SESSION 1: IMPROVING QUALITY of LIFE

PANEL 1.1B: Human Health

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Nuances and Safe Implementation of Advanced Radiotherapy

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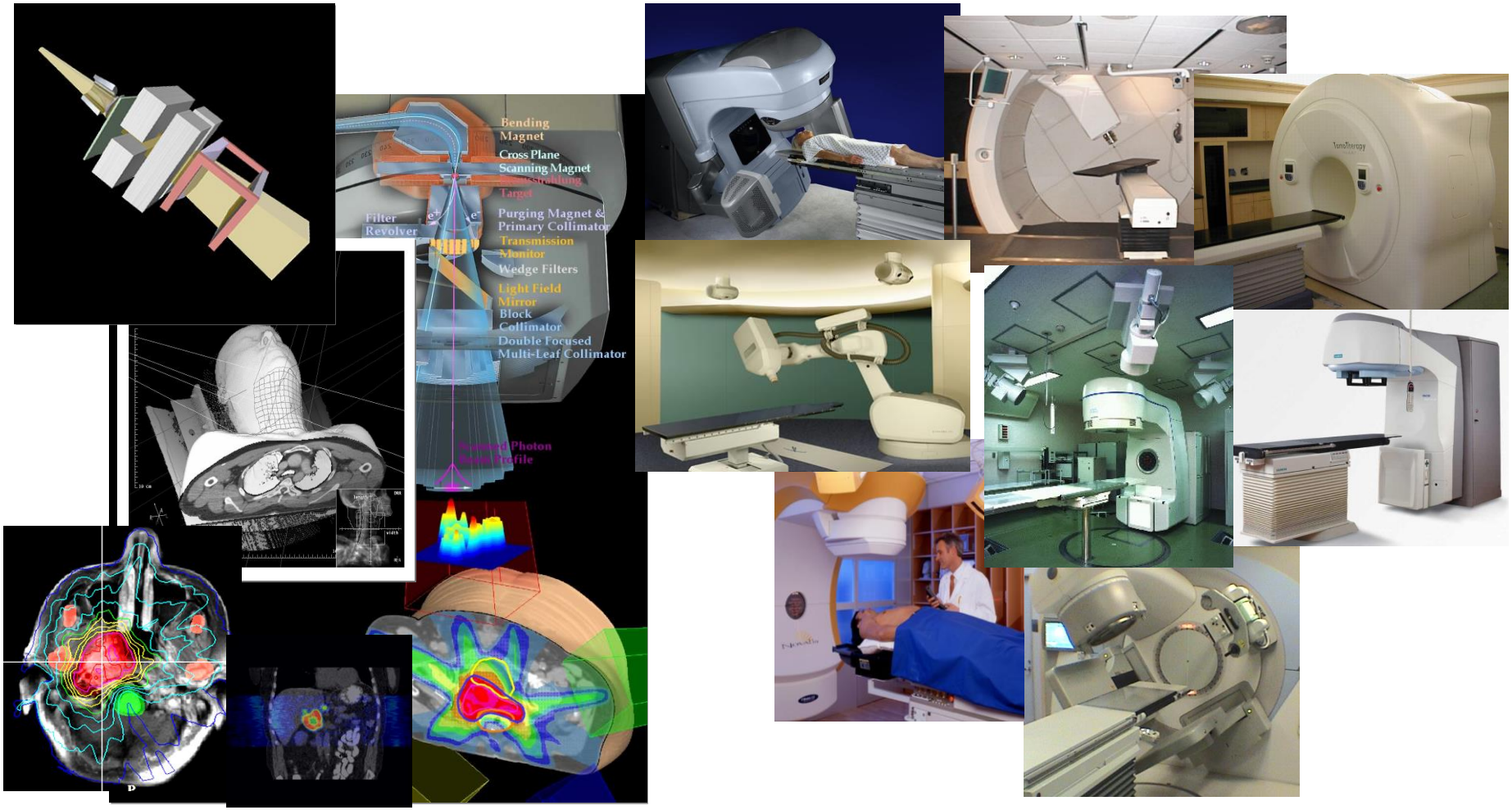
We made great progress in optimizing the planning and delivery of radiotherapy

(Circa 2018)



Virtual Simulation, 3D Computation & Optimization, IMRT, IGRT, Monte Carlo Computation, PT, IMPT, etc.

State-of-the-Art Radiotherapy

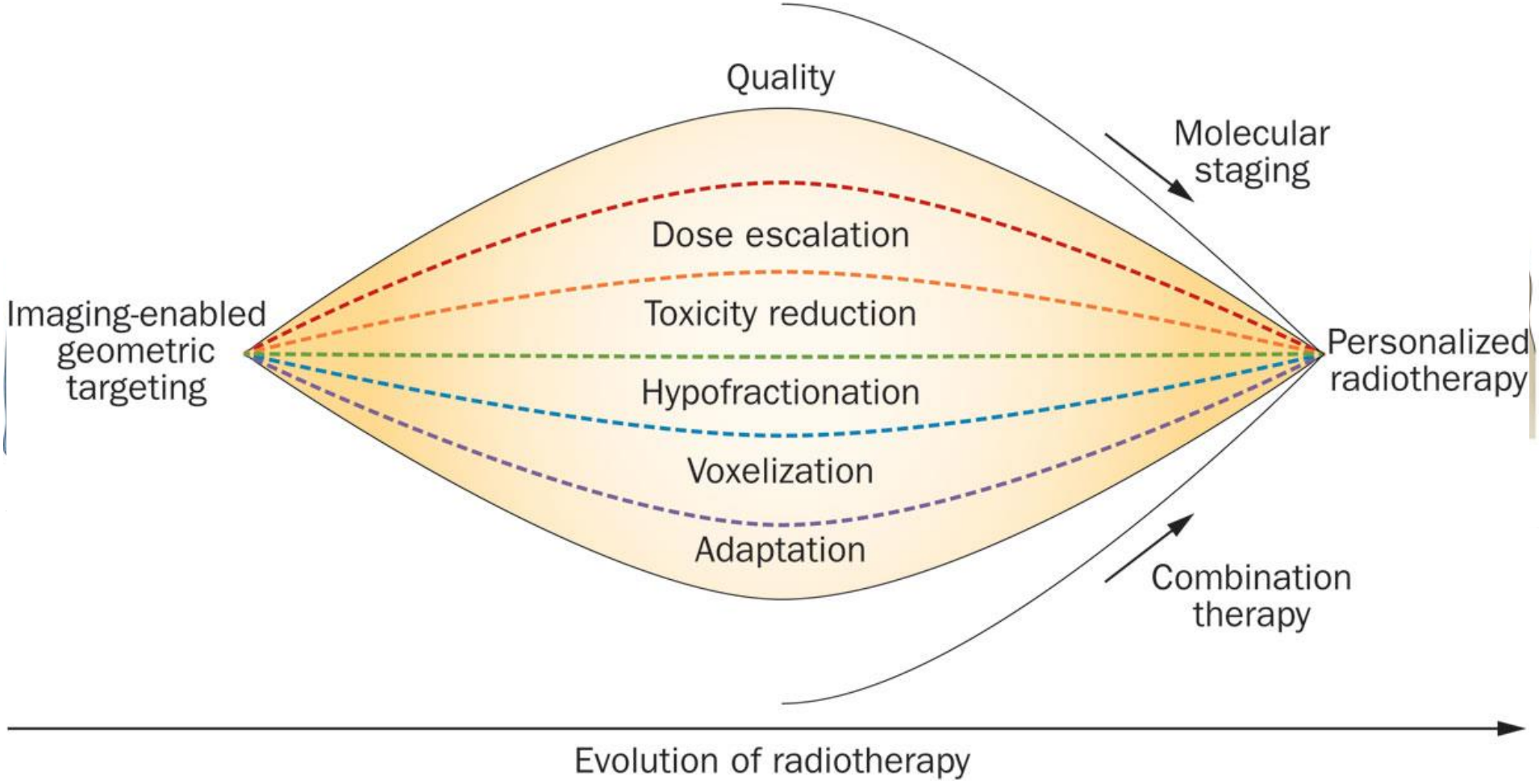
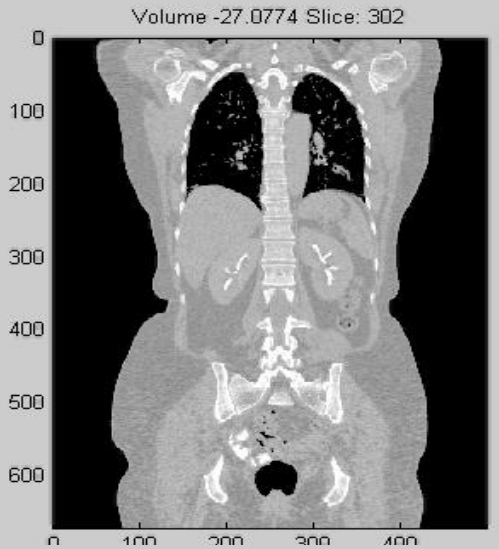


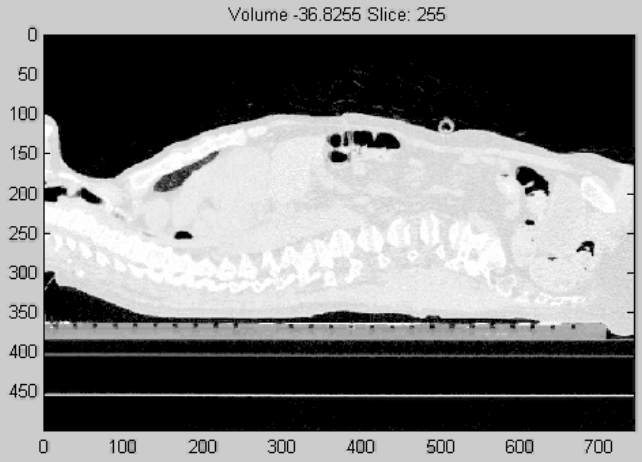
Image-guided radiotherapy Planning and Delivery

David Jaffray, Nat. Rev. Clin. Oncol. 9, 688-699 (2012)

Unresolved Clinical Challenge

How to manage dose delivery uncertainties due to temporally varying inter-, intra-fraction motion, and physiological changes?





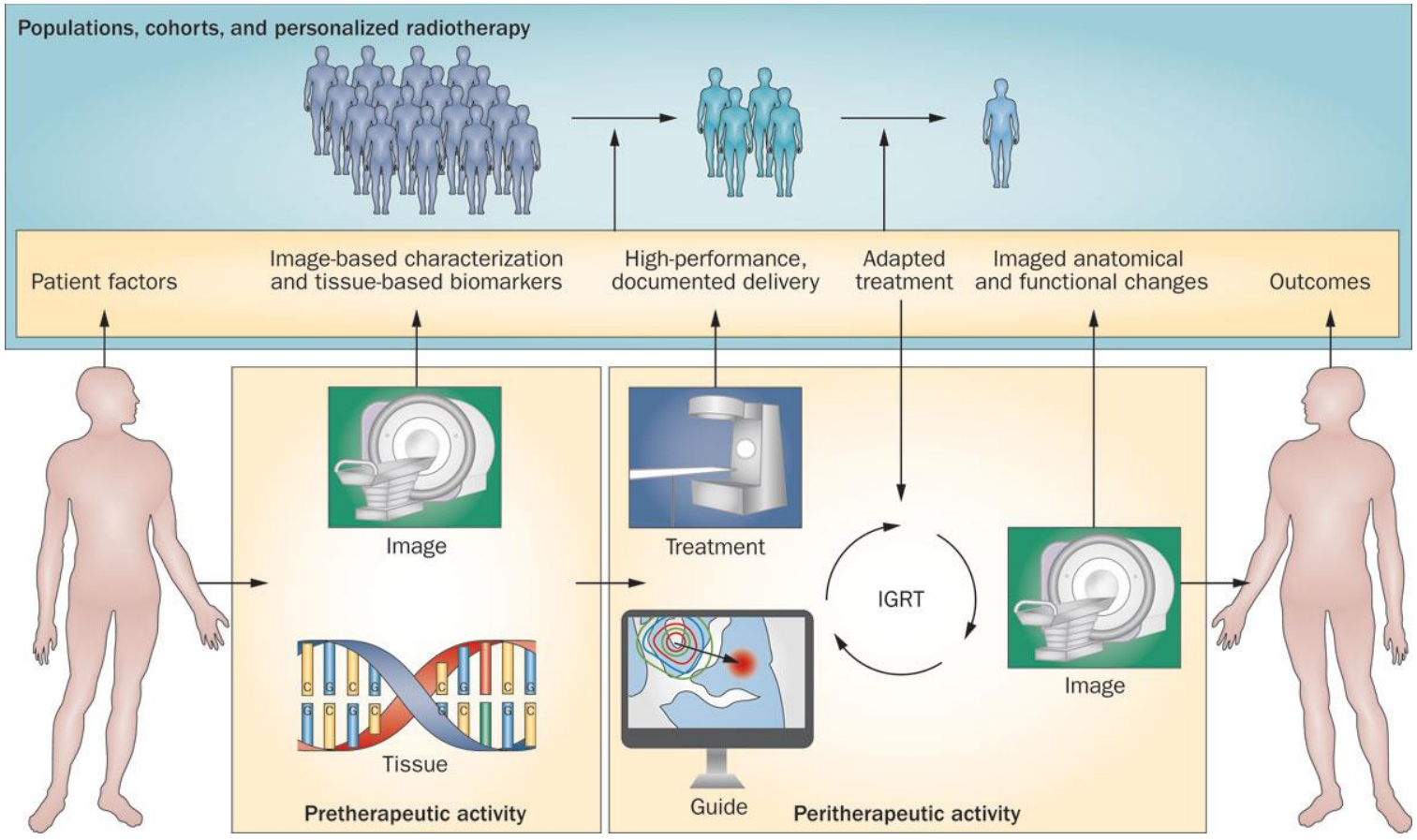
Emerging Trend in Radiotherapy

- Real time imaging
  - using MRI-guided radiotherapy
- Real time radiotherapy treatment adaptation
  - to manage anatomical motion
- Response-adapted radiotherapy
  - using anatomical and functional information

ViewRay MR Linac

Elekta MR Linac

Future Trends in Radiotherapy



- **Big Data, Artificial Intelligence, Machine Learning, and ….-omic**

David Jaffray, Nat. Rev. Clin. Oncol. 10, 194 (2012)

Radiotherapy Challenges

Circa 2018

- **Training and education in advanced radiotherapy techniques**
  - Several modern treatment technologies and practices (IMRT, IGRT, SBRT, PT) developed in the past ten years
    - In pursuit of highly conformal target coverage and normal tissue sparing
- **High technical complexity**
  - Multiple systems (software and hardware)
    - A few parameters to several hundred parameters compounded by interconnectivity and interoperability challenges
- **Limited guidance/standards**
  - Pressure to bring new technologies into clinics as soon as possible
- **Stressful and high pressure work environment**
  - Decreased resources and increased workload
- **Increased potential for catastrophic failures**
  - Complex clinical workflow

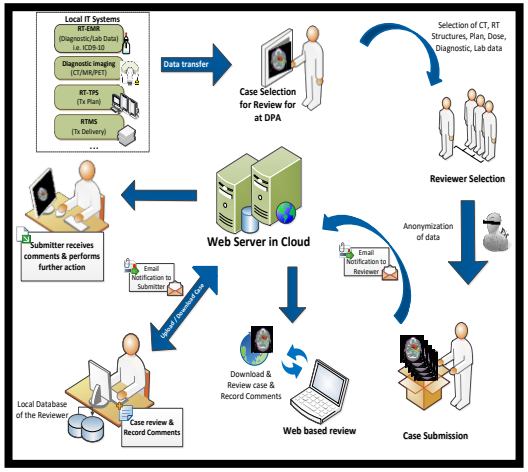
Call to Action for Global Cancer Community

- Inclusion of detailed plans for RT implementation in national cancer control plans that are tailored to local environment,
- Building cancer system capacity through the establishment of national comprehensive cancer resources in every country,
- Training tens of thousands of RT professionals,
- Creating novel financing solutions to allow countries to make the investment in RT,
- Securing access through the inclusion of RT in universal health coverage plans.

Atun, R., et al., Expanding global access to radiotherapy. Lancet Oncol, 2015. 16(10): p. 1153-86

What should we do in Global Cancer Care?

- Facilitate rapid interactions, peer reviews, and clinical collaboration amongst HICs and LMICs leveraging electronic infrastructures
  - Training the trainer, fostering mentor and mentee relationships



- Work with the technology developers and industry to respond to global need through innovations that address pressing global problems as opposed to tweaking existing solutions.
  - Disruptive technologies that lower cost and decrease complexity will be attractive to both developed and developing nations.
    - This will require special consideration of the local environment such as resources, physical and personnel infrastructure