An Introduction to Cancer and Basic Cancer Vocabulary

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Breaking Cancer's Code

THE REVOLUTION IN DIAGNOSIS AND TREATMENT

NEW DISCOVERIES • NEW THERAPIES • NEW HOPE

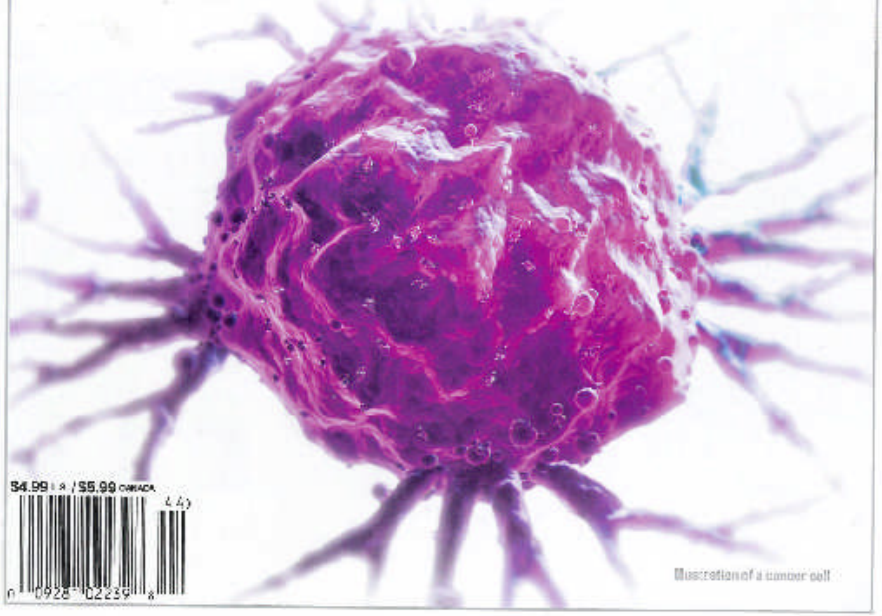

Illustration of a cancer cell

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Overview

Cancer Basics: What Is Cancer?

Causes, Risk Factors, & Prevention

Early Detection, Diagnosis, & Staging

Treatment Overview

What Is Cancer?

Abnormal and unregulated proliferation (growth) of cells, arising from cells of a specific organ

General name for a group of more than 100 diseases

- Although many kinds, they all start because abnormal cells grow (proliferate) uncontrolled

Cancer cells have the ability to create their own blood supply, break away from the organ of origin, travel, and spread to other organs of the body

Morbidity and mortality arise predominantly from organ damage caused by local growth and **metastases to distant anatomic areas**

Cancer Cell Basics

Difference between cancer cell and normal cell:

Normal cell:

- Knows and stays in its place of origin
- Knows when to replicate and when to die
- **2009 Nobel Prize – telomeres** help determine longevity

Cancer cell:

- Does not know when to stop growing and proliferating
- Can travel (metastasize) from organ of origin to any place within the body

How a Normal Cell Becomes Cancerous

What happens to the cell that allows cancer to develop?

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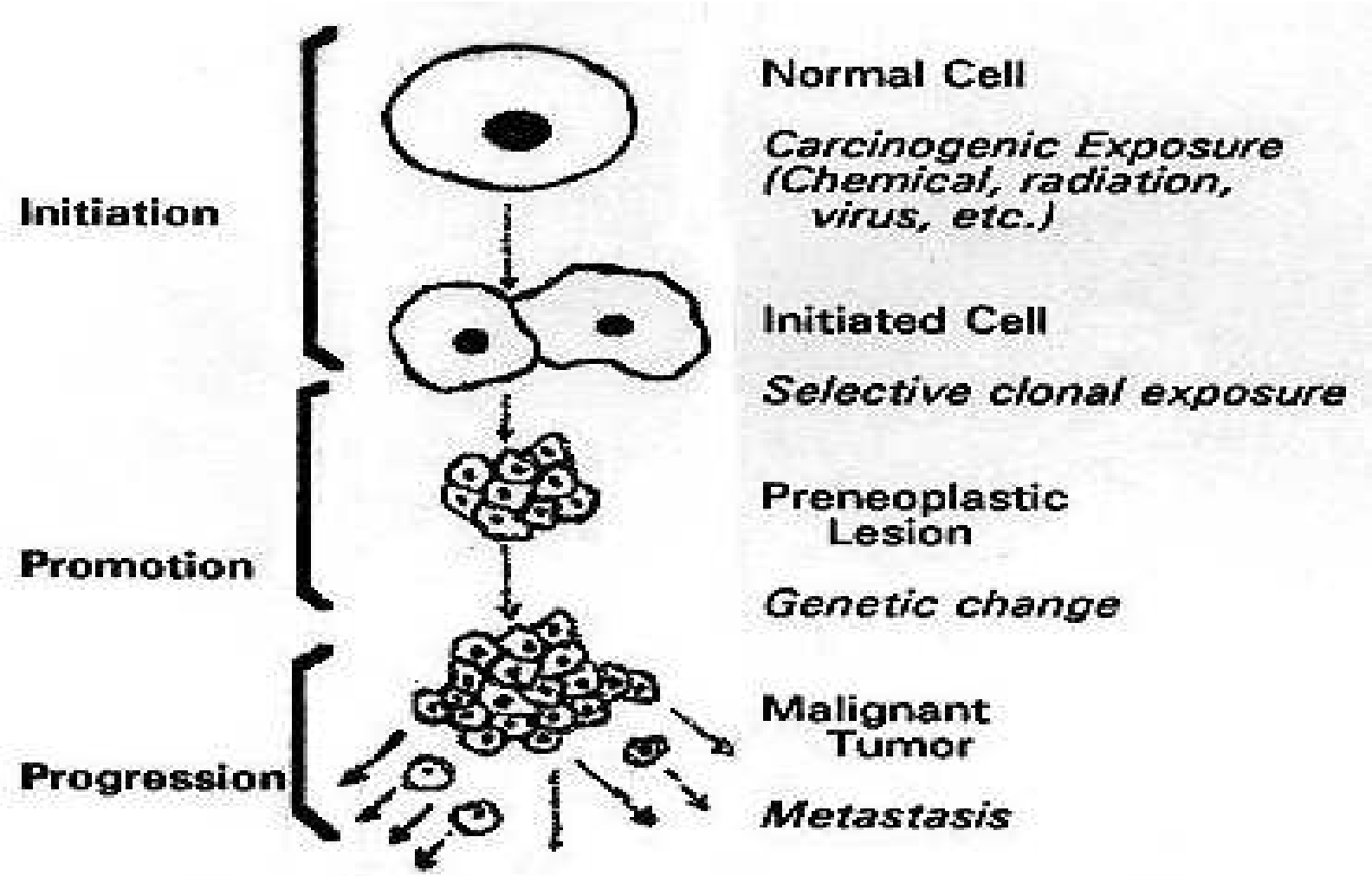
Multistep Carcinogenesis



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Major Risk Factors

Genetic predisposition

Tobacco use ± Alcohol excess

Lack of physical activity

Environment and Diet

Virus

Sun exposure

How Cancers Differ

Tumor Types

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Cancer/Carcinoma ("solid" tumors)

Generally refers to cancers that arise from epithelial surfaces and cells that line glands:

- Skin/Epidermis
- Glands
- Intestines
- Bronchus
- Breast
- Prostate
- Pancreas
- Thyroid
- Kidney
- Testis
- Ovary
- Adrenals
- Liver
- Cervix

Major Types of Carcinomas

Adenocarcinoma

- Any gland (breast, prostate, lung, pancreas, ovary, colon…)

Squamous cell carcinoma

- Any surface or lining of mucous membrane

  (skin, lung, head and neck)

Others

- Urothelial (bladder), islet (pancreas)

The Hematologic Malignancies: Lymphomas and Leukemias

"Liquid" Tumors

Tumors of lymph nodes and blood cells

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Types of Lymphomas

Hodgkin's lymphoma

Characteristic appearance and clinical presentation

Specific type of cell

Various types

Specific response to therapy

Non-Hodgkin's lymphoma

Wide variety of pathologic subtypes

Wide range of presentations and outcomes

Differing treatments than for Hodgkin's lymphoma

The Leukemias

Malignant cells arising from cells of the bone marrow —

- **white cells** (myeloid cells, lymphoid cells, monocytes)
- **red cells** (erythroleukemia)
- **platelets** (megakaryocytic leukemias)
- **plasma cells** (myeloma)

Sarcomas

Neither carcinoma nor hematologic malignancy

Arise from **soft tissues or bone**

Wide spectrum of sites and presentations

Osteosarcoma (bone)

Chondrosarcoma (cartilage)

Synovial cell sarcoma (joint)

Leiomyosarcoma (muscle)

Liposarcoma (fat)

Rhabdomyosarcoma (primitive muscle)

Angiosarcoma (blood vessel, Kaposi's) …

How Is Cancer Diagnosed? ("7 warning signs")

Symptomatic

- Cough
- Rectal bleeding
- Palpation of breast lump
- Weight loss
- Skin abnormality- change in a freckle or mole, red areas
- Coughing up blood/chest pain
- Change in bowel habits
- Abdominal pain
- Blood in urine
- Difficulty swallowing
- Hoarseness

How Is Cancer Diagnosed?

Asymptomatic

- Blood test – PSA, other markers
- Screening study(ies) – PAP, PSA, colonoscopy, mammogram, total-body CT scan
- Asymptomatic pick up on physical exam
- Leads to radiographic or surgical biopsy and then to pathology
  - ✓ **PATHOLOGIST** MAKES THE DIAGNOSIS OF CANCER

Multidisciplinary Strategies

Primary Care Physician/Internist/Family Practitioner

Surgeon

Radiologist

Pathologist

Medical Oncologist

Radiation Oncologist

Surgical Specialist

Nurse/Nurse Oncologist

Social Worker

Financial Planner

Tumor Registrar/Demographics

Clinical Trials Coordinator

Community Outreach and Support

"It takes a village"….

Multidisciplinary Clinic Concept

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Major Cancers for Panel Discussion and What the NHC and BIDMC are Doing

Non–small-cell lung cancer	Thoracic multidisciplinary MDC)
Breast cancer	Breast MDC
Colorectal cancer	Multidisciplinary Discussion at Tumor Boards
Pancreatic cancer	MDC in formation; Seed program with Dr Kaplan
Hepatocellular cancer	In house expert, Dr Rodgers
Prostate	
Skin	

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How Cancer Spreads

Metastases

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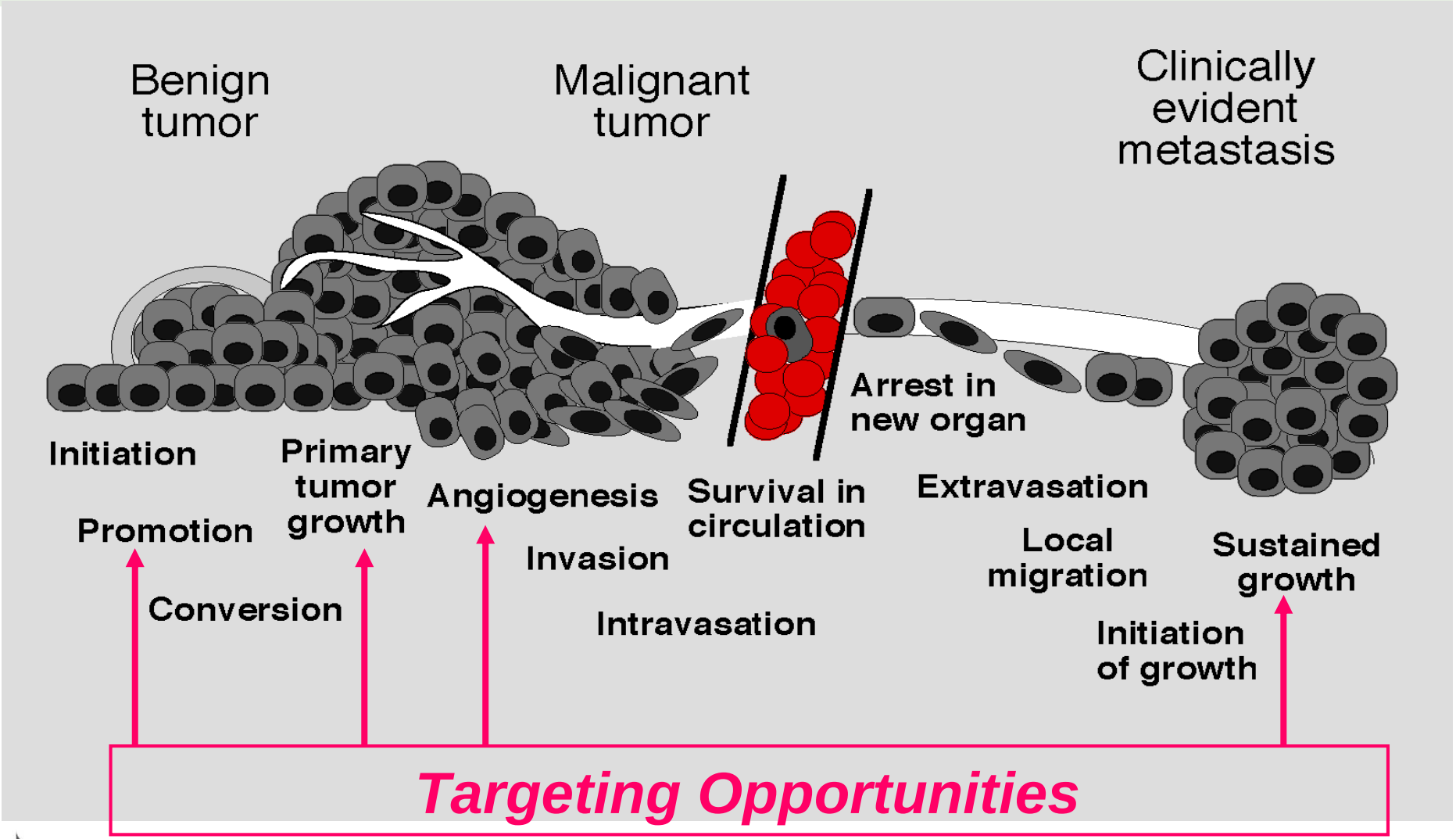
Tumor Progression



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Early Detection, Diagnosis and Staging

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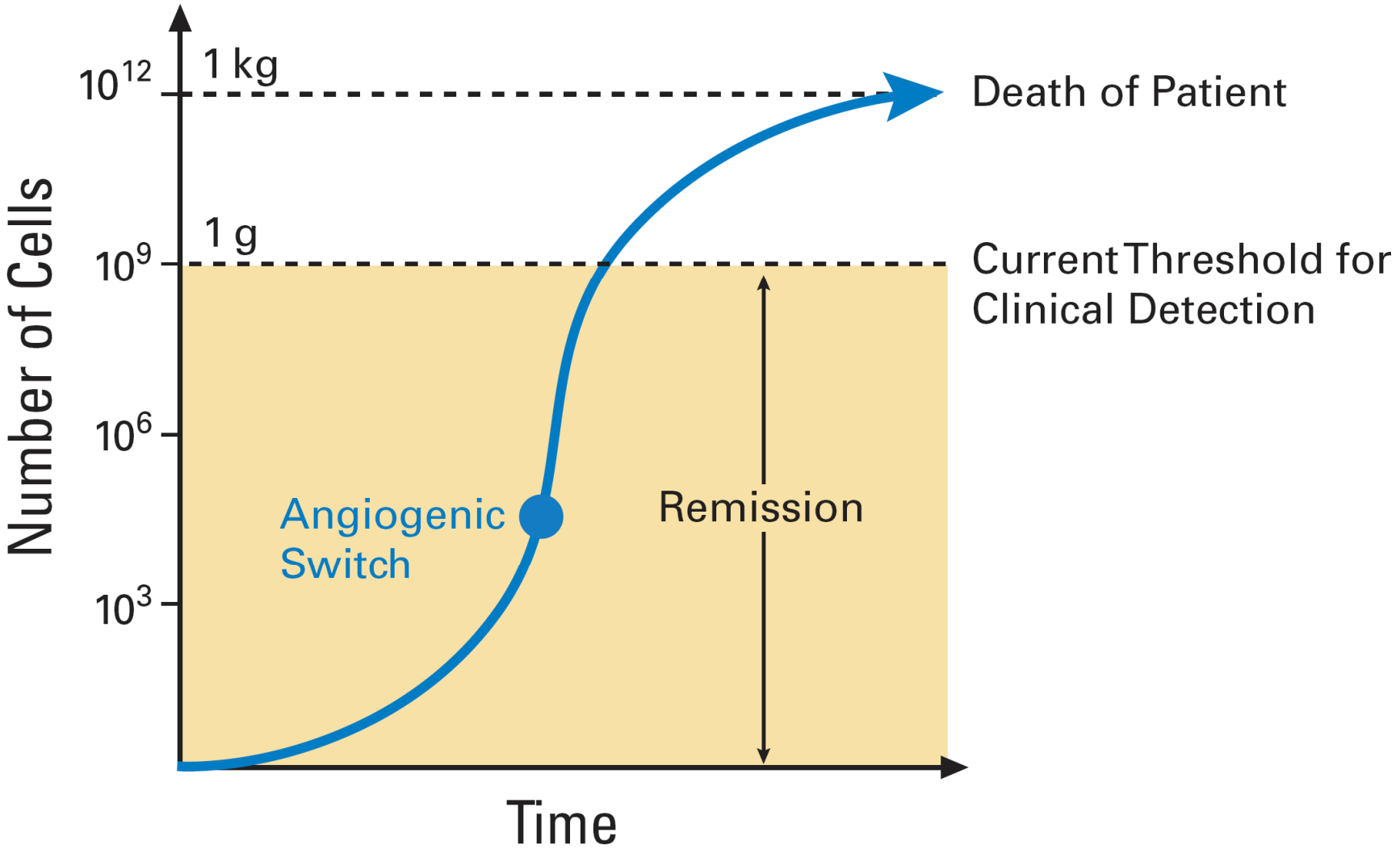

Frangioni JV. "New technologies for human cancer imaging." J. Clin. Oncol. 2008; 26: 4012-21.

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Lung Cancer Tumor

http://science.nationalgeographic.com/science/enlarge/lung-tumor.html

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Staging Considerations

What Is Staging?

Process of finding out how far the cancer has spread

Vital step in determining treatment choices; also gives a clearer idea of the outlook for recovery

There is more than one system for staging

- **TNM system** is used most often
- **Biopsy, CT, MRI, PET, Ultrasound, blood tests** all help determine stage

Staging Using TNM and Group Staging

T = Tumor size

N = Node status

M = Presence or absence of metastases

G = *Degree of differentiation*

Letters or numbers after the T, N, and M give more details about each of these factors

Once established, T, N, and M are then subgrouped into stage class (Stage I to Stage IV)

A Few Comments about Genomics and Genetics

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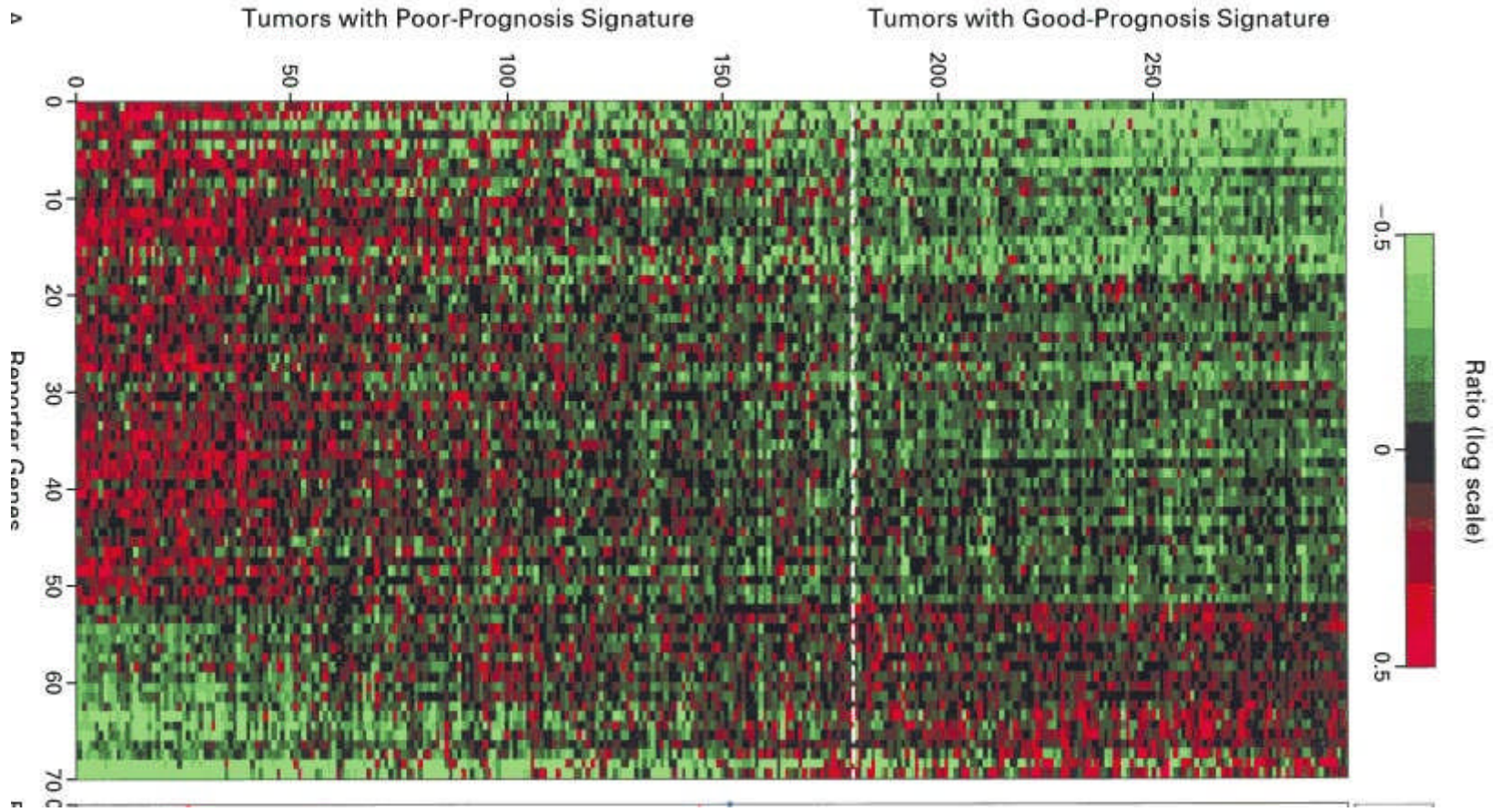
Gene Expression for Breast Cancer



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The Future

Chemoprevention – the ability to use drugs or lifestyle modifications to prevent cancer from developing

Improvement in staging – detecting many fewer cells or identifying blood tests that tell about the presence of cancer

Determining a specific "finger print" of an individual's cancer

Selecting a specific treatment, based upon the likelihood of the cancer to **respond** to that treatment AND **minimizing** the side effects of treatment

A Thought for the Day

"Tell me and I forget.
Teach me and I remember.
Involve me and I learn."

– Benjamin Franklin

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