Biorepository and Tissue Technology Shared Resource (BTTSR) Scott VandenBerg, MD, PhD, Director / Richard Schwab, MD, Co-Director / Nissi Varki, MD ,Co-Director

Abstract

The BTTSR provides for the acquisition, multi-modality processing, and archiving of well-annotated human biospecimens that is seamlessly integrated with histology and tissue analysis services. Three major activities are provided by this shared resource: 1) the biorepository for human tumor specimens that are acquired during diagnostic and therapeutic procedures from consented subjects with associated blood, urine (when applicable), and CSF (when applicable), and that are linkable to clinical and diagnostic and made available to MCC investigators; 2) tissue histology and technology for state-of-the-art molecular morphology/biomarker applications, and 3) histopathologic expertise for validation of diagnostic parameters on biorepository specimens, and assistance in the interpretation of human and mouse tissue pathology. Each major activity is coordinated by an expert faculty co-director. Dr. Vandenberg (STT), an experienced pathologist, is overall Director of the BTTSR, Dr. Schwab (STT) oversees the biorepository clinical affairs and sample collection and distribution, and Dr. Varki (STT) oversees the histology and tissue technology applications in human samples and animal models. The BTTSR assists in the formulation of targeted prospective collections for clinical trials or for translational research projects directed at biospecimens that need specific parameters, in addition to routine tissue collection during diagnostic or therapeutic procedures. Tissue technology includes multi-label immunohistochemistry, multiplexing immunofluorescence, and in situ hybridization in addition to analytical microscopy for molecular morphology, including spectral imaging. The state-of-the-art laser-capture microscopy in the tissue technology resource provides an important resource for performing genomic/expression profiling and proteomics on tissue sections with complex tumor cell heterogeneity and complements the biomarker discovery capabilities performed in this facility

Services Provided

- Patient Consenting; Tissue Collection, Processing And Storage
- Human Xenograft Biospecimen Repositories
- Blood, Urine, and Saliva Samples
- MCC Associated Biorepositories
- Histology and Multiple-Modality Biomarker Detection in Tissue
- Training and Consultation

Facilities and Location

Biorepository and Tissue Technology:

- Moores Cancer Center (MCC) (520 sq ft)
- Center for Advanced Laboratory Medicine (CALM) (1108 sq ft)

Histology:

• MCC (520 sq ft)

Personnel

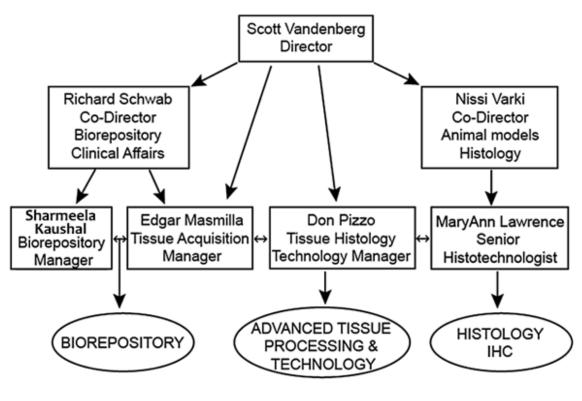
Scott VandenBerg– Director Richard Schwab – Co-Director Nissi Varki–Co-Director Sharmeela Kaushal-Staff Research Associate Edgar Masmilla, Pathologists' Assistant Maryann Lawrence–Staff Research Associate Gina Liang– Staff Research Associate Donald Pizzo– Staff Research Associate

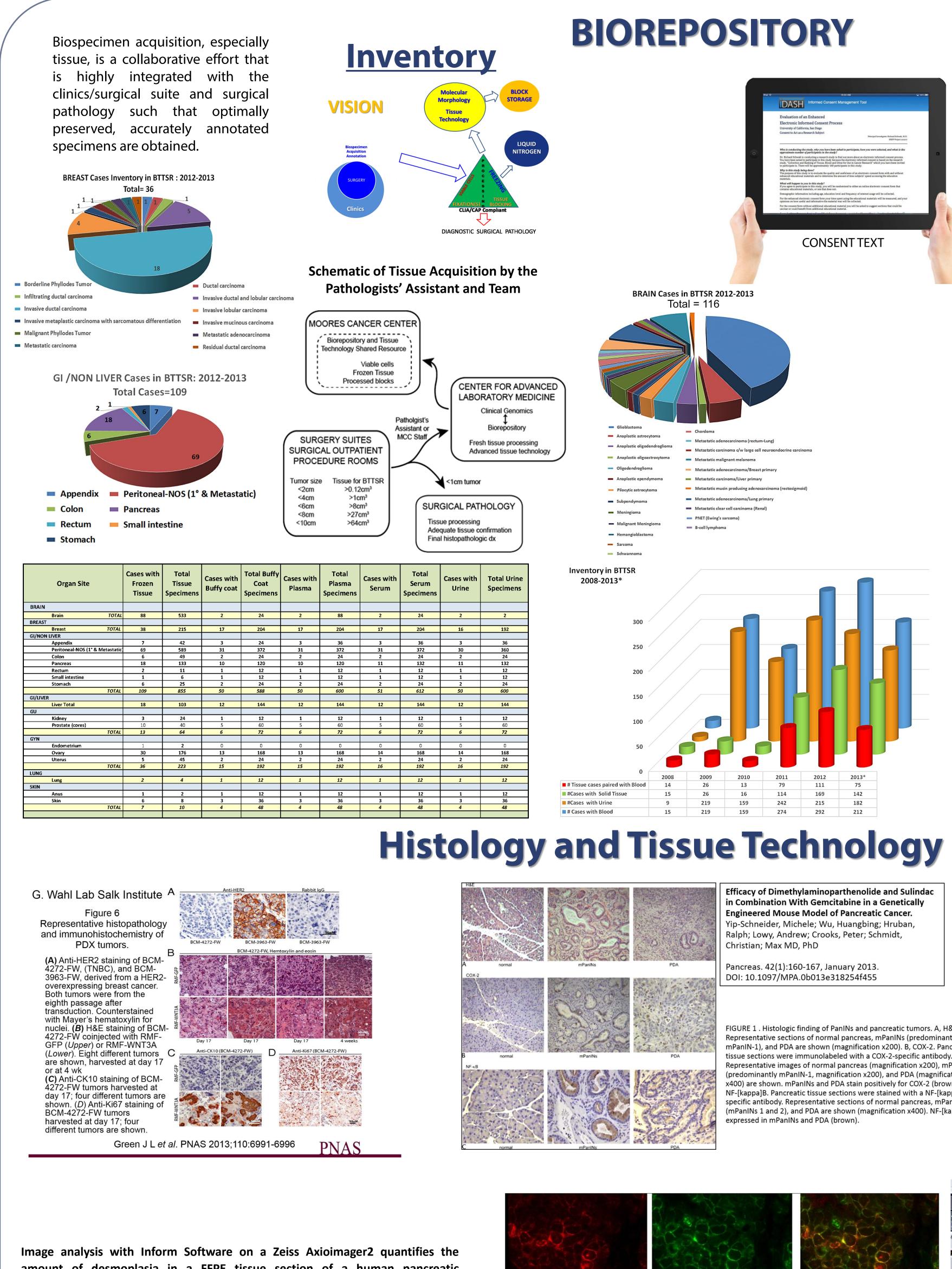
Key Instrumentation

<u>Biorepository</u>

- ThermoFisher Revco[®] UxF and Ultima PLUS, and Sanyo VIP -80°C Freezers
- MVE and Thermo Forma Cryo3 Automatic LN Freezers
- Nanodrop 2000c spectrophotometer
- Class IIA biosafety cabinets
- ABS Arcturus XT LCM system
- <u>Histology/Immunohistochemistry/Tissue Technology</u>
- Ventana Discovery Ultra Automated Slide Preparation System
- Li-Cor Odyssey Infrared In-Cell Western/Fluorescent ELISA Imaging System
- CRi/Caliper Nuance Multispectral Imaging System
- Multiple Tissue Processors, Embedding Stations and Cryostats/Microtomes,
- Tissue Micro-Array Production







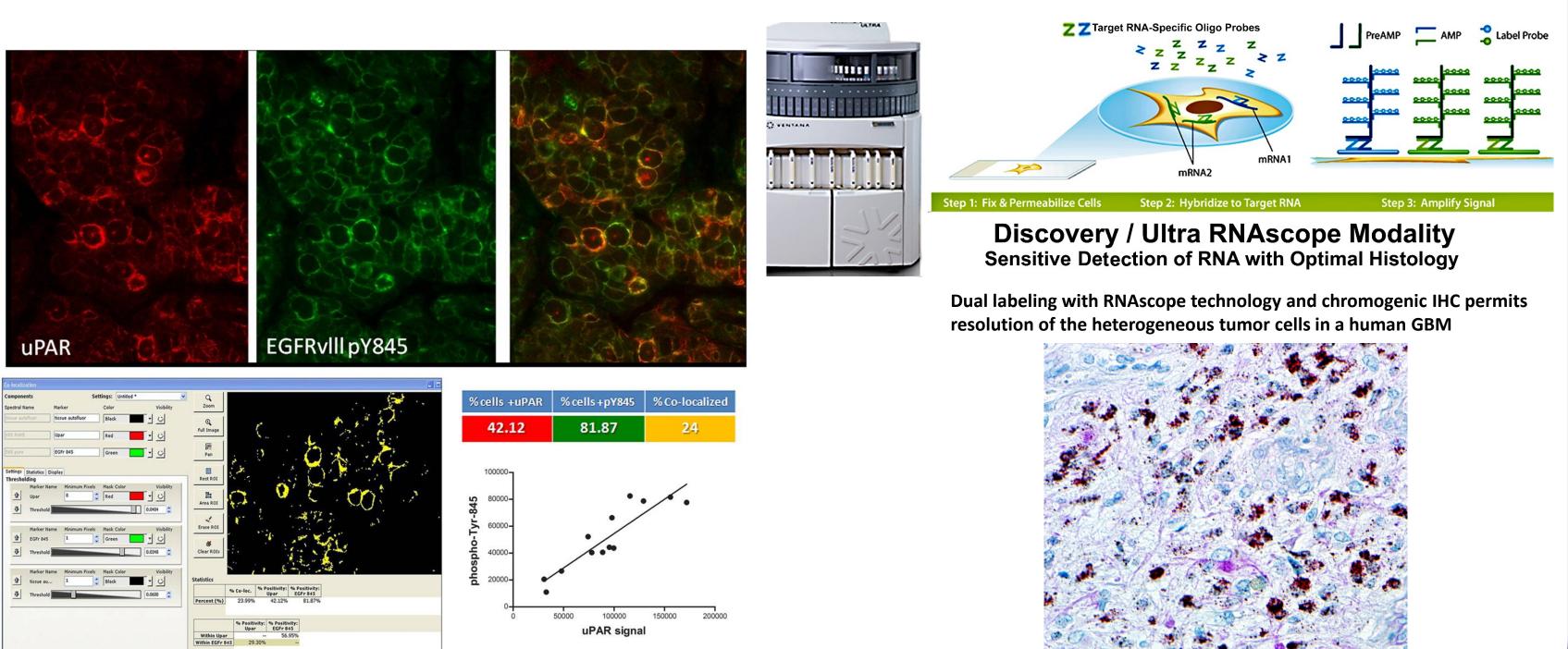
amount of desmoplasia in a FFPE tissue section of a human pancreatic adenocarcinoma

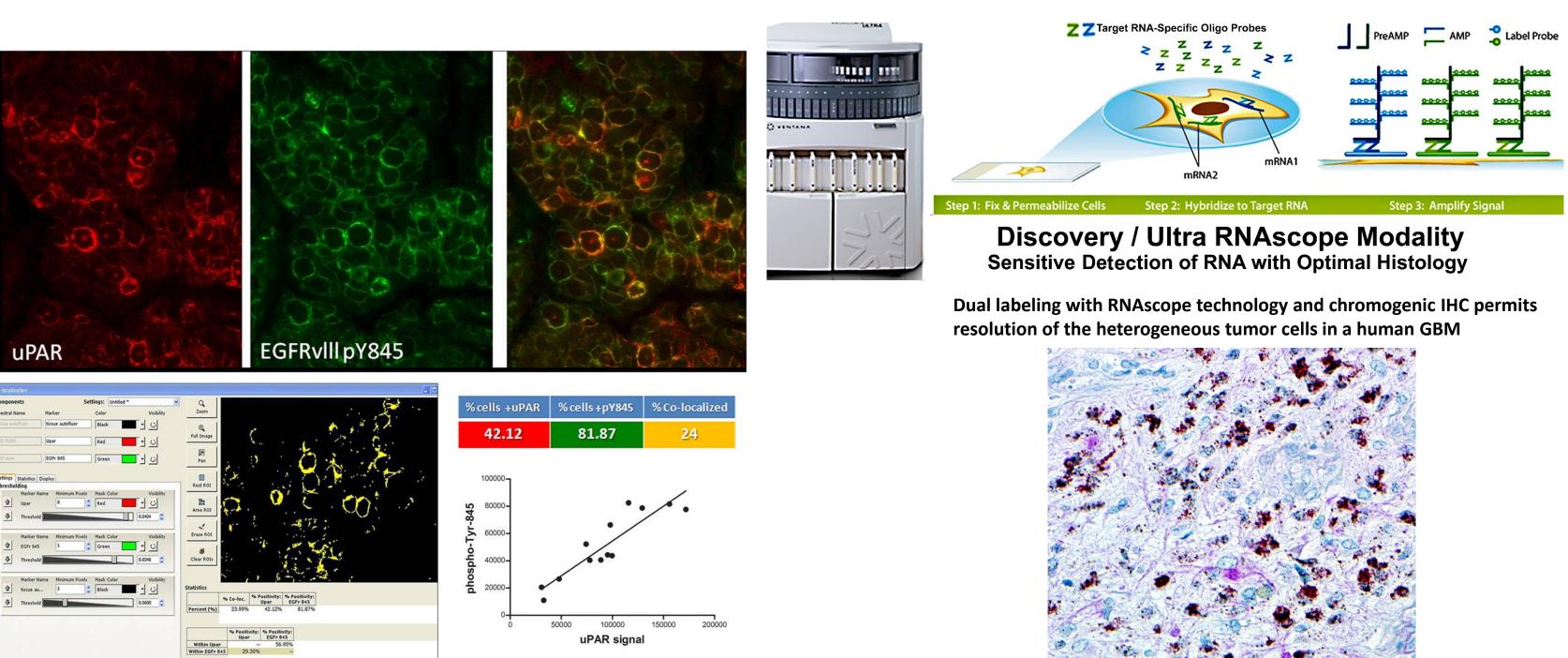
Pancreatic Adenocarcinoma 2

|--|

Collagen Cells Lumen/Spaces

63.9% 7.6% 28.5%

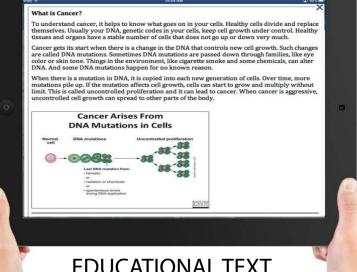




Fluorescence multiplexing correlates the expression of uPAR with EGFR signaling at p-Tyr-845 in a GBM with a EGFRvIII mutation.



E-Consenting research project collaboration Dr. Lucila Ohno Machado's team aims at creating effective more friendly, user that system consenting incorporate better educational and patient feedback activities.



FEEDBACK SURVEY

EDUCATIONAL TEXT

A3 👻 : 🗙 🗸

Andrew M. Lowy, MD

Bob S. Carter, MD Clark Chin-Chu Chen, N David Barba, MD

John Furgus Alksne, M Joseph Ciacci

Sheet2 Sheet1

P Q R

AJ Sort A to Z

Z↓ Sort Z to A

More Sort Options. Clear Filter From "Surgeon"

..... (Select All)

Alan Hemming, MI

-Andrew M. Lowy, MD

Anne Marie Wallace, MD

Anthony Perricone, MD Bob S. Carter, MD

Bobby S. Korn, MD

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OK Cancel

🖌 Anna Kulidjian, Ml

Anne Wallace, MD

PivotTable Fields

Specimen Alternate ID Specimen Quantity Specimen Patient Code

Specimen Notes

Collected Quantity

fields between areas below

III COLUMNS

Σ VALUES

Count of Coll...

 Σ Values

Anatomic Site

FILTERS

ROWS

Anatomic Site 🔻

Defer Layout Update

Choose fields to add to report:

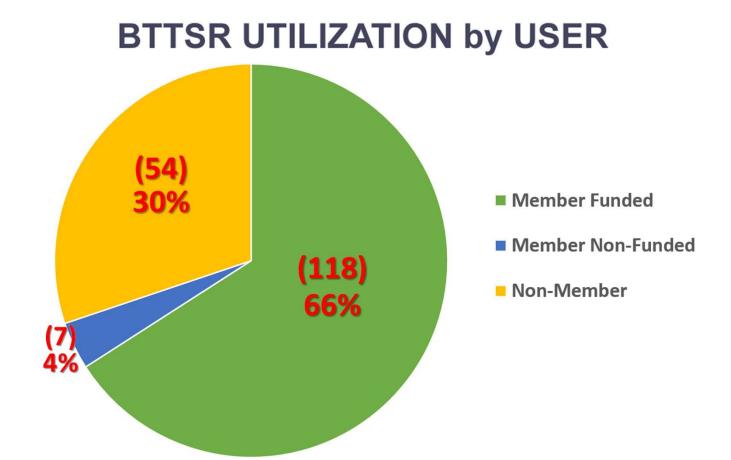
An important determinant for maximizing tissue acquisition into the Biorepository is tracking the success of the consenting process and tracking consented patients by specific clinicians and organsite as show in a screen shot of a pivot table from the tracking database.

GURE 1. Histologic finding of PanINs and pancreatic tumors. A, H Representative sections of normal pancreas, mPanINs (predominantly PanIN-1), and PDA are shown (magnification x200), B. COX-2, Pancreat issue sections were immunolabeled with a COX-2-specific antibody epresentative images of normal pancreas (magnification x200), mPanINs pecific antibody. Representative sections of normal pancreas, mPanINs mPanINs 1 and 2), and PDA are shown (magnification x400). NF-IkappalB i

> **BROWN (RNA) wt EGFR** Purple (peptide) EGFRvIII



Utilization and Capacity



Operational and Proposed Budget

The BTTSR is supported by a mixture of recharge activity, CCSG and other grant/institutional funds as described in the History & Institutional Support.

Income Source	Current Support	Percent of Current Total	Proposed Support-Year 1	Percent of Proposed Total		
CCSG	\$99,150	10%	\$217,409	20%		
Fees for Service/ Chargebacks	\$371,873	37%	\$380,000	36%		
Other (Grants/Institutional)	\$530,593	53%	\$464,090	44%		
Totals	\$1,001,616	<mark>100%</mark>	\$ <mark>1,061,499</mark>	100%		

Recharge Rates and Cost Effectiveness

Recharge rates are calculated on the basis of cost of services including labor reagents, supplies and expendable costs. Labor costs are partially supported by the CCSG funding so MCC investigators receive a subsidy on their rates. Recharge to non-MCC investigators includes the full cost, including full labor costs. Examples of the BTTSR histology rates are shown (below left). The table, below right, shows a price comparison with other academic and commercial providers.

Histology Recharge Rates

Comrise	MCC	UCSD	Non-UCSD							
Service	Rate	Rate	Rate	Price Comparison						
Paraffin blocking (per sample)	\$4	\$5	\$8	Service	мсс	UC Davis	a Yale	Harvard	Vanderbilt	AML labs
Sectioning (per sample/slide)	\$2	\$3	\$5							
Step Sectioning (per slice/per step)	\$2	\$3	\$5	Paraffin Section	\$2.00	\$5.00	\$3-4	\$3-60	\$4.25	\$1.50
				H&E	\$2.00	\$19.20	\$3.00	\$3.63	\$6.95	\$3.00
H&E Staining (per slide)	\$2	\$4	\$5	Paraffin Block	\$4.00	\$5.00	\$8.00	\$5.00	\$7.00	\$4.00
Special Stains (per slide)	\$7	\$10	\$15	Special Stain	\$7.00	\$12.00	\$10.00	\$9-29	\$9.50	\$10-50
IHC assay development (per Ab)	\$105	\$160	\$235	Frozen Section	\$2.00	\$6.00	\$75/h	\$3.38	\$4.00	\$6.00
IHC optimization (per assay)	\$105	\$160	\$235	IHC	\$25/ h	\$56.00	\$40.00	\$30.00	\$25.00	Not done
IHC Technologists Time (per hour)	\$25	\$47	\$68							

Value Added

- Seamless integration of biospecimen acquisition, archiving and morphologic applications to permit the optimal use and access to annotated human tumor tissue that otherwise would not be available for translational research.
- Human tissue acquisition organized by a full-time Pathologists' Assistant to ensure standardized tissue acquisition for all tumor/organ sites.
- Personnel with expertise in all aspects of tissue handling, histopathology, mouse models, and biomarker detection for:
 - Project planning involving human tissue research.
 - Troubleshooting biomarker detection procedures.
 - Customized fresh (and viable) tissue processing.
 - Training personnel in individual MCC laboratories.

Future Directions

- Developing innovative applications of dual ISH/IHC or IF labeling and fluorescence multiplexing in tissue sections aimed at better defining heterogeneous tumor cell populations.
- Development of the capacity for routine viable cell processing/short-term normoxic/hypoxic conditions.
- Optimization of LCM technology for the study of heterogeneous tumor cell populations using biomarker-directed micro-capture.