

# Anal Cancer

Radiation Treatment, Planning,  
Quality Assurance, Risks and  
Benefits



**Amarillo**

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# Anal Cancer

- Relatively rare (about 5,000 cases per year in the U.S. and about 700 deaths)
- Incidence is related to HPV exposure like cervix cancer some cases are sexually transmitted.
- Typically seen in men and women ages 30s to 70s.

# Curative Treatment of Anal Cancer

Surgical – Abdominoperineal Resection (APR)  
sometimes pelvic exenteration.

- Remove Anus and rectum

- Perform Colostomy

- Remove lymph nodes.

- Remove adjacent involved organs, possibly vagina and prostate.

Standard of care for 50+ years, ending in 1980's  
Effective with about 70% cure rate if found early.

# Chemo-Radiation for Curative Treatment of Anal Cancer

- Standard of care for over 20 years.
- Similar cure rates > 70% with organ preservation.
- Computer technology has completely revolutionized the radiation treatment dramatically improving tumor control rates with much lower complication rates.

# Informed Consent

- Ideally all treatment options, benefits and risks are reviewed with the patient.
- The patient then chooses a treatment option and assumes the risks of potential injury associated with that treatment choice before proceeding.
- In this internet era complications are discussed, but not that these complications were part of the risks that the patient chose to undertake with the potential benefit of cure and organ preservation.

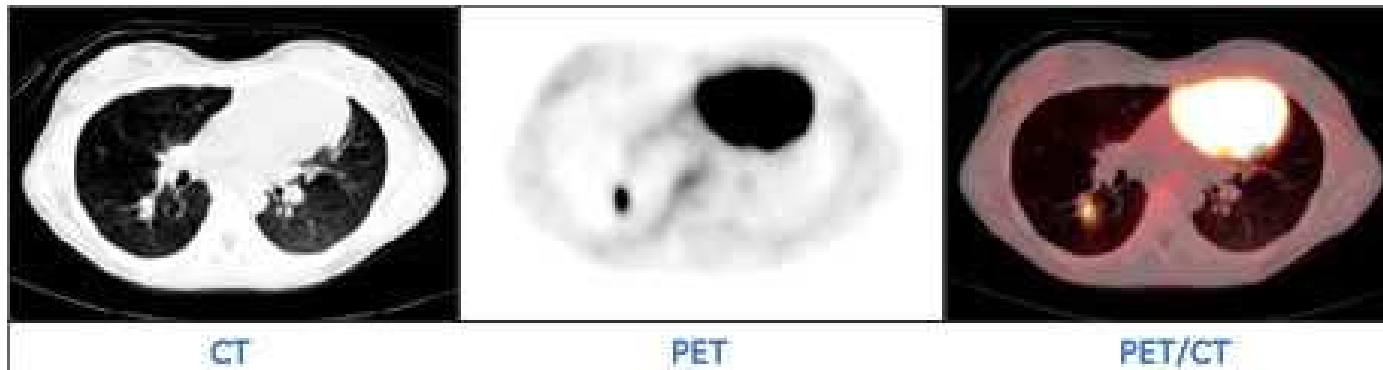
# IMRT Treatment Planning

Computer driven shaping of radiation dose distribution within the patient to more accurately treat the cancer while limiting dose to normal tissues



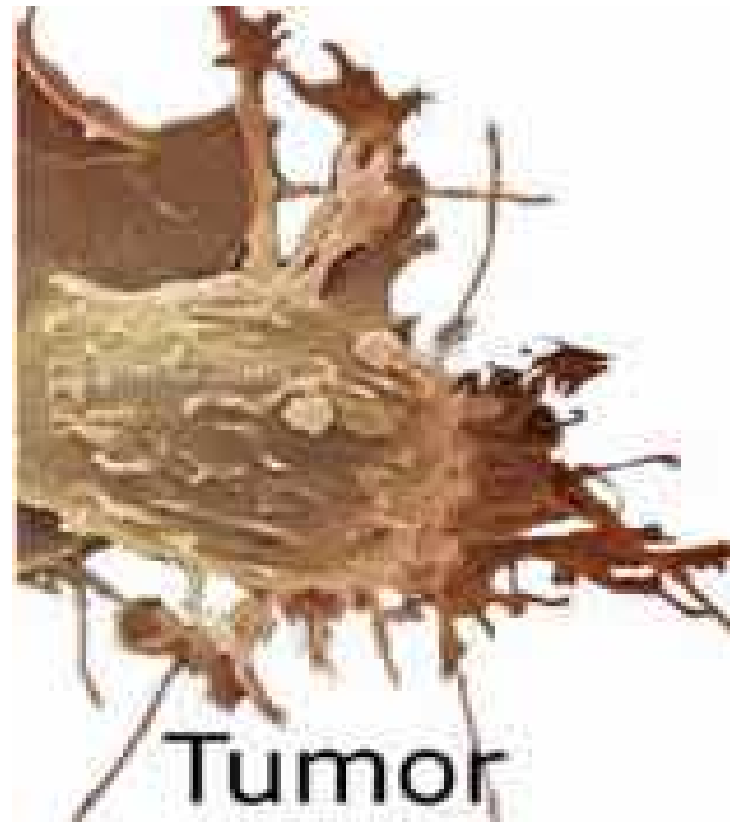
# IMRT Treatment Planning

PET/CT information is loaded into the computer. MD circles on the monitor target dose and normal tissue every 0.25 cm slice often over 100 slices.



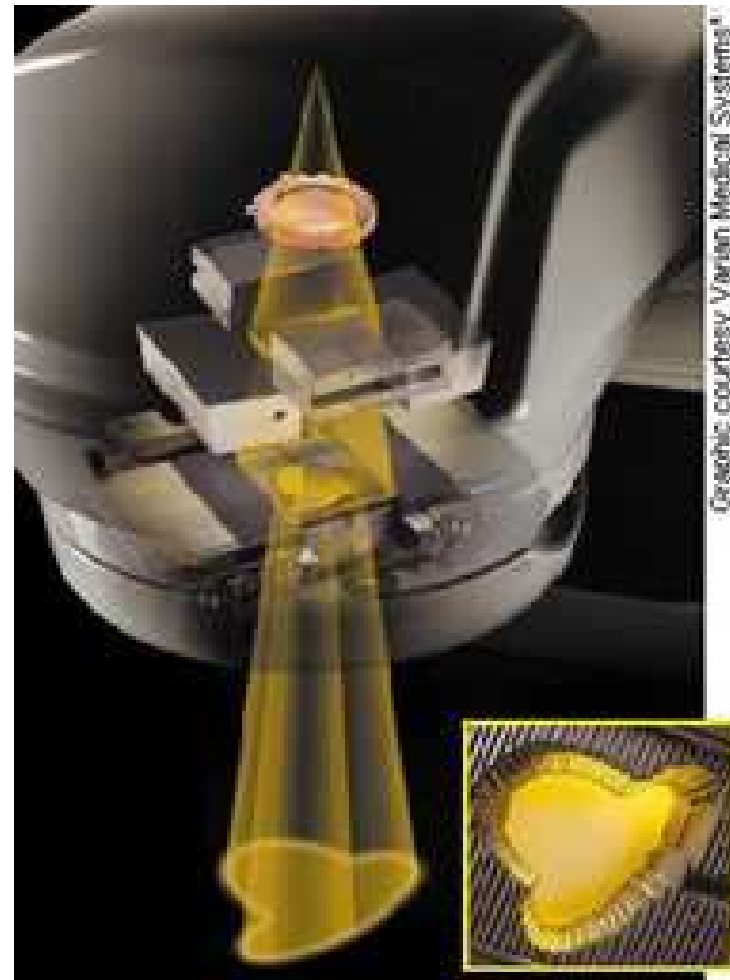
# How We Target Radiation

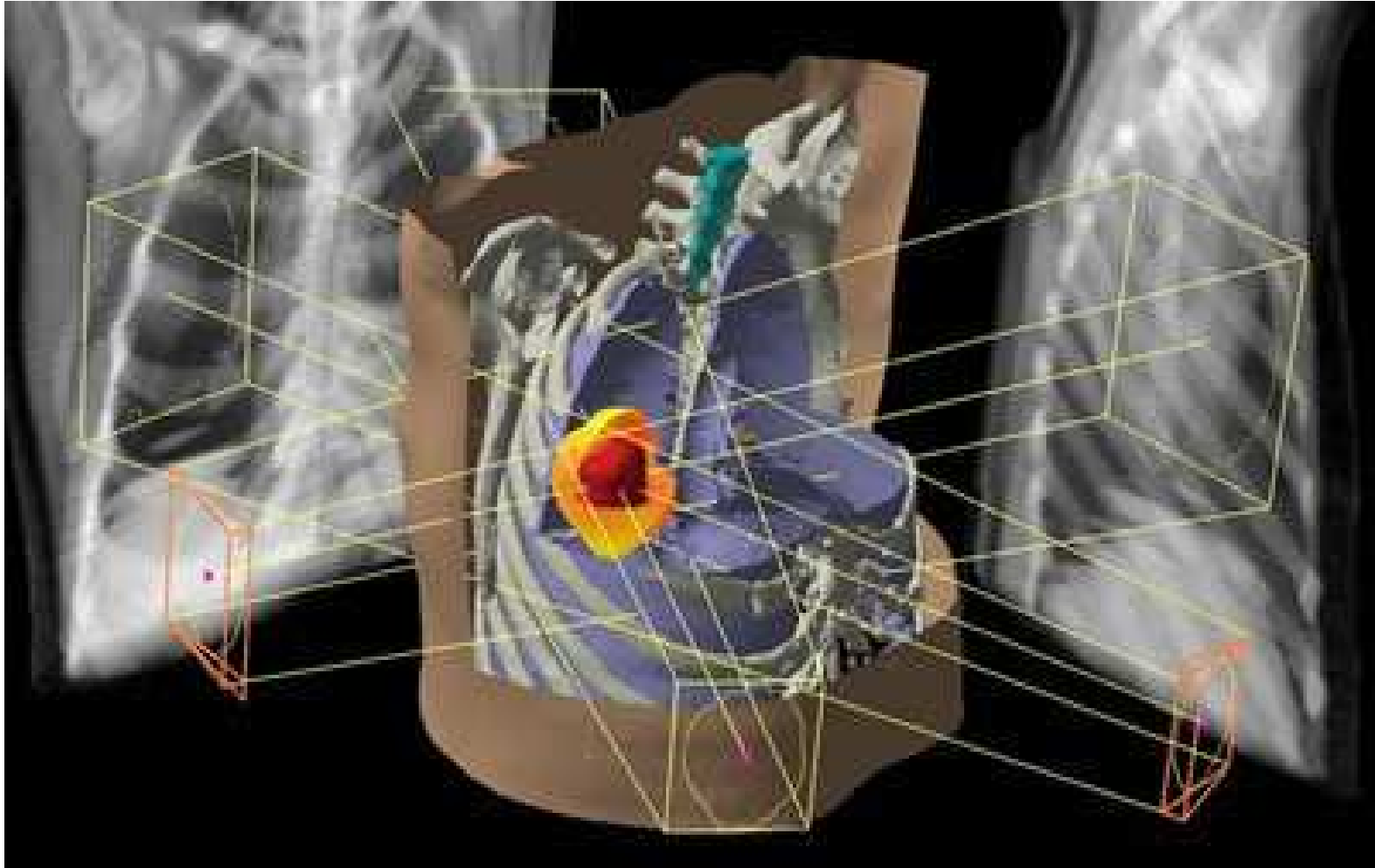
- In order to treat all the cancer some normal appearing tissue must be treated because it may contain microscopic extensions of tumor.
- PET only reliably shows 1 cubic centimeter of tumor or more. (It will never show a few cancer cells that could grow back and kill the patient.)

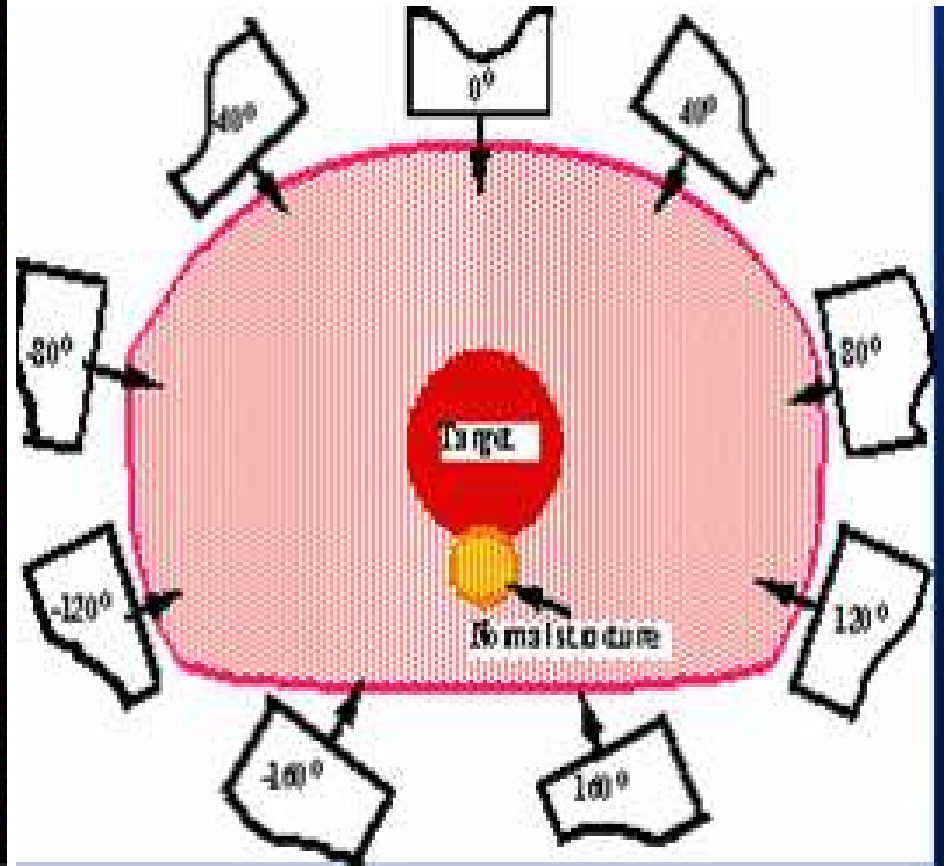


# IMRT Treatment Planning

Computer uses 9 directions over 360° circumference with preferential deliver of treatment to target and not to normal structure.

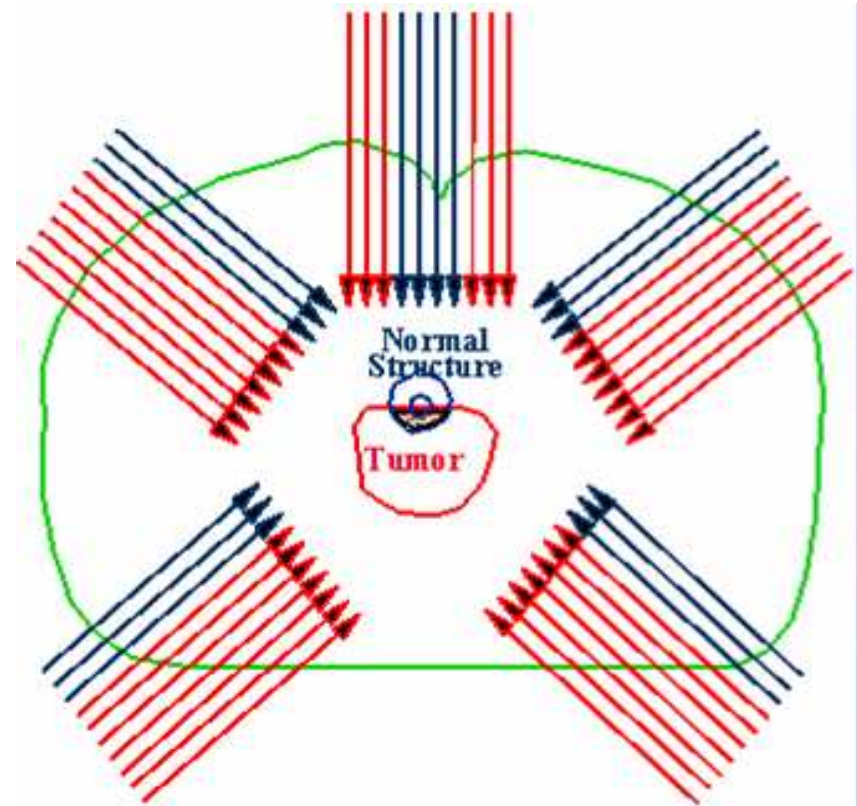






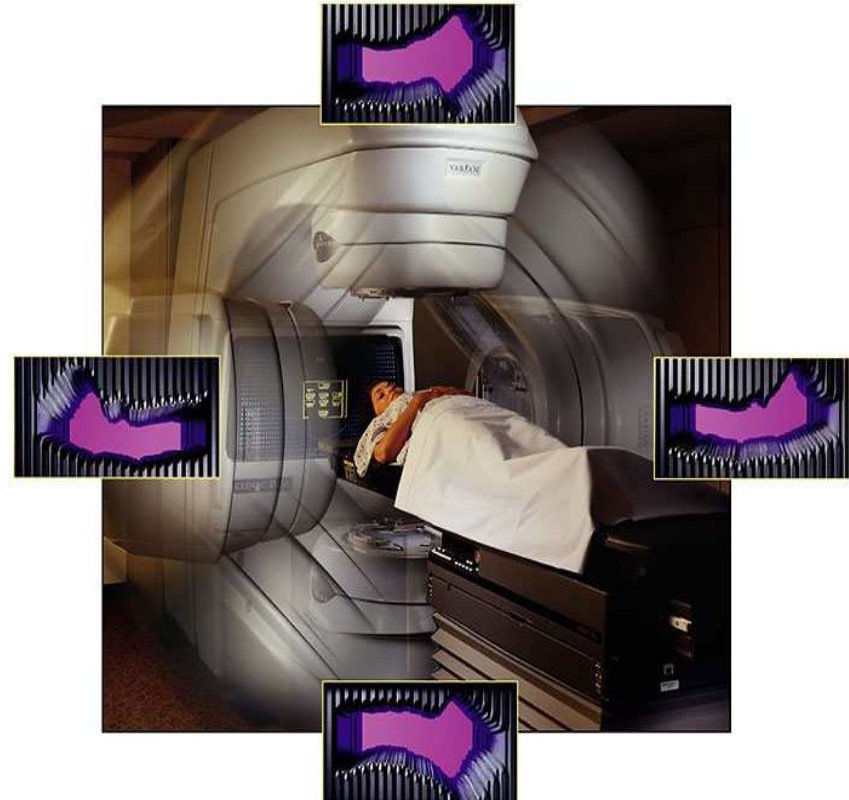
# IMRT Treatment Planning

IMRT results in more dose to cancer and less dose to normal structures. This provides more cures and less injury. Depending on the cancer potentially doubling cures and cutting toxicity by 75%.



# IMRT Treatment Planning

Daily treatment uses a CT scan on the machine to position patient in exactly the same place as they were for planning.



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Millennium MLC: Clinac® EX with MLC-120

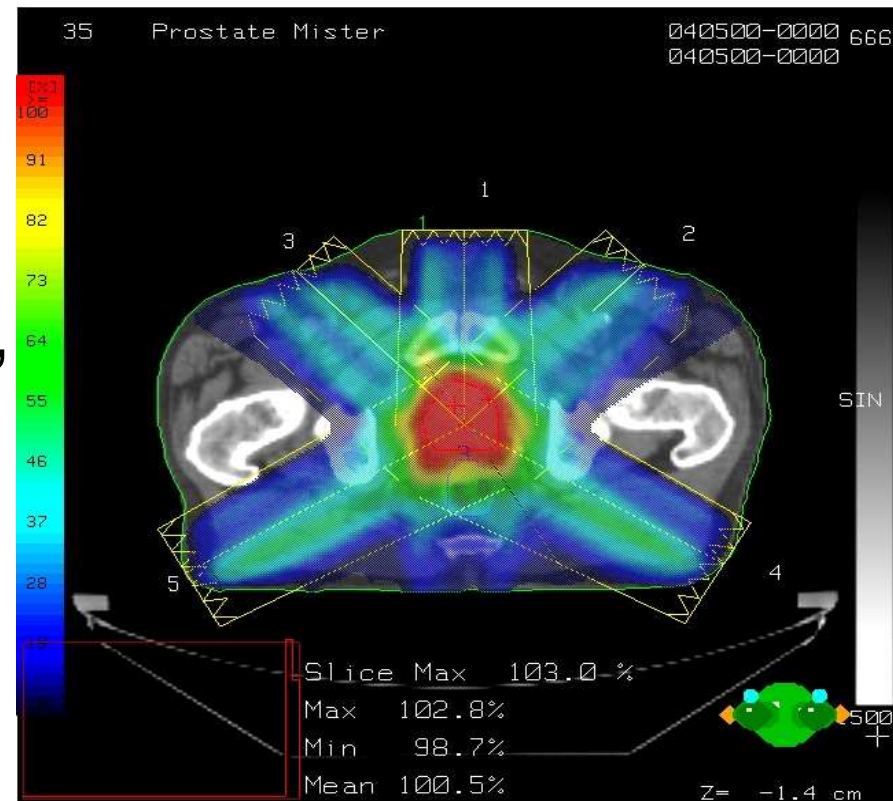
# Pelvic normal tissue to be protected during radiation

- Small bowel, rectum, bladder, femoral heads, nerve, vagina, prostate, external genitalia.
- All of this is entered into the computer planning system.



# Normal tissue dose limits

- Standard published guidelines exist to attempt to limit dose to keep injury risk low, ideally less than 1%.



# PROBLEMS:

1. Some tumors invade or abut multiple normal structures and then normal tissue tolerance must be exceeded to give patient a chance for cure.
2. Anal cancer frequently invades rectovaginal septum and lower rectum.
3. Some normal tissues do not follow the textbook guidelines and can be injured at lower than expected doses.

# Results

Stage I: ~90% cure

Stage II: ~75% cure

Stage III: ~60% cure

# Anal Toxicity

- Up to 25% of patients can have stool leakage due to tumor destroying their sphincter. Radiation kills the tumor, but only scar tissue grows back and scar tissue cannot function as a sphincter.
- Adjusting diet and occasional use of Imodium control this problem surprisingly well.

# Anal Toxicity

- Pain and ulceration almost always occurs but heals completely in more than 95% of cases. However, this can take months to heal post radiation.
- The slow healing ulcer is frequently misdiagnosed as tumor. Simply giving it time will allow it to resolve.

# Vagina, Bladder, Urethra Toxicity

Vagina – dryness, stenosis, sexual dysfunction.

Everyone has some of this mostly tolerable.  
(Grossly underreported and undertreated)

Bladder/Urethra – Frequency and urgency  
resolves over a few months.

Urine incontinence is seen in less than 1% of patients, if they were continent before treatment. (Up to 20% are incontinent prior to treatment.)

# Other Toxicities

Rectum – Proctitis resolves in > 95% of patients.

Rectovaginal Fistula - occurs in less than 5% of patients. When tumor penetrates through the vaginal wall and is killed by radiation a fistula results more than 10% of the time. (Must do pretreatment pelvic exam in every patient.)

Small bowel - < 1% bowel obstruction

Femoral head - < 1% pathologic fracture

Skin – all get some perineal scarring

# Endpoints/ Interventions required for Complications

None - > 70% need nothing.

Medications - < 25% of patients need metamucil, imodium, creams, etc.

Surgery Required - < 5% of patients need APR or exenteration, cautery.

Death - < 1% of patients die from treatment toxicity. However this number will probably grow as more extremely elderly chronically ill patients present with this disease.

# Quality Assurance

- 1-24-2010, New York Times article, “Radiation Offers New Cures, and Ways to Do Harm”
- This article described very rare fatal injuries from radiation being given carelessly/negligently.

# Quality Assurance at Texas Oncology Amarillo

- Our center employs an approximately 10 step process to minimize all errors:
  - MD reviews treatment plan 3 times
  - Dosimetrist reviews plan at least twice with 2 sets of dose calculation software
  - Physicist reviews all of the above and performs a test treatment to verify appropriate machine output
  - 2 Technicians review all of the above immediately before first treatment
  - The treatment delivery computer system has hundreds of safeguards to minimize misadministration risks