MAYO CLINIC
Cancer Center

Mayo Clinic Cancer Center
ARIZONA CAMPUS

Mayo Clinic Cancer Center – Arizona Campus

Healing the Individual Cancer Patient

Ruben A. Mesa, MD
Professor and Chair, Division of Hematology & Medical Oncology
Deputy Director, Mayo Clinic Cancer Center

www.mayoclinic.org/cancer

You have Lymphoma

You have
Pancreas Cancer

You have Cancer

You have Leukemia

You have
Breast Cancer

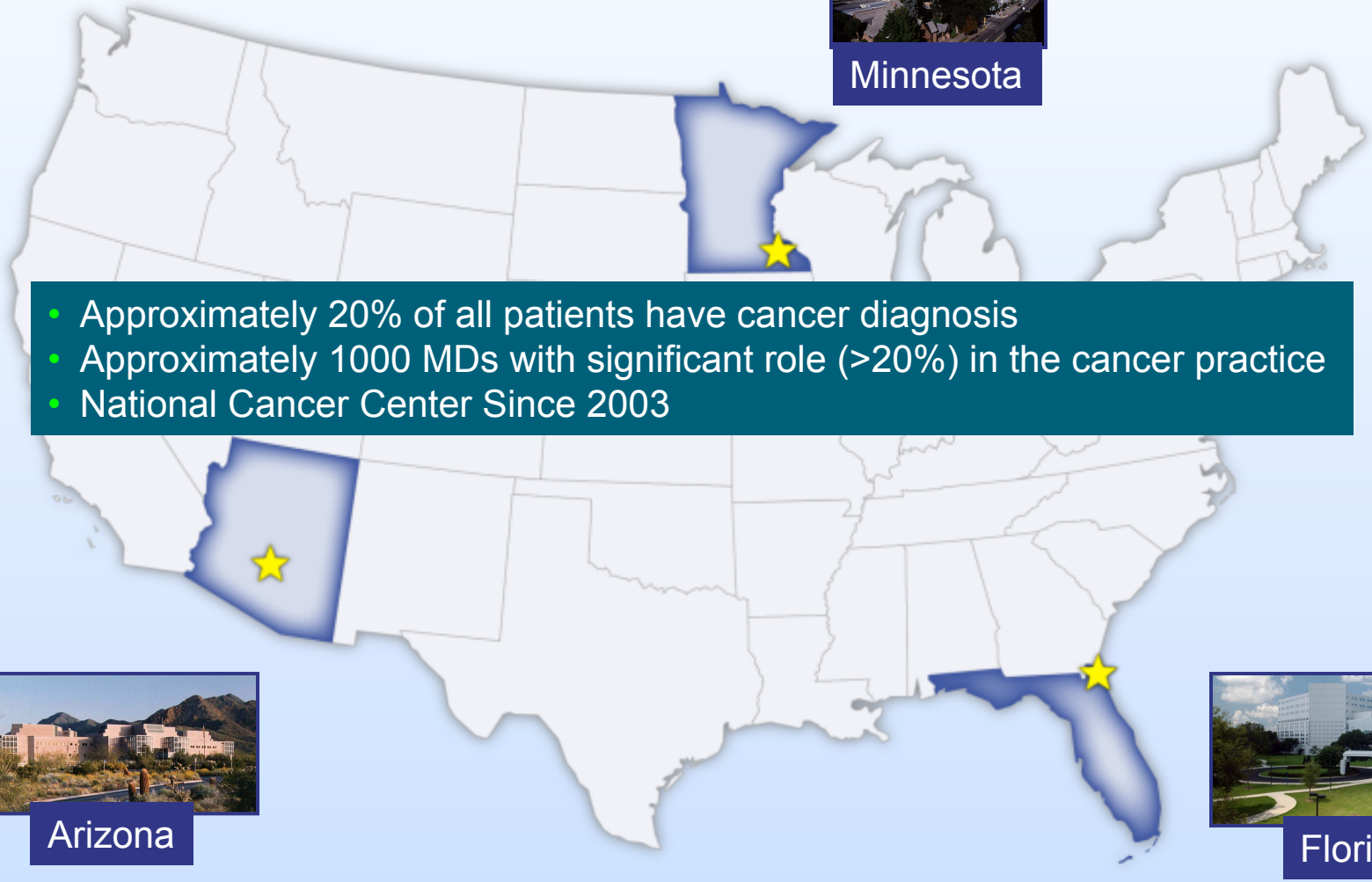
Embody Health: A Journey with Mayo Clinic
Healing the Individual Cancer Patient

- Mayo Clinic Cancer Center – Who are we?
- Individualized care decisions
- Individualizing healing through regeneration
- Individualizing the cancer survivors journey

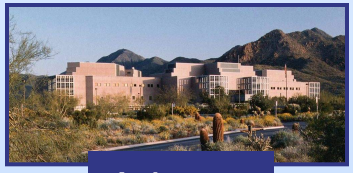
Mayo Clinic Cancer Center

An NCI Designated Comprehensive Cancer Center Since 1973

Minnesota



- Approximately 20% of all patients have cancer diagnosis
- Approximately 1000 MDs with significant role (>20%) in the cancer practice
- National Cancer Center Since 2003



Arizona

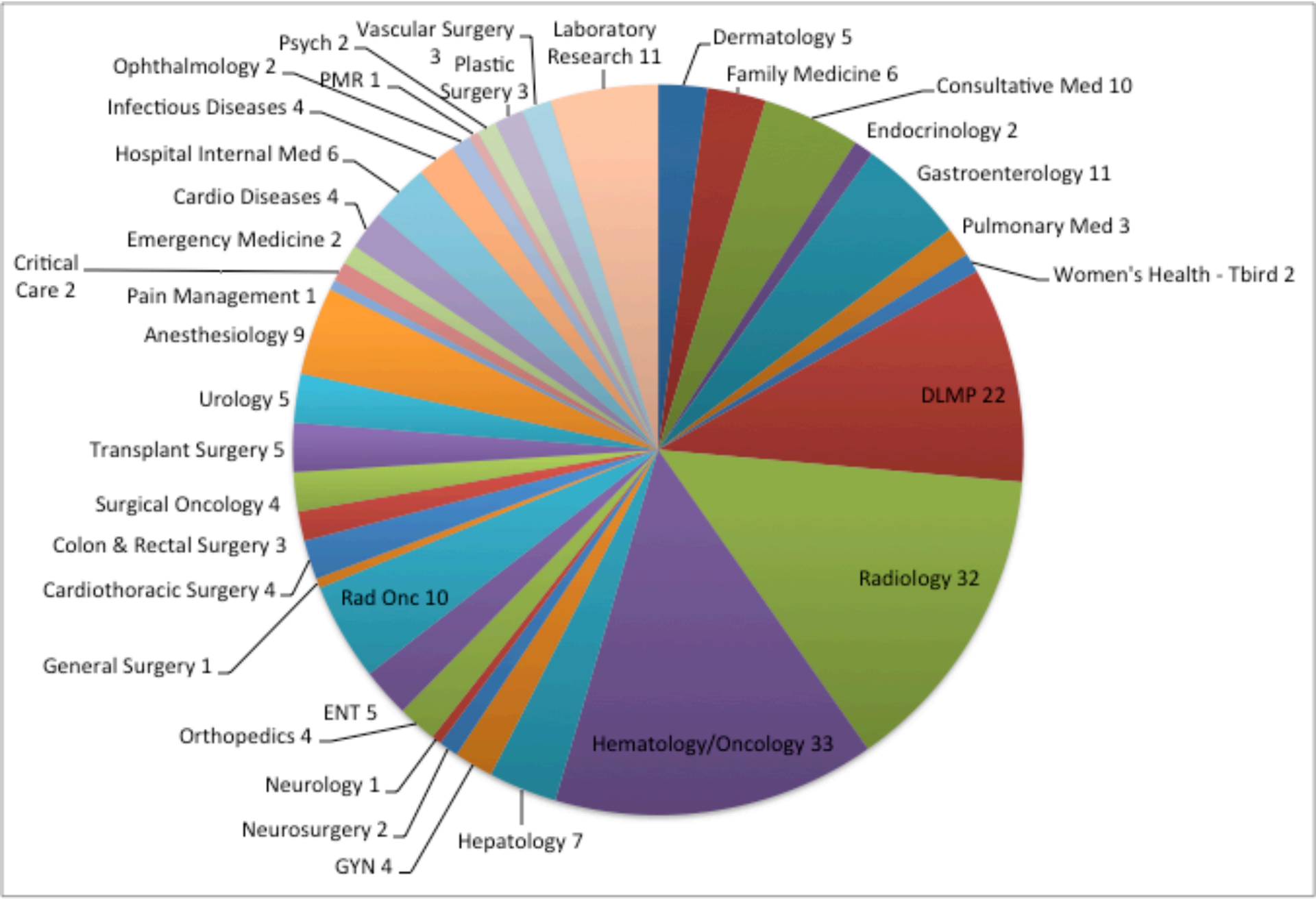
Florida

Mayo Clinic Cancer Center
Arizona Campus

20 Teams to Battle Cancer

- Brain/Nerve Cancer Team
- Breast Cancer Team
- Cutaneous Cancers/ Melanoma Team
- Endocrine Cancers Team
- GI Cancers Team
- GU Cancers Team
- Gynecologic Cancers Team
- Head and Neck Cancers Team
- Sarcoma Team
- Thoracic Cancers Team
- Acute and Chronic Leukemias Team
- Lymphoma Team
- Myeloma and Protein Disorders Team
- Blood and Marrow Transplant Team
- Cancer Prevention Team
- Cancer Genetics Team
- Cancer Immunology and Vaccine Team
- Phase I Drug Development Team
- Cancer Survivorship Team
- Palliative and Supportive Care Team

Mayo Clinic Cancer Center in Arizona – Cancer Center Faculty (N=229)



Cancer

Phoenix	2013	2012	2011	2010
Mayo Clinic (#33 in US)	**1**	**1**	**1**	**1**
Scottsdale Healthcare Shea*	2	2	2	3
Banner Good Samaritan*	3	3	3	2
Chandler Regional*	4	-	-	-
Banner Desert	5	5	5	6
St. Joseph's	6	8	8	5
Scottsdale Healthcare Osborn	7	4	7	9
Banner Thunderbird	8	6	4	4
Banner Boswell	9	10	6	8
John C. Lincoln North Mtn	10	7	9	7

- #33 for Cancer in USA
- Only top ranked in AZ
- Only top ranked in SW

MAYO CLINIC

*Top 25% in the US

PCAP

EOT Update

Mayo Clinic Cancer Center

Arizona Campus – Research Priorities (Not in Any Order)

- Proton Beam as optimal Radiation Therapy
- Hematological Malignancy Targeted Therapy
- Phase I / Investigator Initiated Clinical Trials
- Cancer Prevention/ Heath Equity Research Initiative
- Cancer Immunology and Immunotherapy
- "Individualized" Cancer Care
  - *Genomically directed care*
  - *Patient Centered Care*
- Regenerative Cancer Care
  - *Blood, Marrow, and Mesenchymal Cell Transplantation*
- Science of Cancer Survivorship Delivery
  - *"The Cancer Phoenix Project"*

©2011 MFMER | 3133089-9

Embody Health: A Journey with Mayo Clinic
Healing the Individual Cancer Patient

- Mayo Clinic Cancer Center – Who are we?
- Individualized care decisions
- Individualizing healing through regeneration
- Individualizing the cancer survivors journey

‘Individualized Medicine’ as a Differentiator

VANDERBILT MAGAZINE

Features | Departments | Letters | About VM | Previous Issues | RSS | Search

The

Empov
health

BY BILL S

Featu

The iconic Norman Rockwell painting of a family doctor checking the heart of a y
fashioned.
doctor bac
whole tear
empowere
tech imaging.

Ailments will be diagnosed more quickly and accurately—or prevented
before the
unique ge
blasting a
have fewe

“After having gone through a period where blockbuster drugs and massive screening were the norm, we are actually moving back to a place where we’re trying to tailor care to the individual,” says Dr. Jeff Balser, Vanderbilt University’s vice chancellor for health affairs and dean of the School of Medicine.

“I try to think
through tec
rememberi

In 2010 Vanderbilt University Medical Center launched two major personalized medicine initiatives to advance

A True Partner in

cancer medicine?

ert

standard of care for patients based on the genetic makeup of the cancer.

es
s in
d
st
appropriate therapy. This advancement is one of the latest developments from nearly two decades of promising discovery science that the Robert J. Kleberg, Jr. and Helen C. Kleberg Foundation has

medicine. Additional investment in

“…reinvent healthcare with 21st century tools”

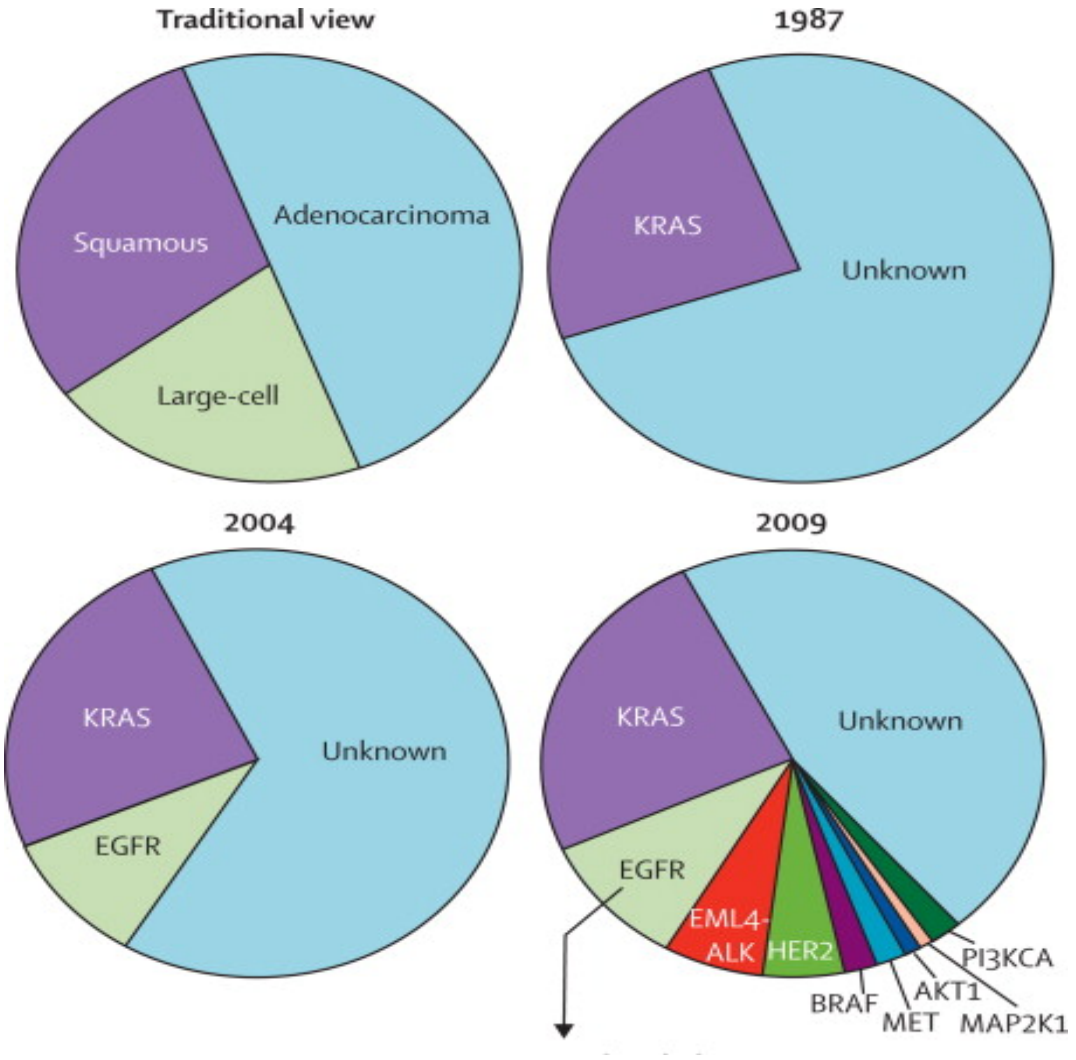
“…diagnosed more accurately”

“…treatments that are more effective”

“…fewer side effects”

©2012 MFMER | slide-11

Non Small Cell Lung Cancer

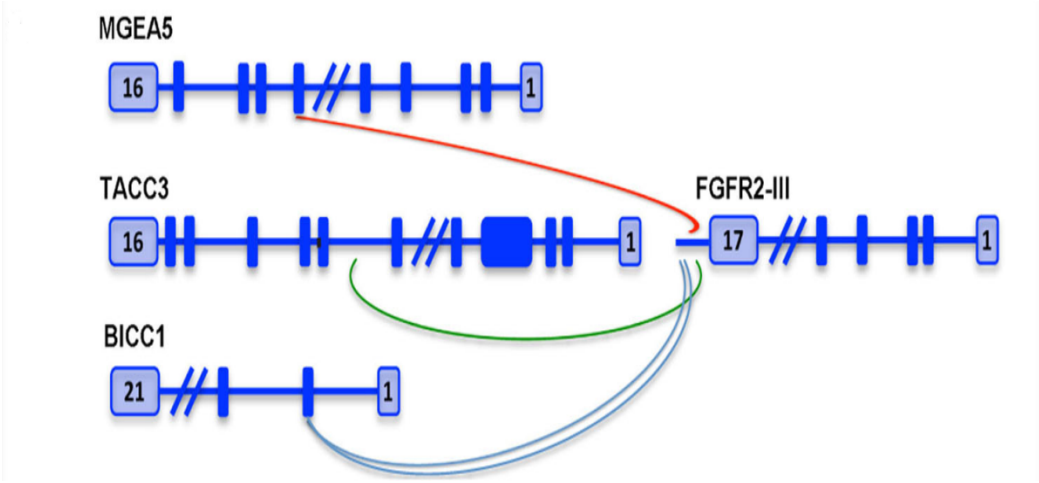


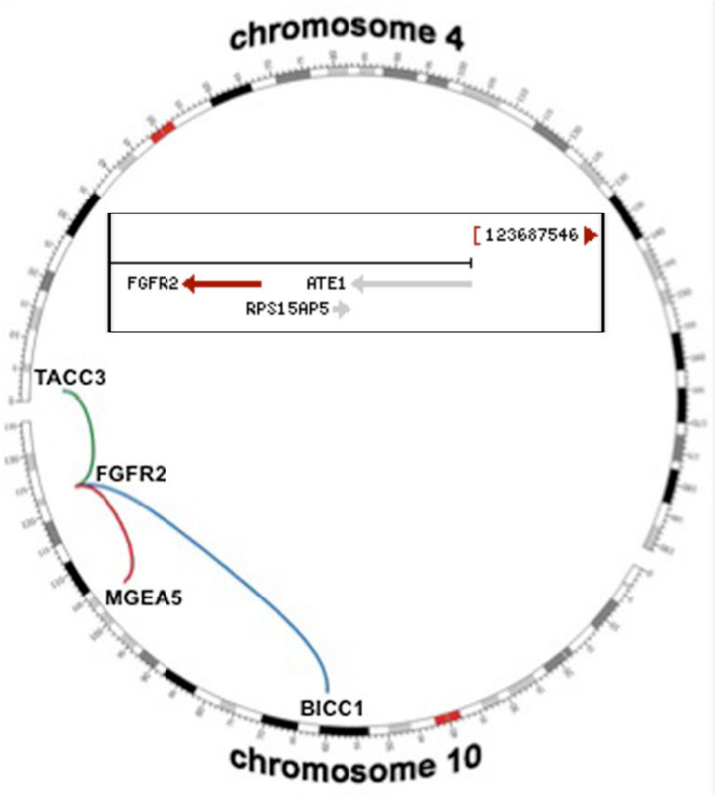
Pao W. The Lancet Oncology Volume 12, Issue 2 2011 175 - 180

©2012 MFMER | slide-12

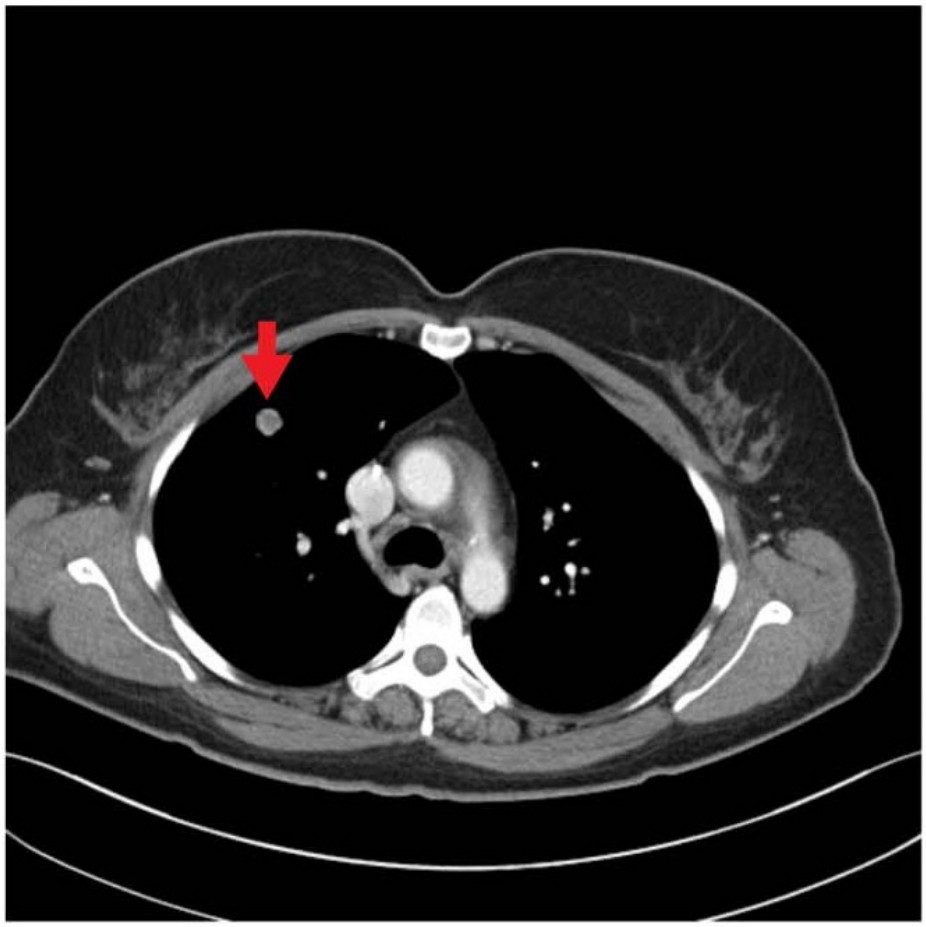
PRECISION MEDICINE – WHOLE GENOME SEQUENCING

FGFR2 FUSION GENE – NEW DRUG TARGET IN CHOLANGIOCARINOMA (BILE DUCT CANCER)

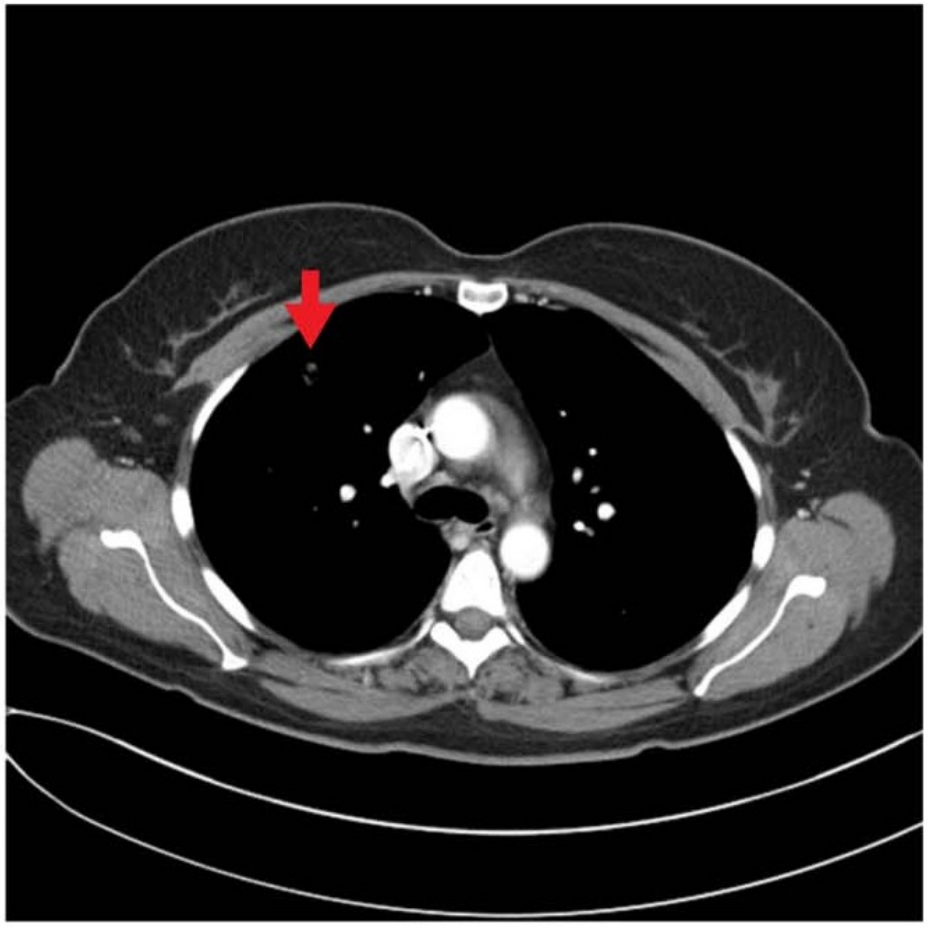




RESPONSE TO PAZOPANIB – FGFR2 INHIBITOR



Baseline



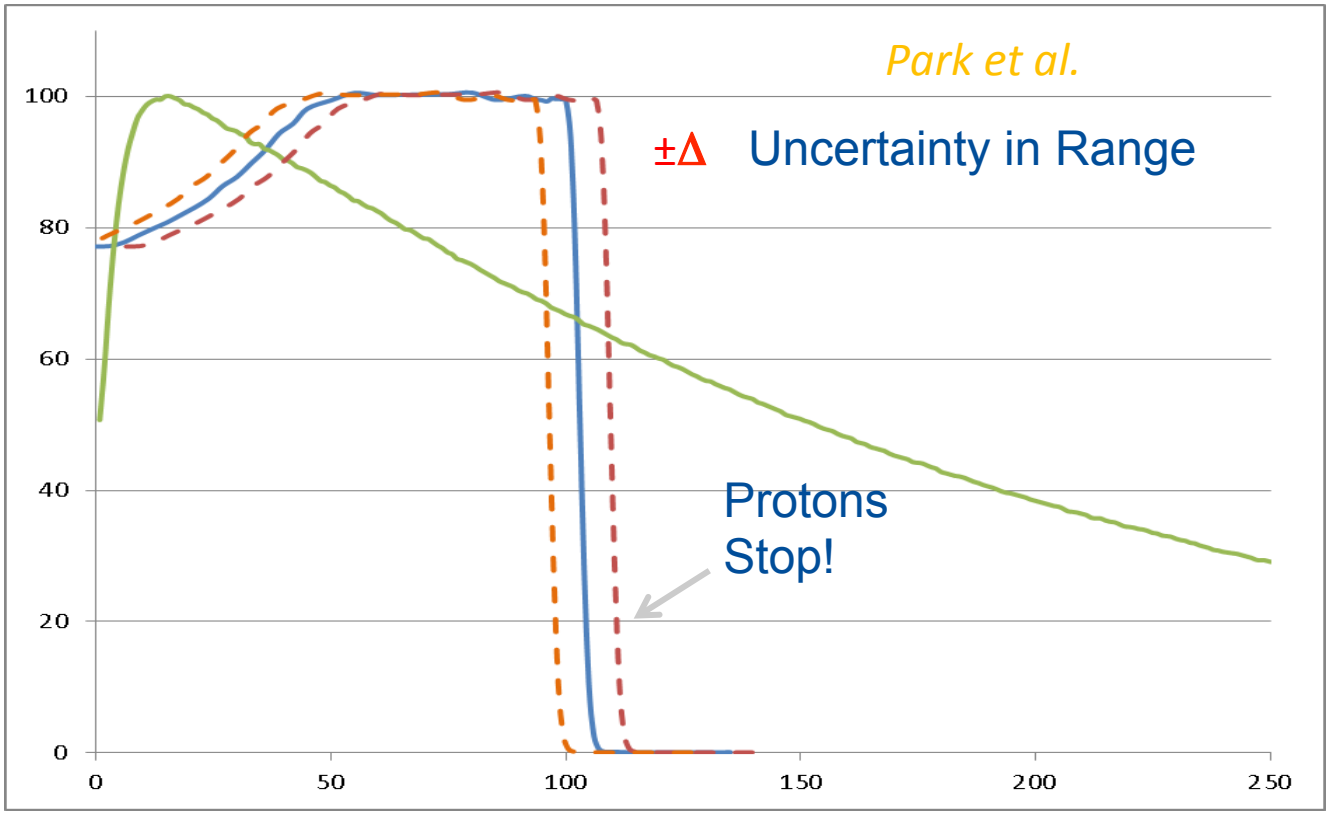
4 months

Diagnosis	Variant gene(s)	Therapy	Best Response	Drug Source
NSCLC	KRAS, PIK3CA	MEK + PI3K inhibitor	PR	Clinical trial at Tgen
Pancreatic adenocarcinoma	JAK2, CSFIR, KRAS, SMAD4	Imatinib	PD	Off label
Cholangiocarcinoma	ERRFI1	Erlotinib	PR	Off label
Hepatocellular carcinoma	BAP1	Sorafenib + vorinostat	PD	Off label
Pancreatic adenocarcinoma	CHUK, GLI3, KRAS	Bortezomib	PD	Off label
Cholangiocarcinoma	FGFR2:MGEA5 FGFR3	Ponatinib	PR	Off Label
Pancreatic adenocarcinoma	TGFBR3, SMURF2	Bortezomib	PD	Off label
Basal cell carcinoma	GLI2	Arsenic	Not yet available	Clinical trial
Melanoma	KIT	Dasatinib	Not yet available	Off label
Pancreatic Adenocarcinoma	MDM2	MDM2 inhibitor	Not Yet Started	Single patient IND

©2012 MFMER

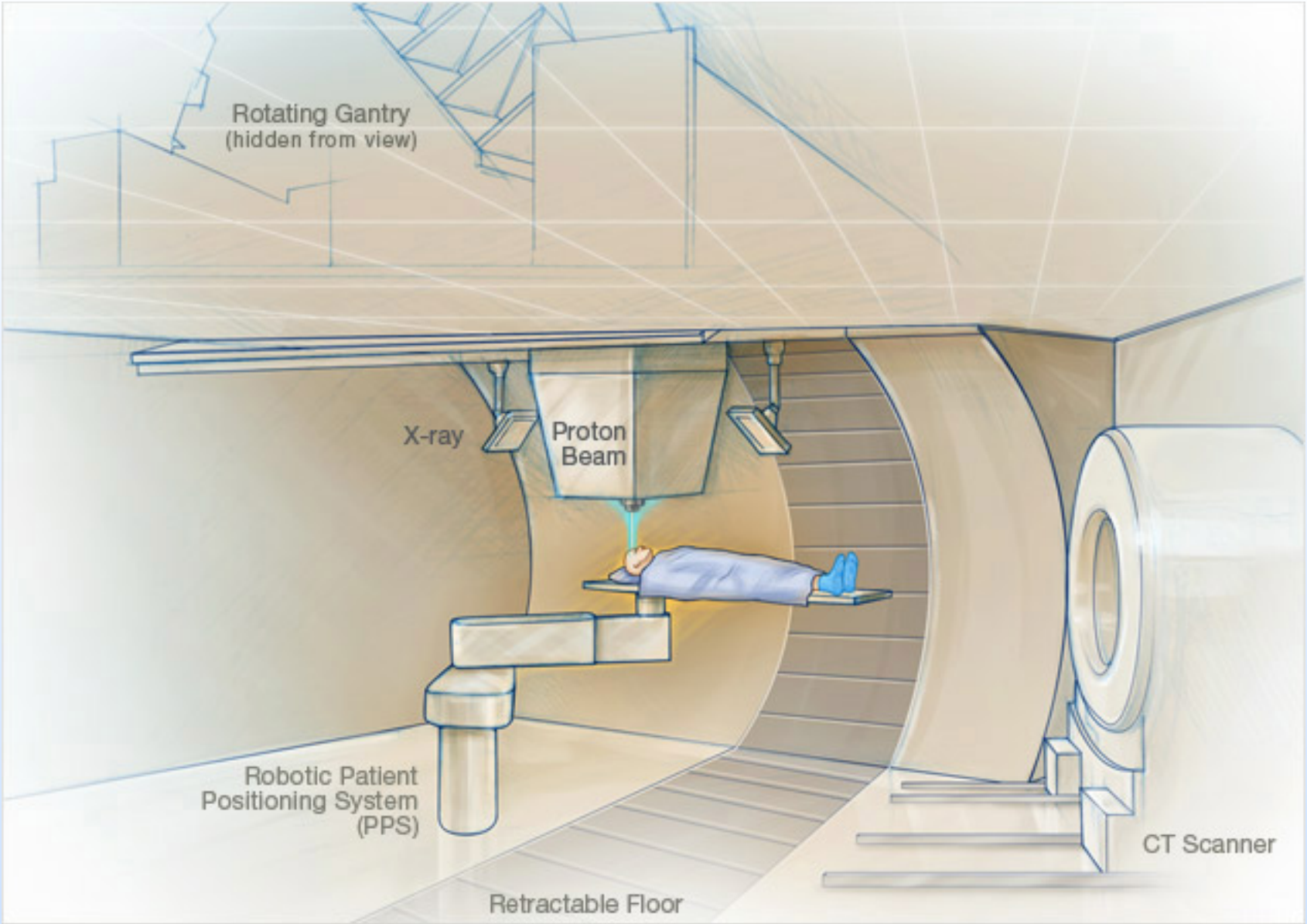
MAYO CLINIC

Uncertainties in proton therapy



- **Proton's distal fall off makes it more vulnerable to beam delivery uncertainties than photon**

MAYO CLINIC

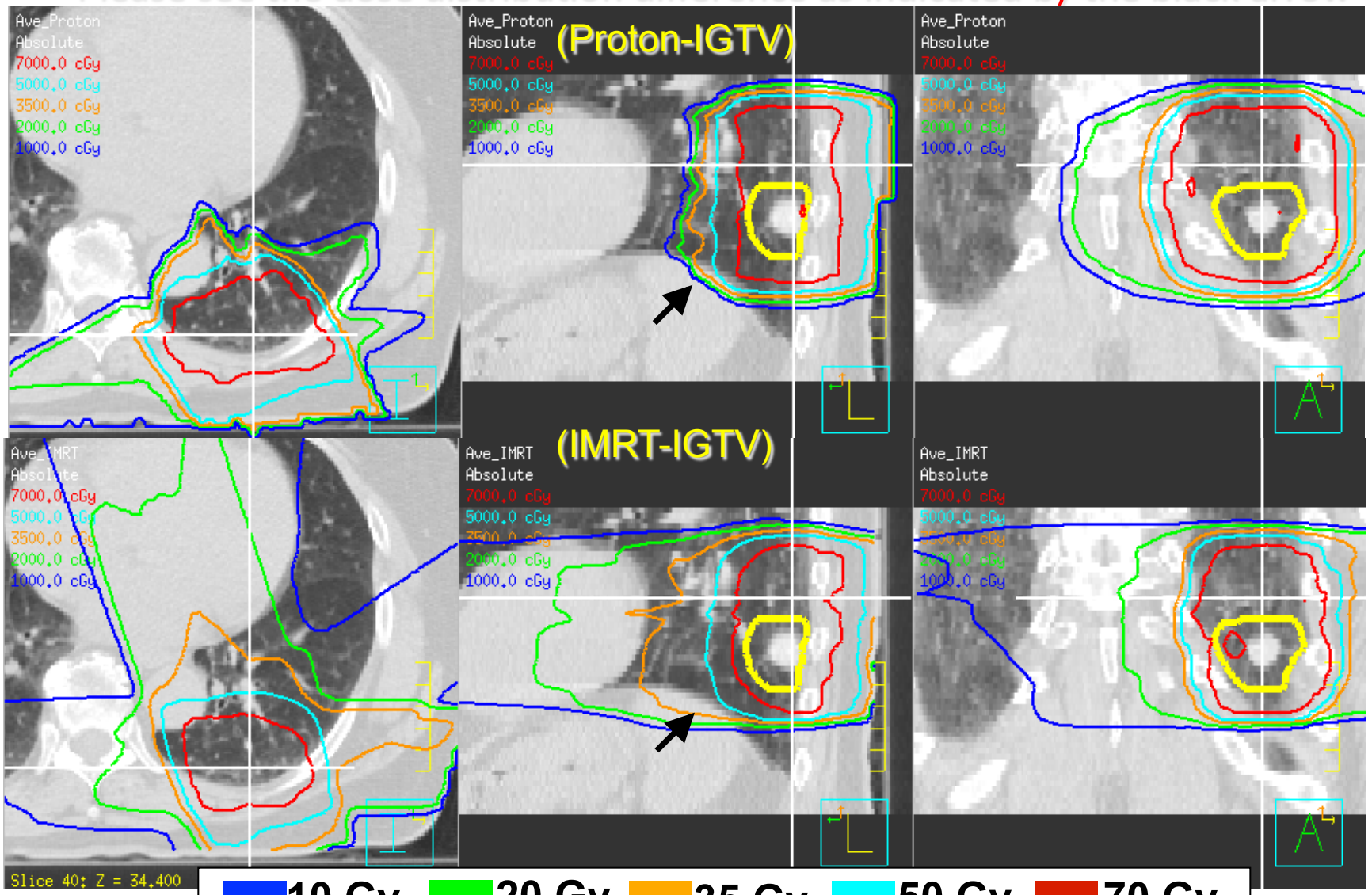


© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.

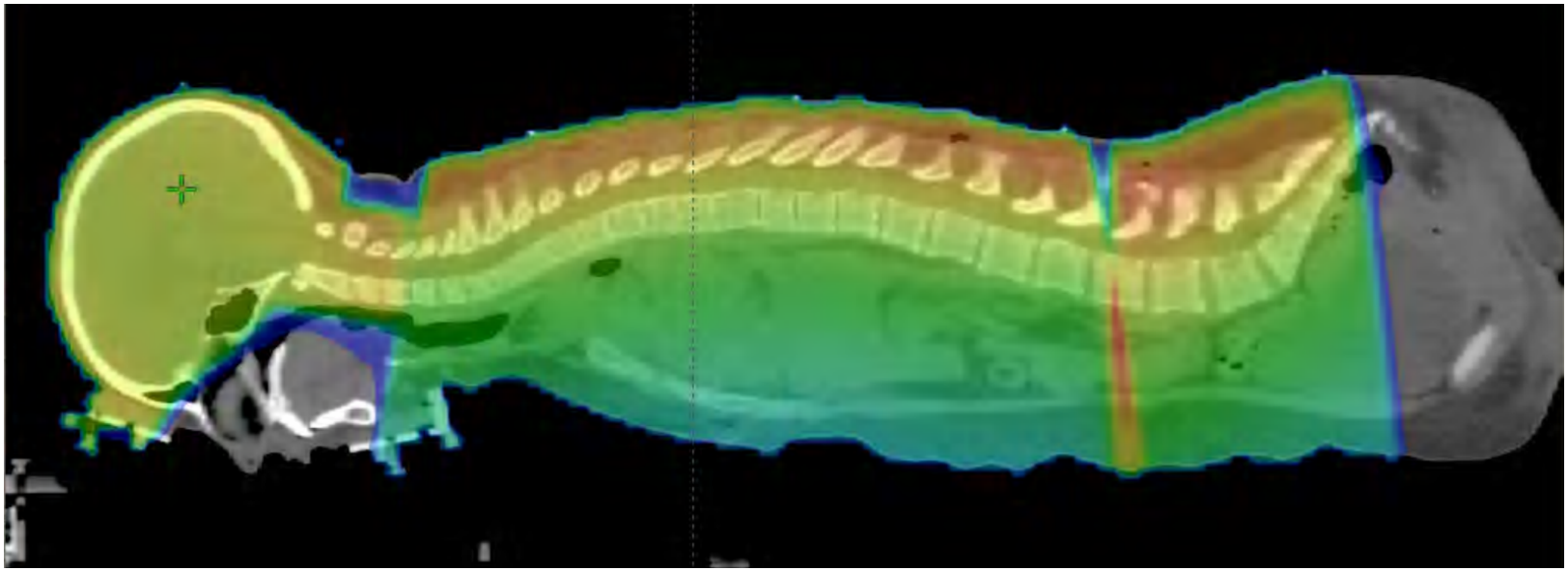
MAYO CLINIC

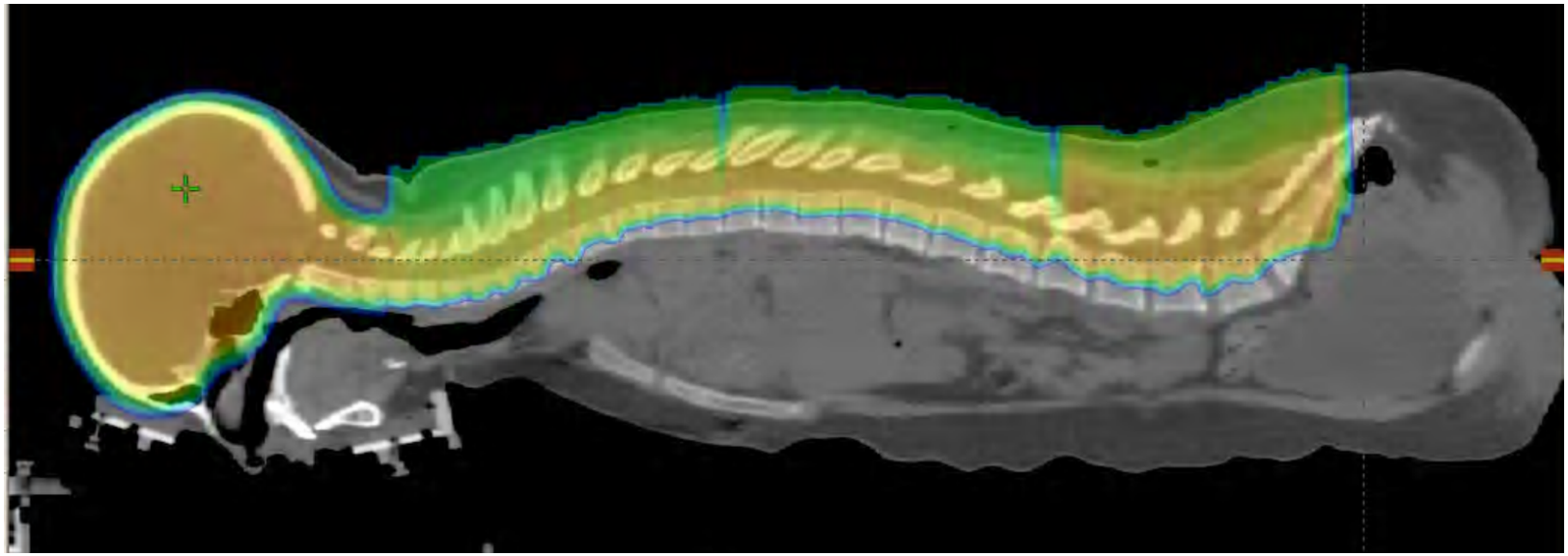
Proton vs. IMRT (effect of motion)

Please see the dose distribution difference as indicated by the black arrow



Dong et al.





©2013 MFMER

Embody Health: A Journey with Mayo Clinic
Healing the Individual Cancer Patient

- Mayo Clinic Cancer Center – Who are we?
- Individualized care decisions
- Individualizing healing through regeneration
- Individualizing the cancer survivors journey

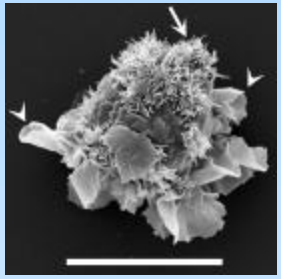
Human Cell Therapy Lab Platforms

The resource intense nature of cell therapy requires selection of key platform technologies

- **Cancer Vaccine**
- **Blood or Bone Marrow mononuclear cells**
- **Adult mesenchymal stromal (stem) cells**
- **Organ re-cellularization**

Cancer Vaccines

Autologous monocytes from apheresis, 3 weeks
Patients relapsed or refractory



Tumor peptides, primary cultures, direct injection

MDC

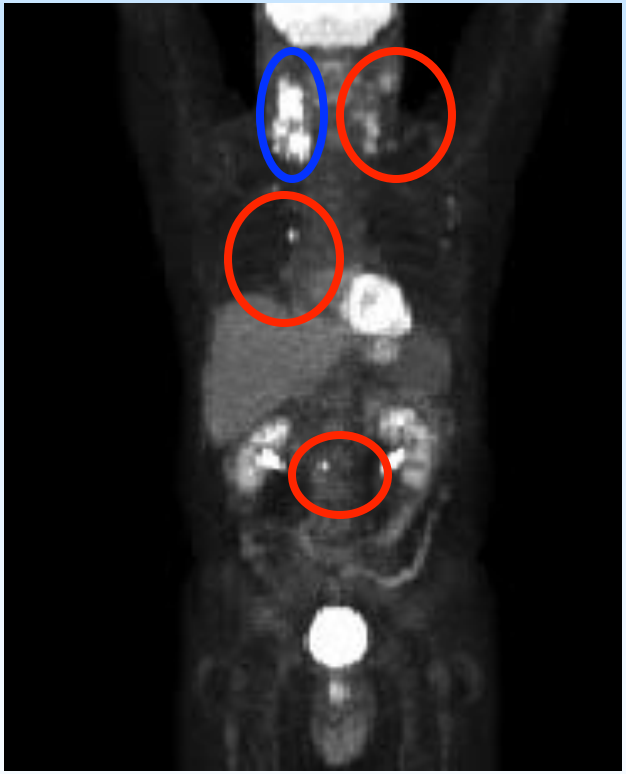
Multiple intradermal or intratumoral injection

Safe

Growing evidence of improved survival

Growing evidence of improved post treatment response to chemo

Drug that is for the patient from the patient



Embody Health: A Journey with Mayo Clinic
Healing the Individual Cancer Patient

- Mayo Clinic Cancer Center – Who are we?
- Individualized care decisions
- Individualizing healing through regeneration
- Individualizing the cancer survivors journey

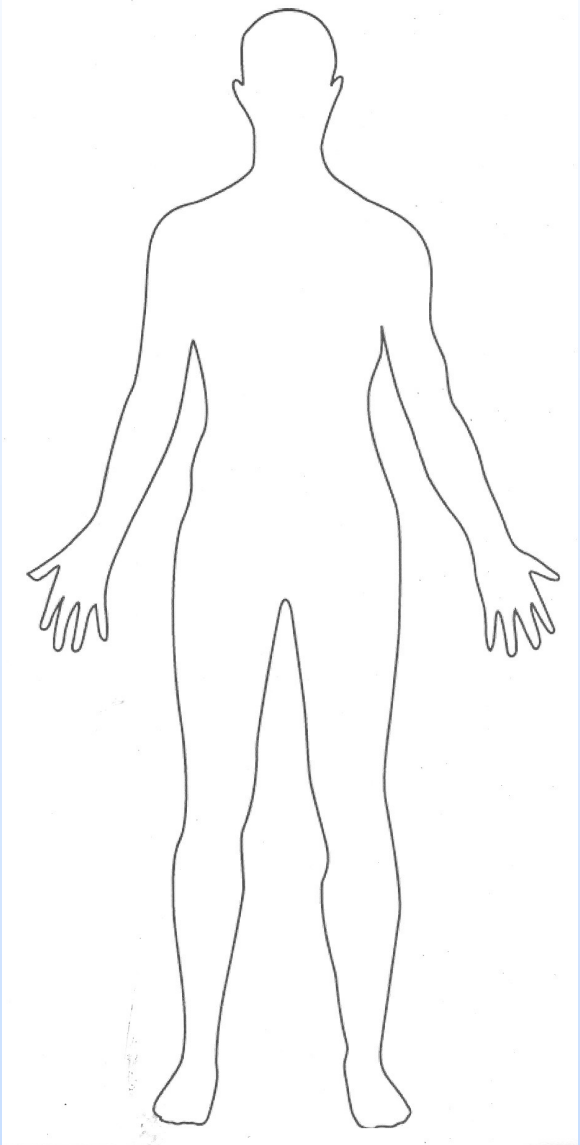
Cancer "Phoenix" Project

Mayo Clinic– ASU

Mayo Clinic Cancer Center – ASU College of Nursing and Health Innovations
ASU College of Health Solutions

Cancer Based Efforts

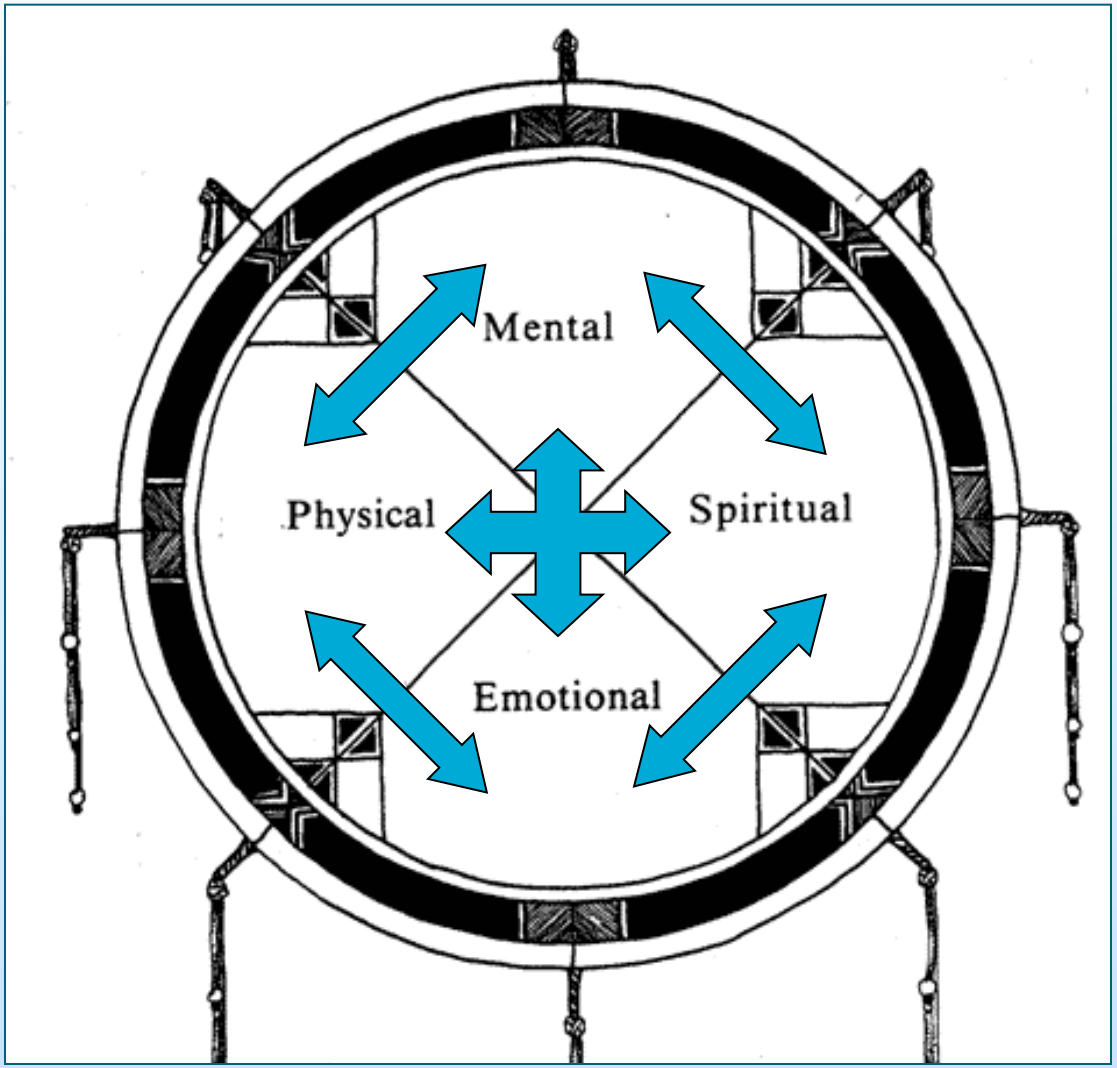
- Pathobiology
- Genomics
- Targeted therapy
- Detection
- Imaging
- Radiotherapy
- Proton Beam
- Surgical techniques
- Chemotherapy
- Biological therapies
- Pharmacogenomics
- Minimal residual disease



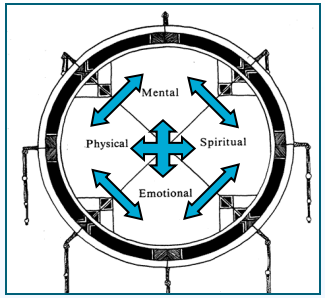
Patient Based Efforts

- Prevention
- Risk Factor Mods
- Awareness/Education
- Symptom Burden
- Monitoring Tox
- Decreasing Rx Tox
- Survivorship
- Palliative Care
- End of life care
- Cultural/ Economic Issues
- EMR Patient Support

Medicine Wheel of Health
"Integrative Medicine"



Present Modalities/Therapies



- Integrative Medicine Consultations
  - Exercise, Nutrition, Stress Reduction Focus
- Women's Health Integrative Medicine Consultation
- Resiliency Classes
- Acupuncture
- Oncologic Massage
- Biofeedback, Cognitive Behavioral Therapy, etc
- Nutrition Counseling

Specialty Palliative Care
New Model of Care - Across the Continuum of Care

- Inpatient palliative care consultation service
- Specialty outpatient palliative care clinic
  - Coordinated interdisciplinary team care
- Supportive care infusion center (SCIC)
  - Specialized acute symptom management
  - Immediate access for acute needs
    - Outside of ER and hospital
- Palliative home care
  - Collaboration with Hospice of the Valley
  - 24/7 access to MD and RN
    - Virtual video visits

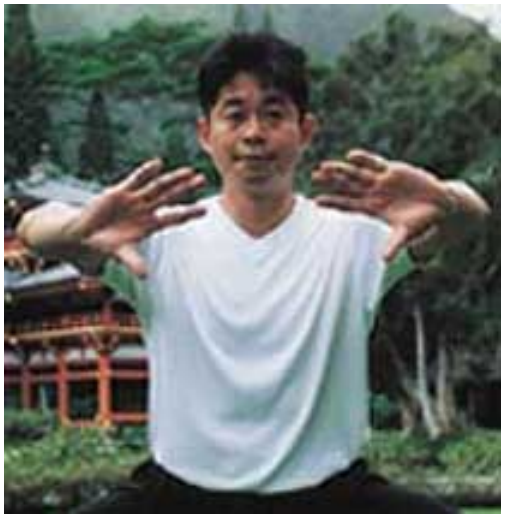
Linda K. Larkey, PhD: Professor

Arizona State University
College of Nursing and Health Innovation
Cancer Prevention and Integrative Medicine Office
Mayo Clinic Research Affiliate; Mayo Clinic Cancer Center Member

Summary: Dr. Larkey conducts behavioral oncology studies in…

- Cancer prevention/health promotion (dietary, physical activity, screening)
- Cancer supportive care/survivorship

QIGONG EXERCISES



Living with *and* Overcoming My Cancer

A Mayo Clinic Symposium for Patients and Their Loved Ones

January 25 & 26, 2014