

Oncology in 21st Century: Rapidly Changing Paradigm: Opportunities & Challenges

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Oncology in First Quarter of 21st Century

- Successes (absolute and relative): opportunities
 - Improved diagnosis: piggy-backing on advances in molecular biology, immunology and radio-imaging in later half of 20th century
 - Improved supportive and definitive care (novel drugs, surgery, radiation therapy)
 - Learning how and why not to do too many investigations during follow up
- Failures (absolute or relative): challenges
 - Prevention of preventable ones: oral cavity, breast, lung and more
 - Early diagnosis (in LMICs)
 - Bridging the gap: suspicion, diagnosis and management
 - Cost of cancer care
 - Rapidly changing lifestyles – increased NCDs

Projected Cancer Burden Increase in 2050

- Over 35 million new cases
- A 77% increase from estimated 20 million in 2022
- Reflection of:
 - Population ageing and growth
 - Changes to people's exposure to risk factors
 - Tobacco, socio-economic development, alcohol, obesity, air pollution
 - Genetic predisposition
 - Microbiota – specially, gut microbiota

Males



Most common cancer site: males

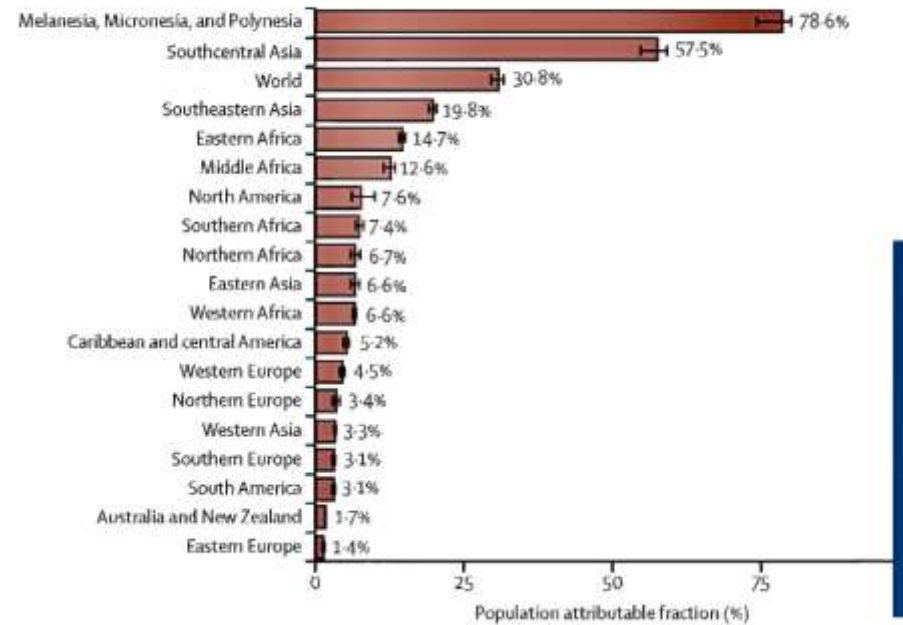


Females



Most common cancer site: females





Population attributable fraction of oral cancer cases in 2022 attributable to smokeless tobacco or areca nut consumption, by world region

Error bars indicate 95% uncertainty intervals.

Investigations

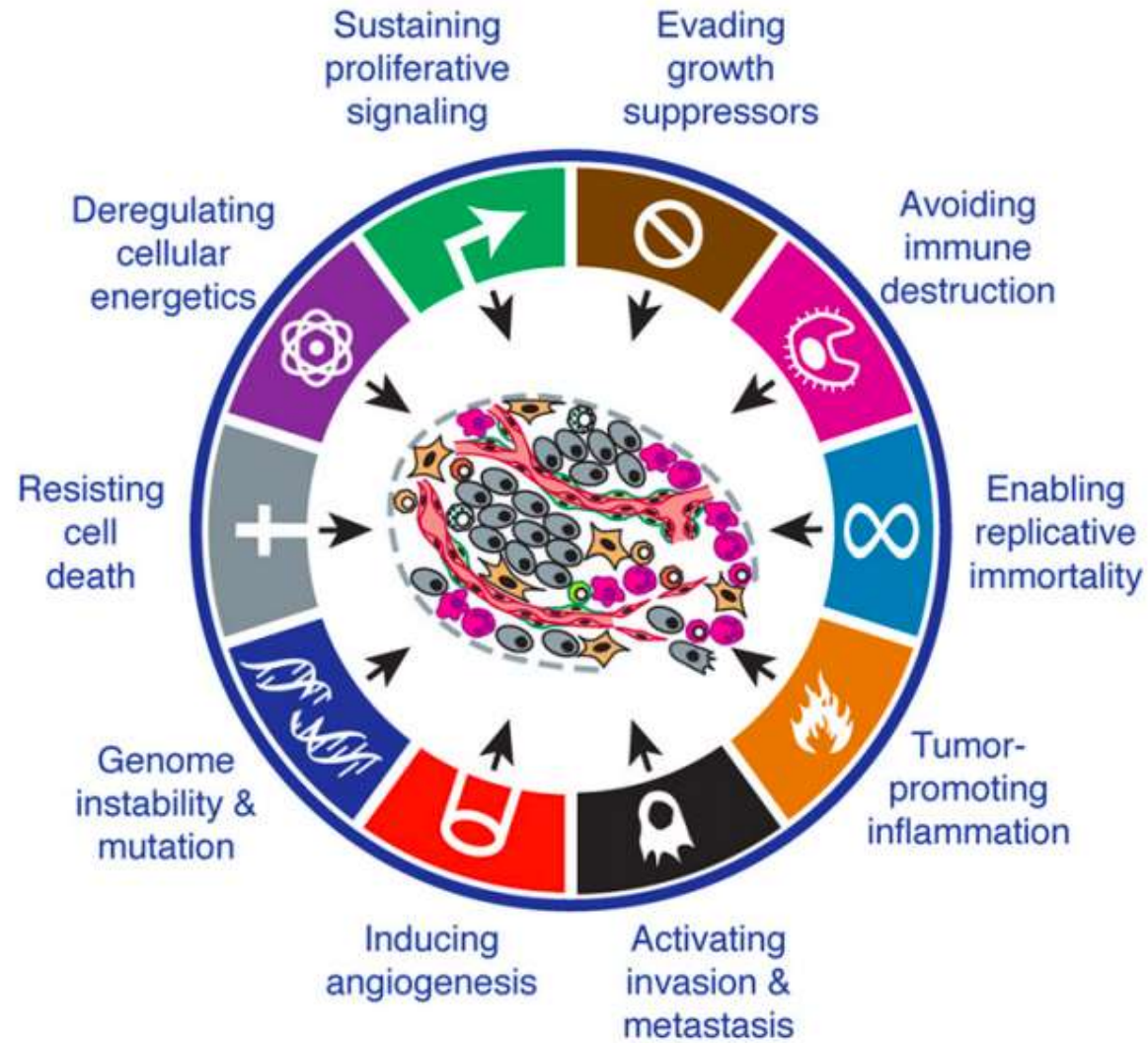
- Know what you want: we ask for too many now
 - For a good reason
- More being done than optimal ones?
- Less being done?
- Need for following guidelines

Diagnosis of Cancer: Field is evolving every other day

- Need to go beyond morphology
- Biomarkers
 - IHC (immunohistochemistry - using monoclonal antibodies)
 - Cell of origin
 - Molecular: trying to find driver mutations (cell of origin, pathogenesis, prognosis, therapeutic targets)
 - FISH (Fluorescent In-Situ Hybridization)
 - PCR (Polymerized Chain Reaction)
 - CGH (Comparative Genomic Hybridization)
 - NGS (Next Generation Sequencing)

Molecular heterogeneity of Cancer: Hallmarks of Cancer

Hallmarks of Cancer



Oncology in 21st Century

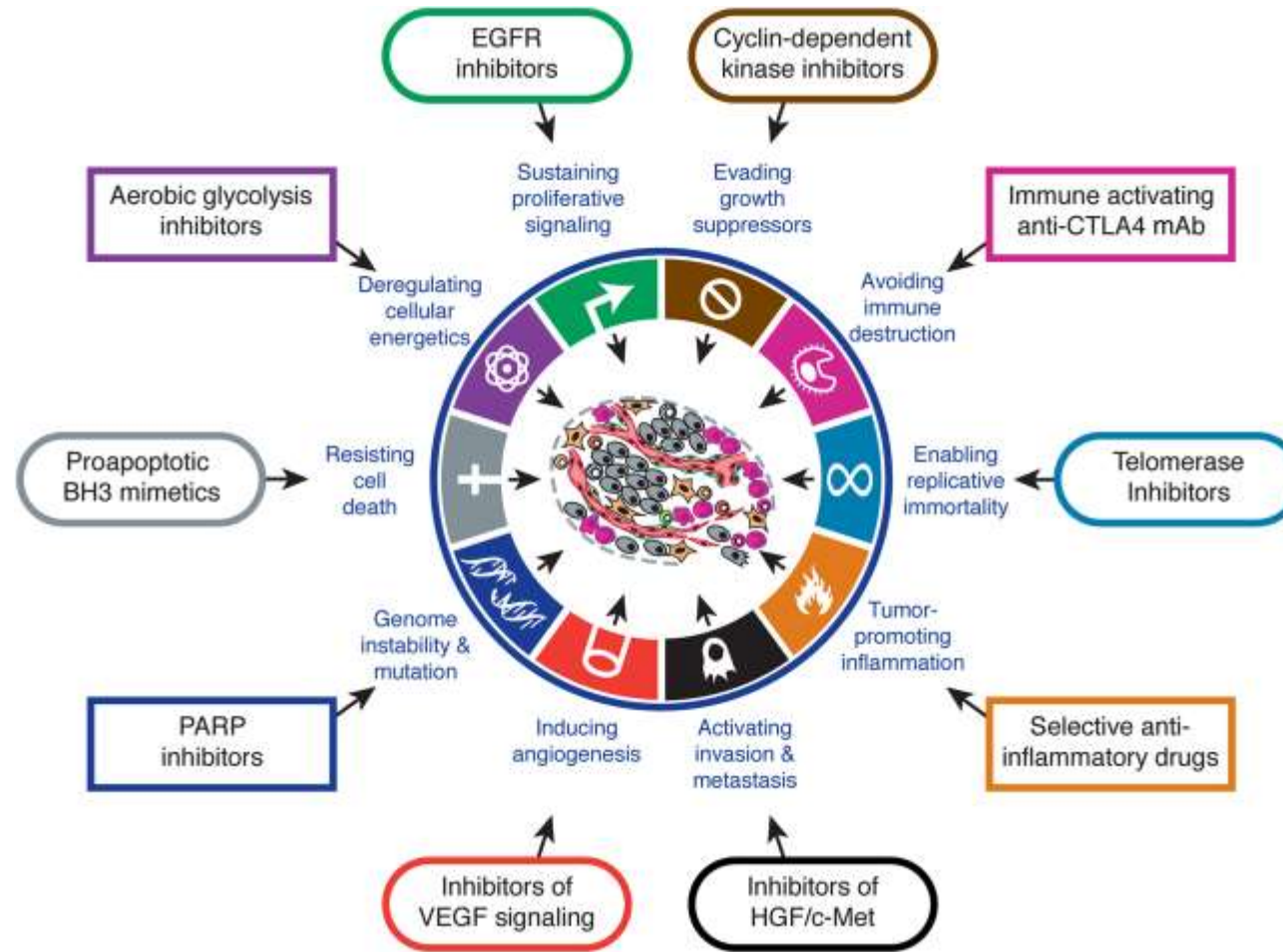
- Principles to Practice
 - Opportunities
 - Challenges

Plenty on both plates

Management of Cancers

- 3 pillars
 - Surgery: conventional, laparoscopic, robotic
 - Radiation therapy: machine upgrade, source, delivery
 - Medical Oncology: Cytotoxic Chemotherapy & Supportive Care
- Newer molecules
 - Targeted small molecules
 - Monoclonal antibodies
- Novel immunotherapy
 - 'Live Drugs': CAR-T cells
 - CTLA-4 and Check-point inhibitors

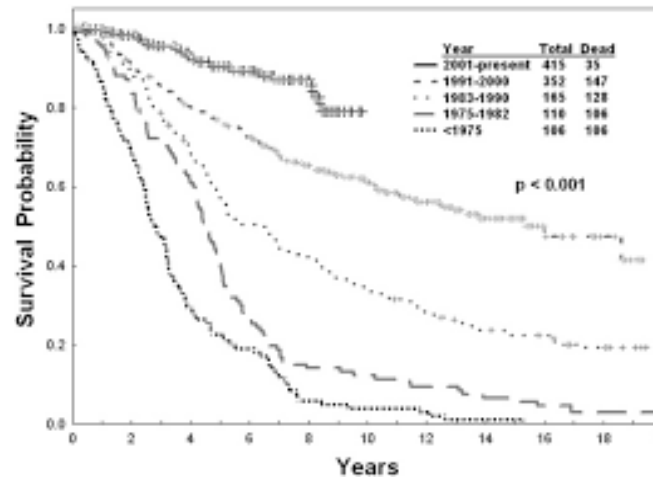
Novel treatment for cancer



Targeted Therapy for Cancers

CML

- A chronic leukemia
- Philadelphia Chromosome positive
 - t(9;22)(q34;q11)
- BCR-ABL positive: a chimeric oncogene
 - A therapeutic target



March 2017 – N Engl J Med Editorial, Dan L. Longo

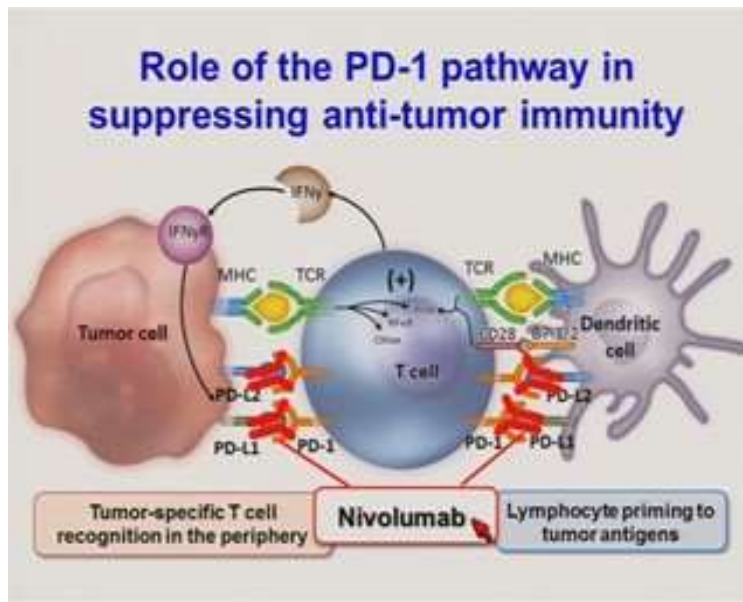
***'imatinib** changed everything'*
'pointed oncology in a new direction'
'the future of oncology is more hopeful now'

10-yr survival on Imatinib (Gleevec/Glivec) – 83.5%



Also drugs for solid tumors: Lung, Kidney, Melanoma and others

Novel Immunotherapeutic Approaches for Cancer



Pembrolizumab/Nivolumab/others +/- targeted drugs

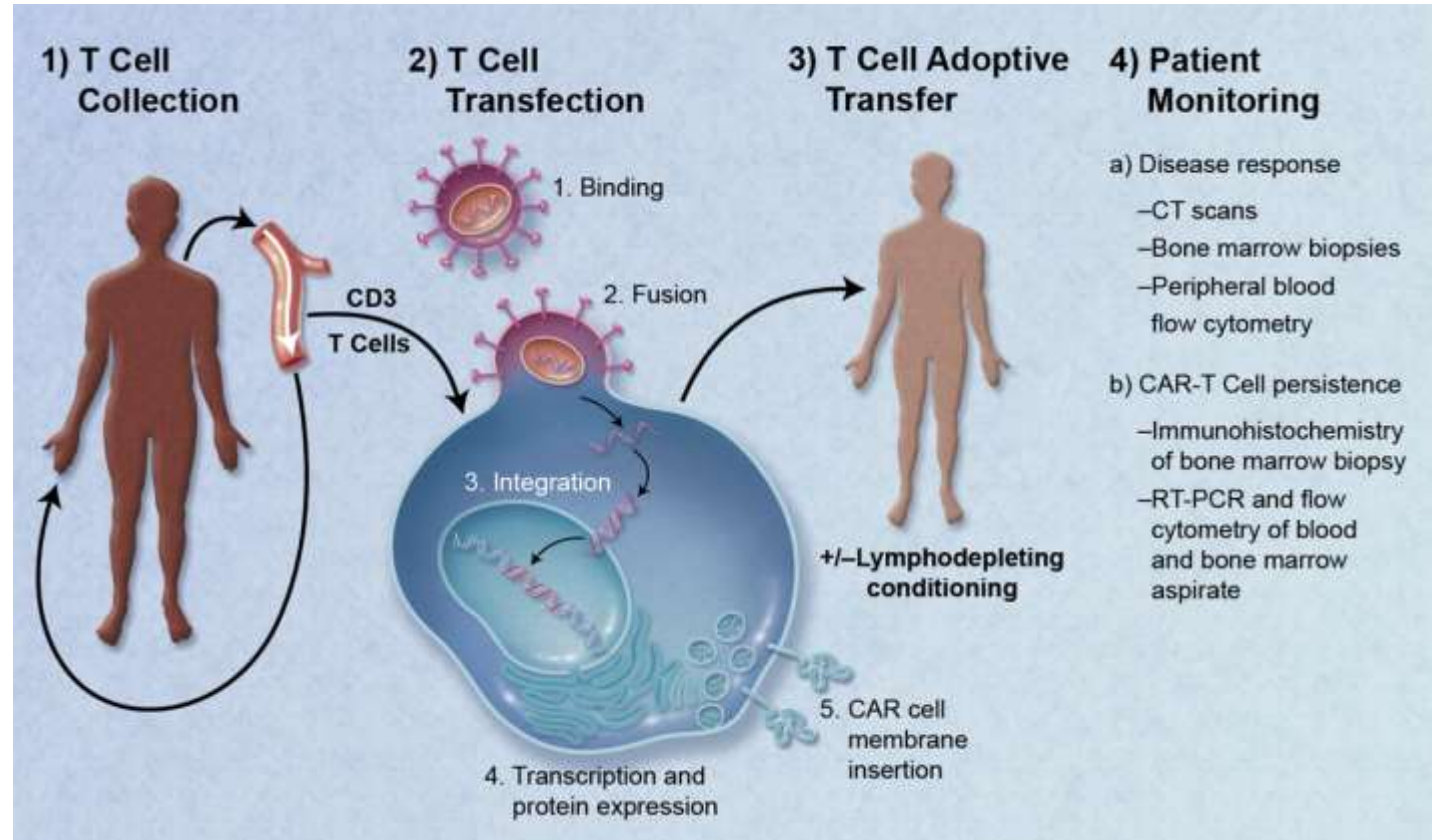
Approved Indications till date –

1. Metastatic melanoma: Overall Survival 6.5 months to 50% at 10 years
2. Squamous skin cancer
3. Metastatic Renal cell cancer: OS at 5 year 0-7% to 36%
4. Other uro-genital cancers
5. Non-small cell lung cancer Overall Survival at 5 years – 2% to 26%
6. Head & Neck cancer
7. Subset of breast cancer
8. Hodgkin Lymphoma: from 3rd line to 1st line

Adoptive Immunotherapy for Cancer

Harnessing Immune System

'Live Drug' – CAR-T Cells



Cancer: The other side of the story

- Cancer incidence: 20 million new cases annually by 2022
- Cancer prevalence: Cured ones or living with cancer
- Burden of cancer: Socio-economic and geographic
- Cancer prevention: A social challenge
- Cancer screening
 - Only for common ones
 - Technical issues
- Early detection of cancer
 - Expertise and facilities
- Cost: diagnosis, treatment, follow ups and rehabilitation

But, most of the advanced cancers
relapse/progress soon: increasing burden on
healthcare

- Subsequent treatment
 - Cost
 - Quality of life
 - Challenges in discussing long term outcome

[Blood](#). 2013 May 30;121(22):4439-42. doi: 10.1182/blood-2013-03-490003. Epub 2013 Apr 25.

The price of drugs for chronic myeloid leukemia (CML) is a reflection of the unsustainable prices of cancer drugs: from the perspective of a large group of CML experts.

[Experts in Chronic Myeloid Leukemia. Collaborators \(119\)](#)

Prevention

- Easier to talk
- Change in lifestyle
- Vaccines
 - They have their role in scheme of things
 - Hepatitis B
 - HPV
 - Newer ones

Where do we need to focus and active role of primary care physicians?

- Two sites
 - Oral cavity cancer in males
 - Breast cancer in females
- Early detection is the key
 - Awareness
 - Physical check
 - Counselling for inexpensive investigations
 - Be the bridge for expedited treatment
 - Active partner in survivorship

Cancer Care in India: Massive Challenges

- Awareness
- Increasing burden
- Diagnostics: integrating changing paradigm
- Cost of treatment: integrating changing paradigm
- ~70% care in private sector
- Survivorship
- Palliative care
- Workforce
- Lack of coordination among healthcare providers

Lasting bond between a cancer patient and the oncologist

- A 39-yr white woman with stage 4 breast cancer ~21 years ago
- An Indian-origin medical oncologist encouraged her for a clinical trial with Trastuzumab (Herceptin – an Anti-Her2 agent)
- Exquisite response – remains disease free
- For every healthcare issues, she consults him first

Cancer is reflection of our life, our struggle, our victory
We can not run away from it,
Only a continued, concerted effort will help to combat

"Early detection is the key"

Thank you