Role of Radiotherapy in Treating Cancer

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What is Cancer?

Cancer is a disease characterized by the uncontrolled growth and spread of abnormal cells. These cells, known as cancer cells, can form tumors and invade surrounding tissues.

### Key Processes in Cancer Development
- **Proliferation**: The growth of cancer cells.
- **Intravasation**: The process by which cancer cells enter the bloodstream.
- **Dissemination**: The spread of cancer cells through the bloodstream.
- **Extravasation**: The movement of cancer cells from the bloodstream into surrounding tissues.
- **Colonization**: The establishment of cancer cells in affected tissues.
- **Micrometastasis**: Early stages of metastasis where cancer cells have spread to distant sites but are not yet visible on imaging.
- **Macroscopic metastasis**: Metastasis that is visible on imaging and can affect multiple organs.

### Common Sites and Symptoms of Cancer Metastasis
- **Brain**
  - Headaches
  - Seizures
  - Vertigo

- **Respiratory**
  - Cough
  - Hemoptysis
  - Dyspnea

- **Lymph nodes**
  - Lymphadenopathy

- **Liver**
  - Hepatomegaly
  - Jaundice

- **Skeletal**
  - Pain
  - Fractures
  - Spinal cord compression

### Additional Concepts
- **Proliferation** and **Apoptosis**: Key processes in cell division and cell death, respectively.
- **Carcinogenic agents**: Environmental factors that increase the risk of cancer.
- **Genetic predisposition**: An inherited increased risk of developing cancer.
Cancer is getting close to us? Is it true?

Cancer ranks as the first or second leading cause of premature death (among those 30–69 years of age) in 134 countries of the world.

Every 1.1 seconds diagnosed with cancer

Every 2 seconds

70% Occur in low-middle income countries

Only 5% of global spending on cancer goes to LMICs.
A blueprint to achieve a better and more sustainable future life for all – created by 2015 by UN general assembly

1. **NO POVERTY**
2. **ZERO HUNGER**
3. **GOOD HEALTH AND WELL-BEING**
4. **AFFORDABLE AND CLEAN ENERGY**
5. **DECENT WORK AND ECONOMIC GROWTH**
6. **INDUSTRY, INNOVATION AND INFRASTRUCTURE**
7. **CLIMATE ACTION**
8. **LIFE BELOW WATER**
9. **LIFE ON LAND**

**400 million**
At least 400 million people have no basic healthcare, and 40 percent lack social protection.

**2 seconds**
Every 2 seconds someone aged 30 to 70 years dies prematurely from noncommunicable diseases - cardiovascular disease, chronic respiratory disease, diabetes or cancer.

**REDUCE MORTALITY FROM NON-COMMUNICABLE DISEASES AND PROMOTE MENTAL HEALTH**

By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.
What Is Radiation Therapy

Around 50% cancer patients need radiation treatment

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Proportion of all cancers in Australia (%)</th>
<th>Optimal radiotherapy utilisation (%)</th>
<th>Optimal number of fractions per cancer patient</th>
<th>Optimal number of fractions per treatment course</th>
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<tbody>
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<td>Bladder</td>
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<td>4.9</td>
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<td>71</td>
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<td>Head and neck</td>
<td>3.3</td>
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<td>20</td>
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<td>Leukaemia</td>
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<td>Lung</td>
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<td>3.9</td>
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<tr>
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<td>Oesophagus</td>
<td>1.2</td>
<td>71</td>
<td>10</td>
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Widel M. Radionuclides in radiation-induced bystander effect; may it share in radionuclide therapy? Neoplasma. 2017;64(5):641-654

Editorial

Radiotherapy in Low- and Middle-income Countries. What Can We Do Differently?

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Inequality in radiotherapy access globally

Need to close the gaps!

Essential part of cancer treatment!

27 million lives could be saved (2015-2035) in LMIC US$278 billion net economic benefit!
Prior to investing in cancer control programmes, decision-makers must consider:

- National cancer priorities;
- A country’s health system capacity to deliver a sustainable programme.

Comprehensive cancer prevention and control requires inclusion of all elements across the cancer continuum.
Roadmap towards a NCCP WHO-IAEA 2019

**PHASE I**
**PRE-PLANNING**
Prepare the planning process
- Identify cancer control as one of the health priorities in the country
- Establish a nodal officer and a technical working group with national and international experts

**PHASE II**
**RADIOThERAPY**
Prepare the planning process
- Identify radiotherapy as an essential component of the NCCP
- Establish a focal point for radiotherapy

**PHASE III**
- Legal and regulatory infrastructure in place
- Contract and initiate infrastructure works
- Start human resource training
- Prepare procurement of equipment
- Prepare evidence-based treatment protocols

**PHASE IV**
- Acceptance tests
- Commissioning of the equipment
- Quality Assurance/Quality Management System
- First clinical treatment
- Safety assessment

MILESTONE 1: Decide to start RT
MILESTONE 2: National RT plan
MILESTONE 3: Preparatory work done
MILESTONE 4: Preparatory work done

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What can we do?

- Economic benefits
- Increased lifespan and quality of life
- Increased patient access to quality radiotherapy
- Strengthened radiotherapy workforce
- Increased adoption & use of radiotherapy technology
- Training, education, professional development and certification of ROs, MPs, RTTs
- Professional networks and societies established

Resources invested by IAEA and government parties in RCA activity – & complementary health sector investment
Political will and commitment is the KEY for NCD!

CD

Disease

transmission

Incidence

Host

NCD

Transnational Industry

National Industry

Policies

Political will

Incidence

Risk factors

Conflict of Interest

Media

Broker

Politic
Global cancer incidence is continuously increasing. The common goal is reducing more than 30% of premature mortality caused by NCD, including cancer, in 2030. More than 50% of cancer patients need radiotherapy, but inequality in RT services does exist, especially in LMIC's. Investment in RT is must and necessary. Investment in RT not only saves lives but brings economic benefits. The evidence is real! National Cancer Control Program. It needs our support and commitment from the government, because without our support all of this is only paperwork!

Conclusion

The word of CANcer, consist "CAN", That's mean we CAN fight Cancer. TERIMA KASIH..
Thank you..

Special thanks to my team: Steven MD, Handoko MD, Mayang MD PhD, GB Prajogi MD