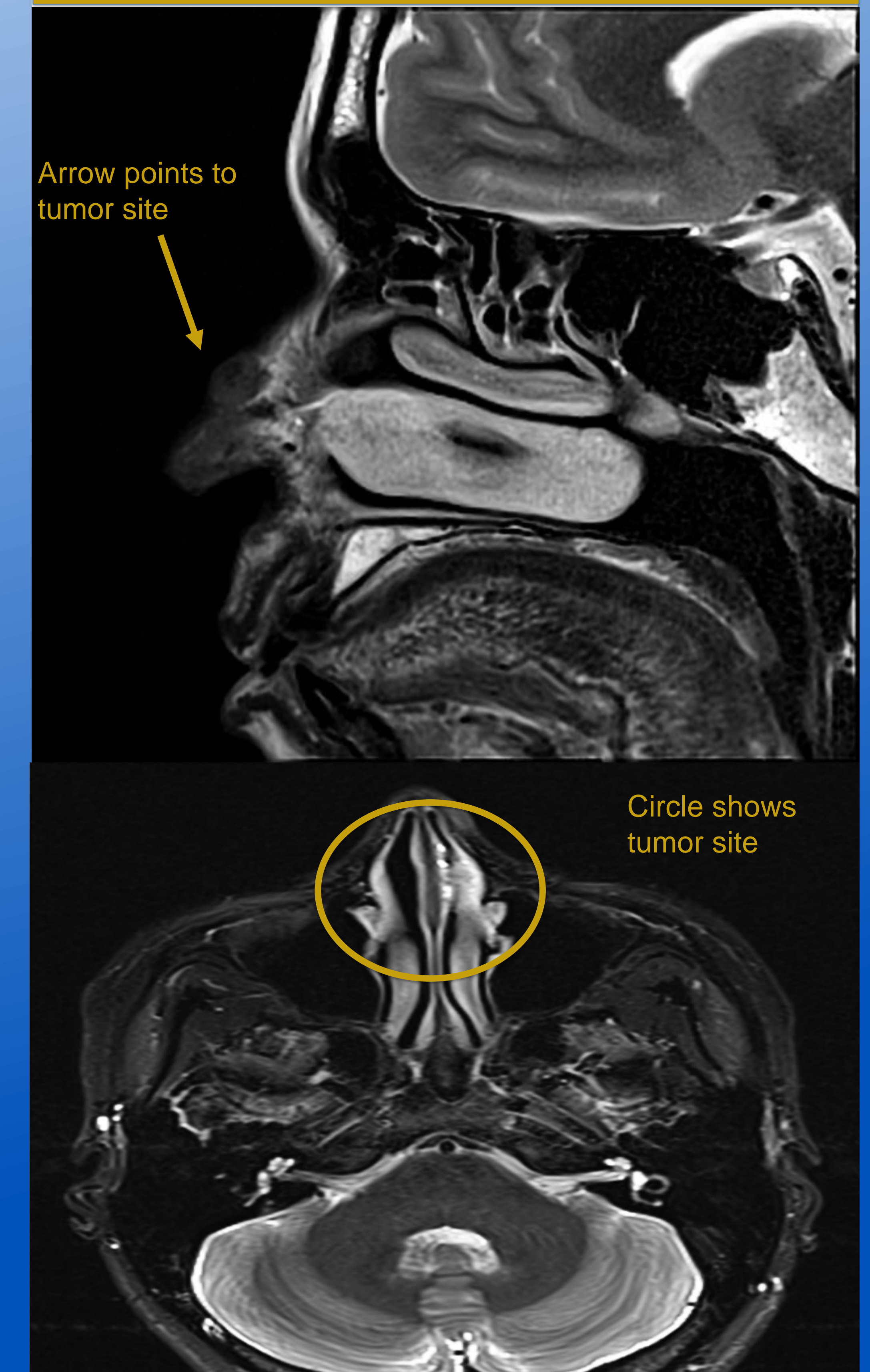
What is Basal Cell Carcinoma?

- Basal cell carcinoma (BCC) is the most common skin tumor and stems from the basal layer of the epithelium (Halperin et al., 2019).
- BCC is often found on the body where sun exposure is most present such as the head or neck.
- BCC typically does not produce metastases
- Main three histological subtypes; nodular, superficial and sclerodermiform.
- Location of the tumor has great prognosis value.
- Low-risk zone includes the trunk and limb. Intermediate risk zone which is classified as the forehead, cheek, chin, scalp and neck. High-risk zone for tumor placement is the nose and periorificial areas (Hennequin, Rio, Quéro, & Clavère, 2022).

Treatment Options

- Surgery: most successful treatment option
- Primary radiation therapy (RT): favored with patients that are poor surgical candidates for reasons such as age or tumor location. Different types of RT:
 - Electron beam therapy
 - Radionuclide brachytherapy
 - Electron brachytherapy
 - Superficial radiation therapy
- Adjuvant radiotherapy: patients who have substantial perineural involvement
- Palliative radiotherapy: patients with advanced or incurable diseases or cutaneous metastases (Wilmas et al., 2021b)

Pretreatment MRI Imaging



Images obtained from post operative case of basal cell carcinoma (Kabra, 2022)

Conclusion

Basal cell carcinoma affects more than one million people every year. With the use of electron beam radiation treatments, the cancerous basal cells can be killed off with minimal damage to the skin. The local recurrence rate after treatment is approximately 3.5% (Hennequin et al., 2022).