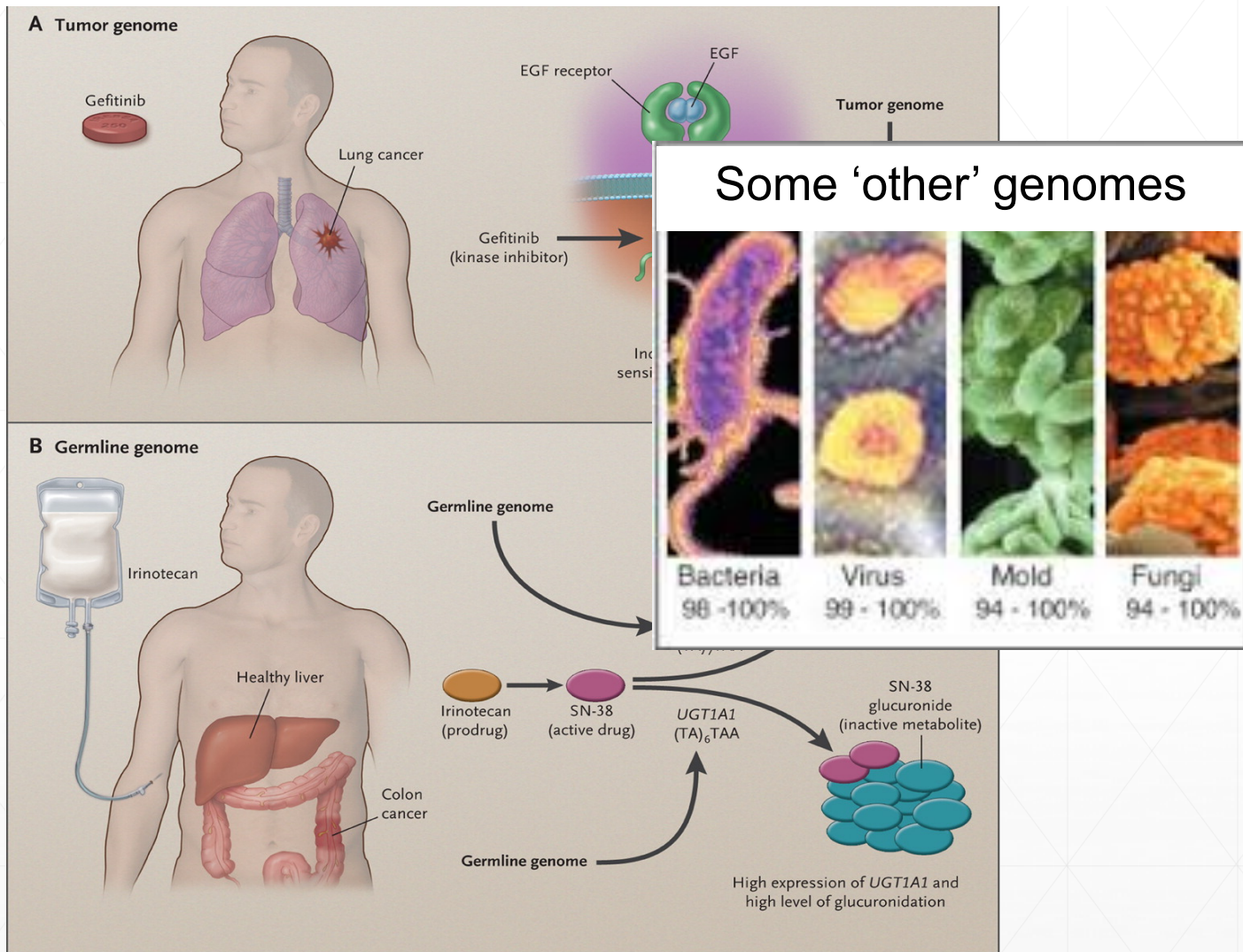


MULTIDISCIPLINARY APPROACHES AND TRAINING PGX PRACTITIONERS

Dr Howard L. McLeod
Medical Director, DeBartolo Family
Personalized Medicine Institute

Senior Member, Division of Population Sciences

Cancer Pharmacogenomics and Tumor and Germline Genomes.



Wang L et al. N Engl J Med 2011;364:1144-1153.



The NEW ENGLAND JOURNAL of MEDICINE

DeBartolo Family PERSONALIZED MEDICINE INSTITUTE



Pharmacogenomic examples-2017

- *bcr/abl* or 9:22 translocation—imatinib mesylate*
- *HER2-neu*—trastuzumab**
- C-kit mutations—imatinib mesylate**
- Epidermal growth factor receptor mutations—gefitinib
- BRAF-vemurafenib
- ALK-Crizotinib
- ROS-1_Crizotinib
- TPMT-mercaptopurine and azathioprine
- UGT1A1-irinotecan**
- CYP2C9/VKORC1-warfarin*
- HLA-B*5701-abacavir *
- HLA-B*1502-carbamazepine *
- IL28B-interferon
- CFTR-ivacaftor
- CYP2C19-clopidogrel, voriconazole
- CYP2D6-5-HT3 receptor antagonists

Pain control

Antiemetics

Antidepressants

ADHD drugs

Anticoagulants

Not just tumor markers!!

WHEN ARE NGS PANELS BEING ORDERED

Disease area dependent

- For disease classification and prognosis
 - Early in myeloid leukemia and CLL
- FDA-approved therapies
- When disease courses progress beyond FDA-approved therapies or NCCN guidelines
 - Early in disease areas with limited standard of care options
 - ◆ Glioblastoma, sarcomas, Merkel cell carcinoma, etc.
 - Later in other disease areas, such as breast, melanoma, genitourinary

FDA-APPROVED TARGETED AGENTS FOR CANCER TREATMENT

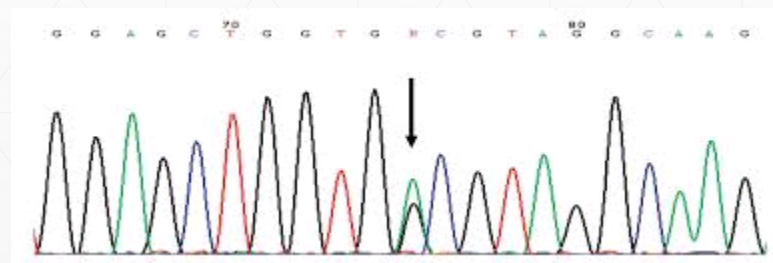
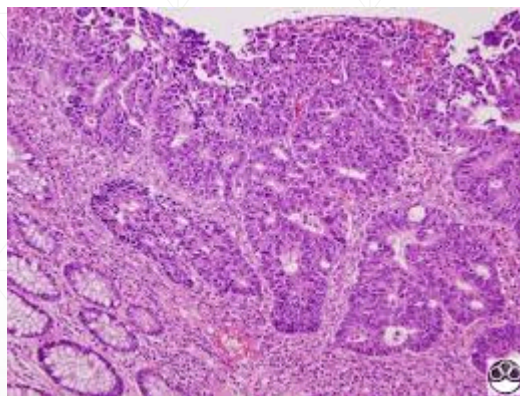
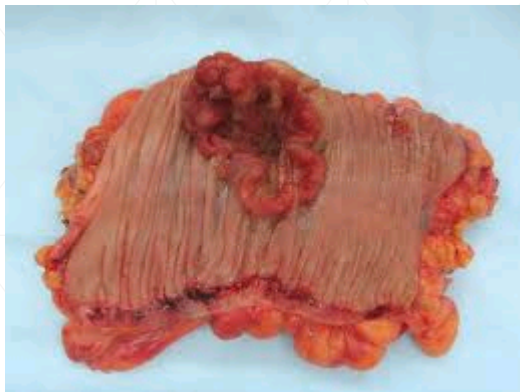
Drug	FDA Approved Indication	Target(s)
Afatinib	NSCLC	EGFR
Axitinib	RCC	VEGFR
Bosutinib	CML	Bcr-abl
Cabozantinib	MTC	RET, VEGFR, MET, TRK8, TIE2
Cobimetinib	Melanoma	MEK1/2
Cetuximab	Colon, NSCLC, HNC	EGFR
Crizotinib	NSCLC	EML4-ALK
Dabrafenib	Melanoma	BRAF V600E
Dasatinib	CML	Bcr-abl, SRC, cKIT, PDGFR
Erlotinib	NSCLC	EGFR
Everolimus	RCC, breast, pNET	mTOR, TSC1/2
Ibrutinib	MCL, CLL	BTK
Idelalisib	CLL	PI3K δ
Imatinib	CML, GIST	Bcr-abl
Lapatinib	Breast	HER2
Nilotinib	CML	Bcr-abl
Osime	NSCLC	EGFR T790M

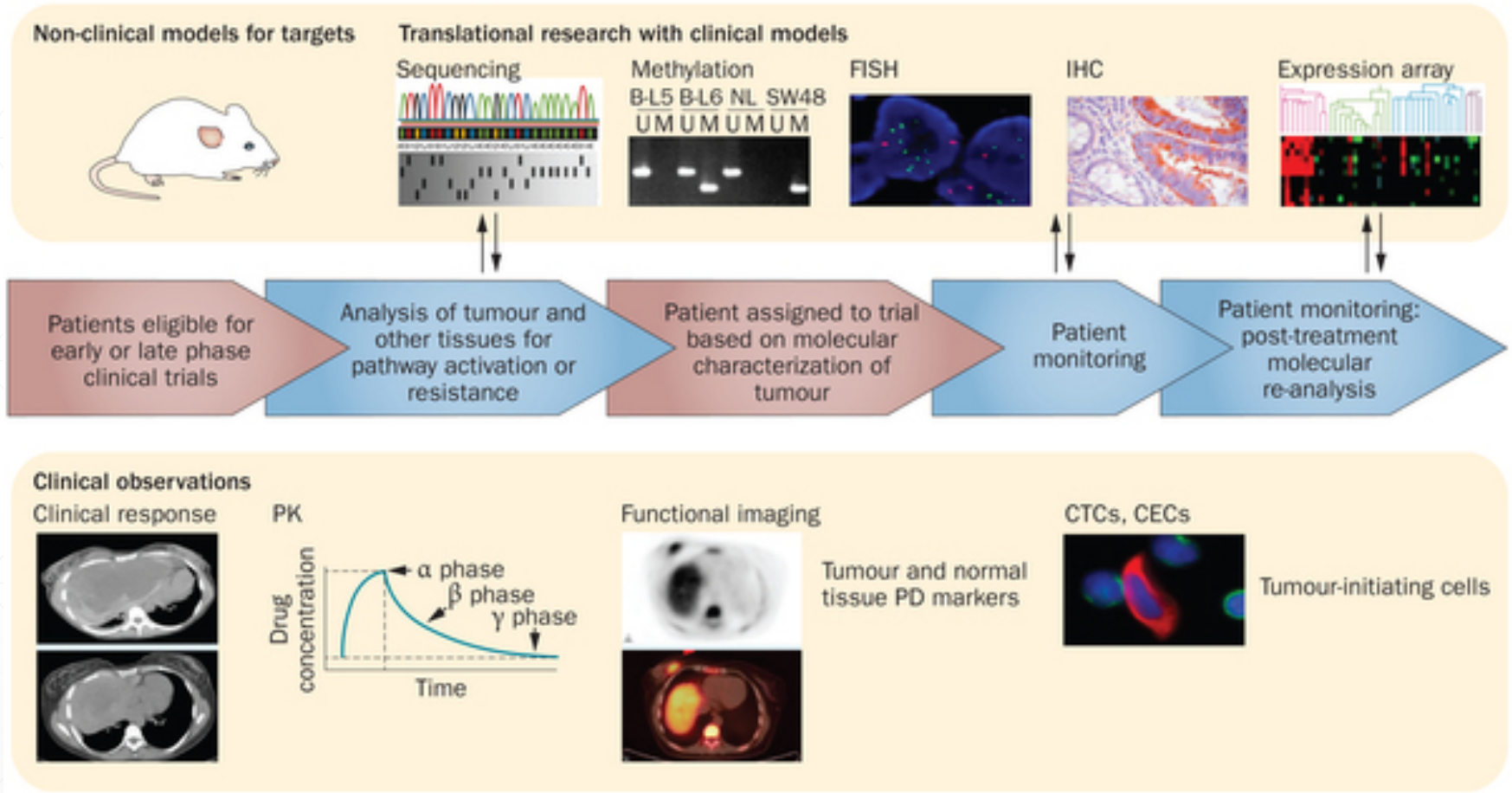
Drug	FDA Approved Indication	Target(s)
Panitumumab	Colon	EGFR
Pazopanib	RCC, STS	VEGFR, PDGFR, FGFR, KIT
Pertuzumab	Breast	HER2
Regorafenib	Colon	VEGFR, TIE2, PDGFR, RET, Ckit
Ruxolitinib	Myelofibrosis	JAK1/2
Sonidegib	BCC	SMO
Sorafenib	RCC, HCC, DTC	BRAF, KIT, FLT3, RET, VEGFR, PDGFR
Sunitinib	RCC, GIST, pNET	PDGFR, VEGFR, KIT, FLT3, RET
Temsirolimus	RCC	mTOR
Trametinib	Melanoma	MEK1/2
Trastuzumab	Breast	HER2
Trastuzumab-DM1	Breast	HER2
Vandetinib	MTC	RET, EGFR, VEGFR, TIE2
Vemurafenib	Melanoma	BRAF V600E
Vismodegib	BCC	SMO

Adapted from: Schilsky RL. Nat Rev Clin Oncol. 2014 Jul;11(7):432-8.



Cancer Care is changing fast: the opportunity and the threat







A lot to take in

- Need to understand
 - What is the clinical need?
 - Which test and why?
 - Which drug (or not)?
 - Via clinical trial or off label use?
 - How to get all of the above into the EMR in a functional way?
 - How to pay for it?
 - What next?

Community Partners

Molecular Diagnostics Program

Clinical Genomics Action Committee

Personalized Medicine Clinical Service

Personalized Cancer Medicine Clinical training program



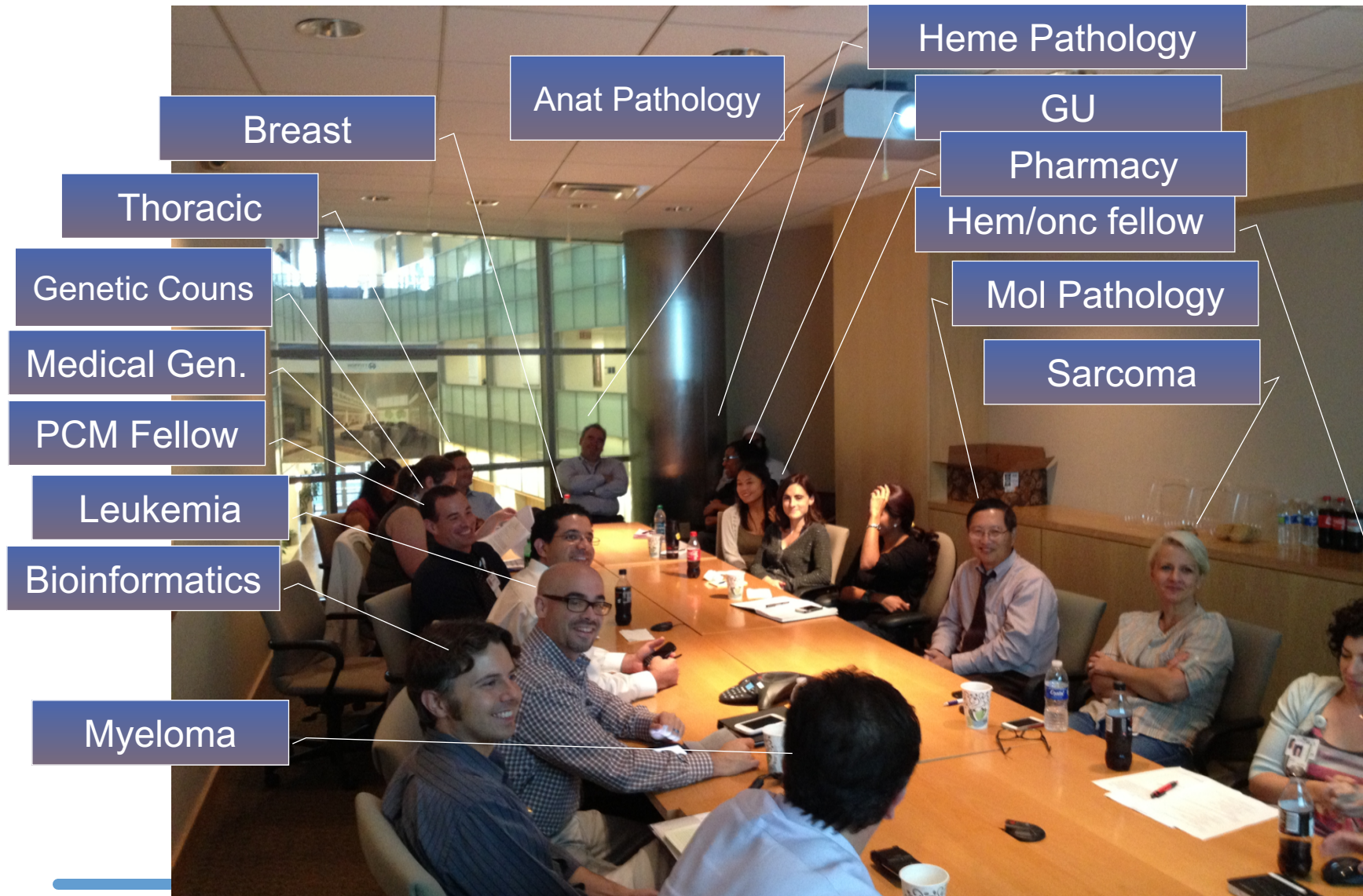
Rotate on Clinical service



Team or TEAM?

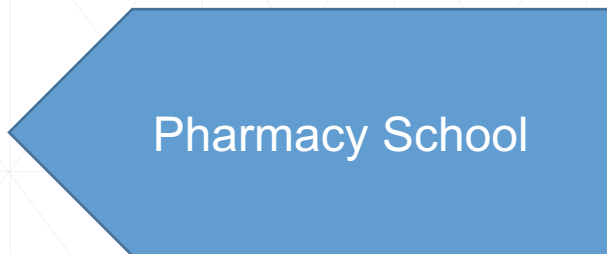


CLINICAL GENOMIC ACTION COMMITTEE (CGAC)





Same campus ≠ same page



- Pathology Basement
- Medical Oncology 4th floor
- Clinical Genetics Who?



Formalize the program: short & long

Personalized Medicine Clinical Service (PMCS)

Length: 4 weeks

Trainees: 2nd- or 3rd-Year Medical Oncology Fellows

Administrative contact: Sapna Joshi (Sapna.Joshi@moffitt.org)

Sapna will help coordinate several meetings through the course of the rotation. If you have any questions regarding meetings and scheduling, she should be your primary contact.

Please notify Sapna of your mandatory meetings (e.g., clinic days) by the first day of the rotation. Sapna will create a schedule for the month based on what days Fellows are not available due to clinic and previously scheduled educational activities. Any conflicts should be noted within 24 hours of receiving the schedule for the month. If no conflicts are noted within 24 hours, then Fellows are expected to attend all scheduled meetings on time, unless an emergency occurs.

PMCS Attendings: The Attendings typically rotate on 2 week blocks with service transition occurring on Tuesdays after the weekly PMCS case review meeting.

J. Kevin Hicks, Pharm.D., PhD
James.hicks@moffitt.org
Office: 813-745-4868

Christine M. Walko, PharmD, BCOP, FCCP
Christine.walko@moffitt.org
Office: 813-745-1519

Overall Rotation Goal: To develop expertise in the application and integration of genomic data into standard clinical oncology practice

Core Competencies:

- Develop an understanding of the basics of genomic analysis and gain comfort with use of common genomic terminology (NHGRI sources) and commonly utilized tests (i.e.

MOFFITT CANCER CENTER		Graduate Medical Education New Program Request	
I. DEMOGRAPHIC INFORMATION FOR THE PROPOSED PROGRAM			
Proposed Program Name	Personalized Medicine Fellowship Program		
Proposed Program Director	Dr. Howard McLeod		
Accreditation Available	<input type="checkbox"/> ACGME <input type="checkbox"/> Subspecialty College : Click here to enter text. <input checked="" type="checkbox"/> Accreditation Exempt		
Length of Program in Years	1 – 3 years		
Total Number of Positions	8 – 10 fellows		
Consider your learning experiences including research opportunities and patient care publications.			
What impact, if any, would there be if this new program was not approved?			
Mainly psychological impact on the program director. Formalizing the program within the Moffitt training mechanism will enhance learning and collaborative opportunities.			
Number of Core Faculty expected to participate in the program (Program Description will contain the list of names and clinical interests)	Howard McLeod, PharmD, Christine Walko, PharmD, James Kevin Hicks, PharmD, PhD, Eric Padron, MD, Theresa Boyle, MD, Andrew Brohl, MD		
Proposed Core Faculty to Trainee Ratio, if program is approved	1:3		
Number of Adjunct Faculty expected to participate in the program (Program Description will contain the list of names and clinical interests)	Click here to enter text.		

JOLLY GOOD FELLOWS



LOTS OF PEOPLE TO TRAIN

- Initial training of >120 Moffitt nurses
- PMCS is a required 1 month clinical rotation for all 2nd year Hem/Onc fellows and Molecular Pathology fellows (56 physicians trained to date).
- Have provided solid tumor and malignant heme 'boot camps' to help grow the Moffitt clinical faculty test ordering and interpretation expertise
- In year 3 of the only Personalized Cancer Medicine Fellowship program in the USA

What do we want in a Precision medicine practitioner?

- Able to guide selection from amongst equal options
- Clear understanding that multidisciplinary is required, rather than preferred
- Learn how to work with IT, patient safety, insurance companies, donors, revenue cycle
- Don't forget why we are doing this

