

30. Clinical Imaging

1 unit – Hedwig Hricak, November 7, 2025

Session 1.

1. Overview of Oncologic Imaging and its importance in clinical care.
2. The potential for the convergence of engineering, biomedical science, and imaging to address future societal challenges, including advances in cancer care, research, and cancer policy.
3. Examples of the challenges and opportunities to translate advances from engineering into tools that enable precision cancer research and care.

Session 2.

1. Each year, roughly 17 million people die prematurely from cancer and other Non-Communicable Diseases (NCDs), accounting for 74% of total deaths globally, and 86% of them are in Low- and Middle-income countries (LMICs).
2. Cancer Incidence is increasing from 30 mil in 2022 to 35 mil in 2050 - 77% increase; *142% in LMIC*
3. Medical imaging plays an essential role in the optimal diagnosis and management of cancer.
4. While access to imaging is recognized as essential in the accurate diagnosis and treatment of cancer care, inequity in access, particularly in LMICs, has a direct impact on health outcomes.
5. Demonstrated by the Lancet Oncology Commission on Medical Imaging and Nuclear Medicine, a detailed analysis of imaging equipment, workforce, policies, and impact on patient outcomes showed that improving access to medical imaging in 11 common cancers could prevent 5.4 million deaths and save 54.92 million life-years over 10 years. A comprehensive scale-up of imaging, treatment, and care quality could prevent 9.55 million deaths (12.5%) and save 232.3 million life-years globally, yielding a return of \$12.43 per dollar invested.

Paper for student discussion: Advances and Challenges in Precision Imaging by Hricak et al.

Background papers:

1. Lancet Oncology Commission on Medical Imaging and Nuclear Medicine by Hricak et al.
2. New Horizons Lecture: Beyond Imaging – Radiology of Tomorrow by Hricak