

**6. Ulusal CERRAHI ONKOLOJİ KONGRESİ**  
 24 - 27 Şubat 2022 | Gloria Golf Resort - ANTALYA

**Dr. Ayşe Altınok**  
 Bahçelievler Medical Park Hastanesi Radyasyon Onkolojisi Kliniği

**Radyasyon Onkolojisi Ne Amaçladı? Nereye varacak?**  
 25.02.2022

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**Radiotherapy Timeline**

- 1895: 100-400 keV X-Rays, Rotation Therapy
- 1950: Co-60, Low Energy Linacs, Betatrons
- 1980: Computerized 2-D Planning, High Energy Linacs, Simulators
- 1990: CT Scanners, 3-D Planning, Accurate Dosimetry
- 1995: MRU, PET, PET-CT, MLCs Optimization, and IMRT, Image-Guided Radiotherapy

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**1895 – X ışınlarının keşfi**

**Wilhelm C. Roentgen**

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**1896- Radyoaktivitenin keşfi**

**Henry Becquerel**

**Radioaktive Strahlen schwarzen Fotografien**

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**1896- İlk radyoterapi uygulanması**

**Leopold Freund**

**Nachtrag zu dem Aufsatz „Ueber eine neue Art Strahlen behandelte Fall von Xarvus pigmentosus piliferus“**

**Yen de laconisme pigmenté à Wien.**

**Der weitere Zustandverlauf in dem der Röntgen-Strahlung behandelten Falle eines Xarvus pigmentosus piliferus.**

**1898 Radyumun keşfi ve brakiterapi**

**Marie Skłodowska Curie**

**Irene & Frederic Joliot Curie**

**THE NOBEL PRIZE IN CHEMISTRY 1911**

**In recognition of their synthesis of new radioactive elements.**

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İlk Radyoterapi Ünitesi




1917- Stockholm Radiumhemmet Enstitüsü

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Türkiye'de ilk radyoterapi ünitesi


- Dr. Tevfik Berkman tarafından Şişli Etfal Hastanesinde "Radyoloji Bölümünde" kurulmuştur.
- 1937





Resim 29: Ülkesinin ilk Radyasyon Onkoloğu, Prof. Dr. A. Tevfik Berkman.

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W.D. Coolidge-1915  
140 kV- XRay



W.D. Coolidge-1937  
400 kV- XRay

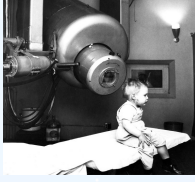



Van De Graff akseleratör- 1937  
1 MeV- 2.25 MeV

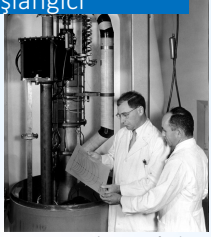


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Modern radyoterapinin başlangıcı



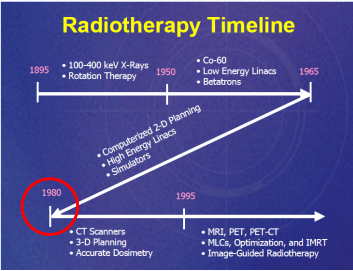
İlk hasta 2 yaş Retinoblastom- 1953- Londra  
Megavoltaj tedavi başlangıcı



Henry Kaplan - Stanford  
1956- 6 MeV

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Radiotherapy Timeline



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1950

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- Betatrons

1965

- Computerized 2-D Planning
- High Energy Linacs
- Simulators

1980

- CT Scanners
- 3-D Planning
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1995

- MRI, PET, PET-CT
- MLCs, Optimization, and IMRT
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GÖRÜNTÜLEME

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**Bilgisayarlı Tomografi**

The Nobel Prize in Physiology or Medicine 1979  
Alan M. Cormack, Godfrey H.ounsfield

The Nobel Prize in Physiology or Medicine 1979  
Researcher Award Ceremony  
Alan M. Cormack  
Godfrey H.ounsfield

The Nobel Prize in Physiology or Medicine 1979 was awarded jointly to Alan M. Cormack and Godfrey H.ounsfield for the development of computer assisted tomography.

Godfrey Hounsfield ve ilk BT

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**Bilgisayarlı Tomografi**

Conventional radiography  
X-ray source  
Patient  
Table  
Photographic film

Conventional tomography  
Motion of X-ray source  
Longitudinal focal plane  
Patient  
Table  
Motion of photographic film

Computed tomography  
X-ray source  
Collimator  
Transverse plane  
Patient  
Table  
Collimator  
Detector  
Computer

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**Manyetik Rezonans Görüntüleme**

Dr. Raymond Damadian ve ilk MR cihazı "Indomitable", 1977

İnsanda ilk MR  
3 Temmuz 1977

The Nobel Prize in Physiology or Medicine 2003  
Paul C. Lauterbur, Sir Peter Mansfield

The Nobel Prize in Physiology or Medicine 2003 was awarded jointly to Paul C. Lauterbur and Sir Peter Mansfield for their discoveries concerning magnetic resonance imaging.

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**PET-CT**

• 1973- ilk PET-CT

• Ülkemizdeki ilk PET-CT Ekim 2000'de kuruldu.

Mikael E. G. Faloutsos

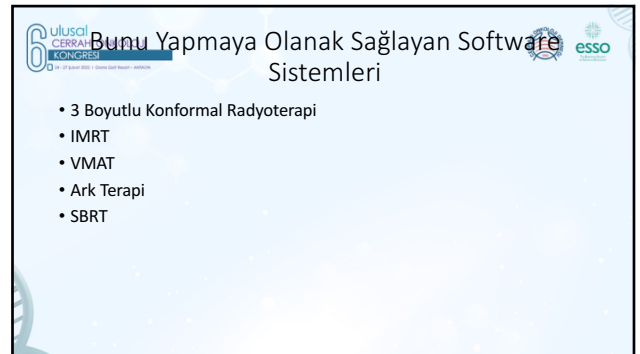
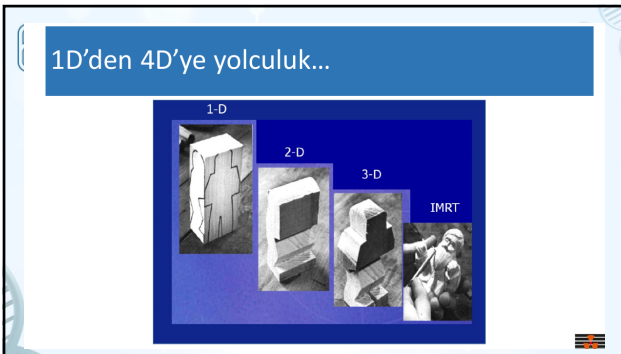
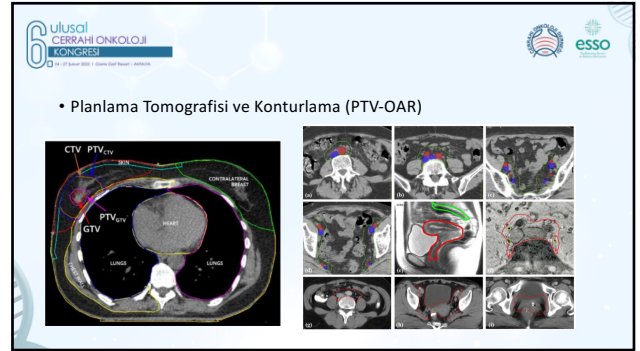
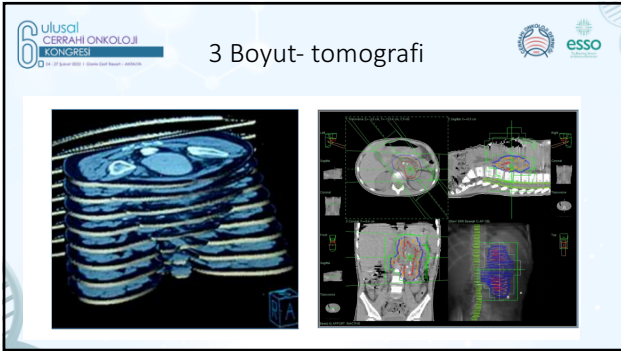
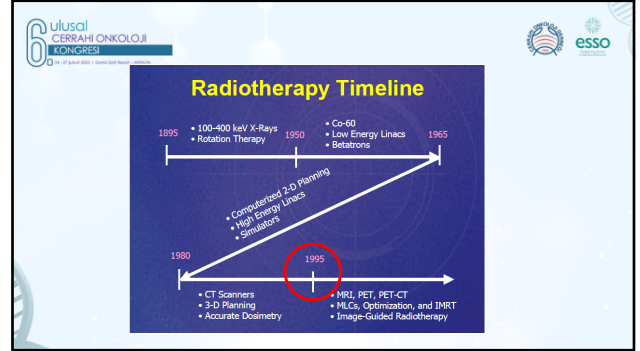
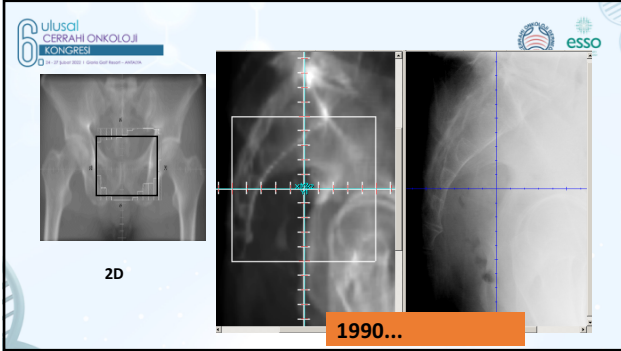
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**Görmemiz neden bu kadar önemli?**

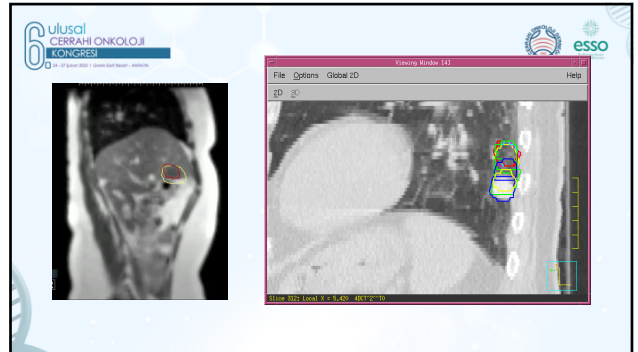
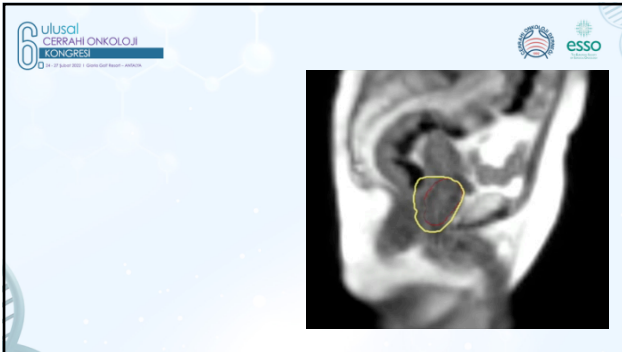
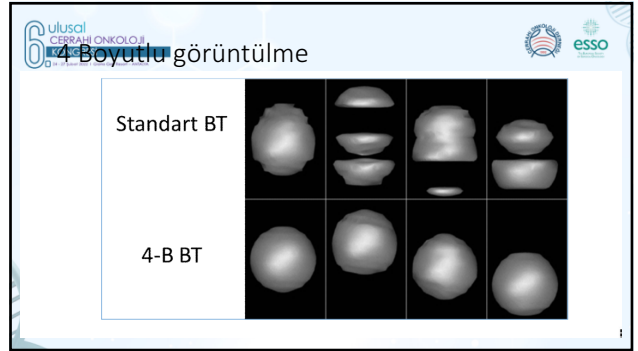
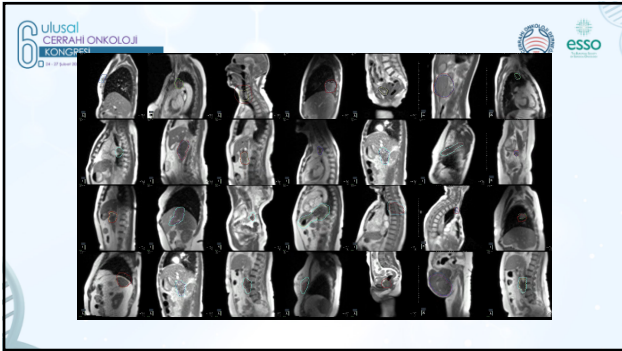
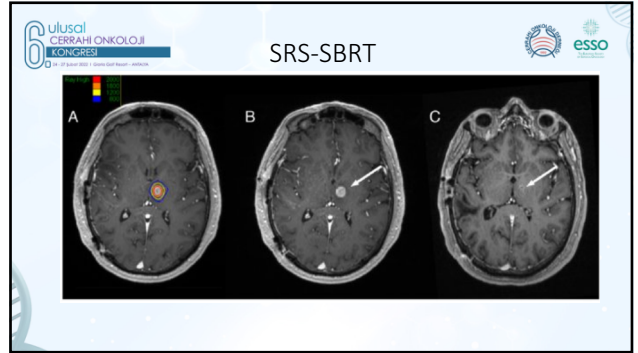
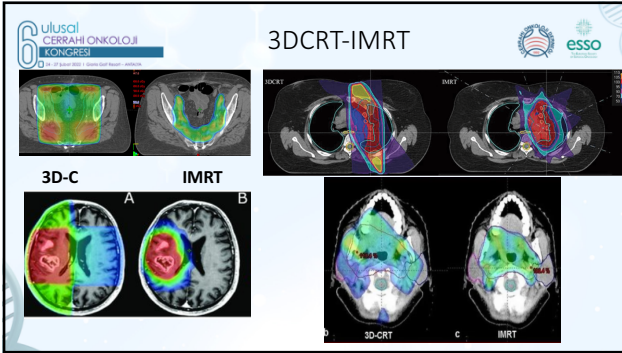
• Radyoterapinin hedefi, tümörü yok et, normal dokuyu koru!

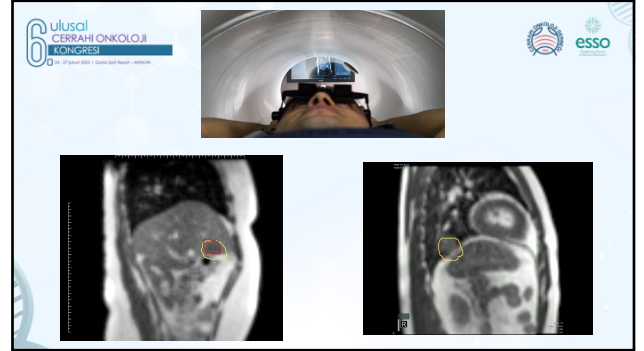
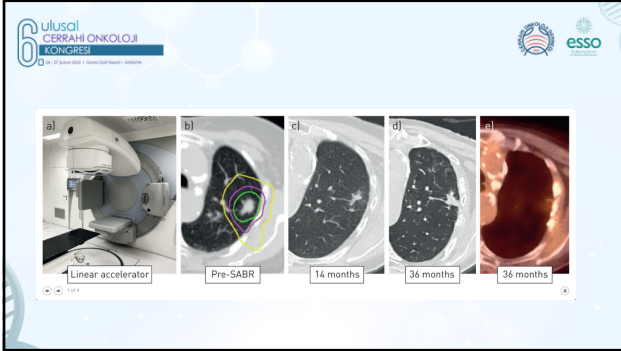
Normal doku  
Kanser

Topları vur, bardakları kırma...









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10-12 Eylül 2022 | İstanbul Kültür Merkezi - İstanbul

### Radyoterapi

- Baş-boyun tümörleri
- Erken evre akciğer
- Prostat
- Beyin, kemik, akciğer metastazları
- Beyin tümörleri
- Akciğer
- Meme
- Özefagus
- Rektum
- Prostat
- Sarkomlar
- Cilt tümörleri
- Jinekolojik tm
- Pediyatrik tm



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### HADRON TERAPİ

- Proton
- Karbon iyon
- X ışını: İyi
- Proton: Daha iyi
- Karbon iyon: En iyi

Karbon    Proton

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### FLASH TERAPİ

- Kullandığımız radyoterapiden 2000 kat daha hızlı, electron bombardımanı.
- Milisaniyelerle tedavi
- 2019 yılında ilk hasta tedavi edildi.
- Normal doku yan etkileri çok az.

Kontrol grubu    17 Gy Klasik radyoterapi    17 Gy Flash radyoterapi

sağlıklı    fibrozis    sağlıklı

- Epidermin kalınlığında bir azalma olmadı ve vaskülerizasyonun aynıdır. Bir anti-IL6 tedavisi zarda bozulma olmadı göstermiştir.

İlk hasta,- cilt lenfoması

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KNOWLEDGE-GUIDED ONCOLOGY: **RapidPlan™ Ramp Up**

- 300+ Orders
- 3,800 Potential Installs
- Disease Site Models
  - Prostate
  - Prostate (+lymph nodes)
  - Head & Neck
  - Lung SBRT
  - Breast
  - More Models Coming

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KNOWLEDGE-GUIDED ONCOLOGY: **University of Michigan: Spine SBRT Study**

	Manual	Rapid Plan
Time	60-90 min	15-20 min

Equivalent Quality

Fig. 3. et al. An analysis of knowledge based planning for stereotactic body radiation therapy of the spine. Abstract presentation at American Association of Physicists in Medicine (AAPM) 53rd Annual Meeting & Exhibition, July 12-16, 2011, Anaheim, CA, University of Michigan

Fig. 4. Histograms depicting the DVH for the spinal cord (C5, P10, R5), and esophagus (E), as well as the relative volume of the target receiving a dose between 29.5 and 34.5 Gy (d).

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**Radio-immunotherapy for Cancer Treatment**

Hodge, Gupta, Neeffes, Guiley. Oncology, 2008 August, 22(9):1064-1064

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**Abscopal Responses in Metastatic Non-Small Cell Lung Cancer (NSCLC) Patients Treated on a Phase 2 Study of Combined Radiation Therapy and Ipilimumab: Evidence for the In Situ Vaccination Hypothesis of Radiation**

E. B. Golden, A. Chachoua, M.B. Fenton-Kerimian, S. Demaria, and S.C. Formenti

New York University

ASTRO Annual Meeting  
October 2016

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**The Abscopal Effect:**  
Radiotherapy in one site can potentially eradicate tumors elsewhere in the body

- Combining radiosurgery with immunotherapy
- Study of NSCLC
- Study shows that SBRT with ipilimumab could increase tumor control and survival
- 25% remission; 100% control/no progression

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1900 1950 1970 2000 2020

Radyasyon Onkologları İçin Radyoterapi Fizikçi Uzmanlık Eğitim Programı

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