



## Digital Cancer Diagnostics & Surgeries

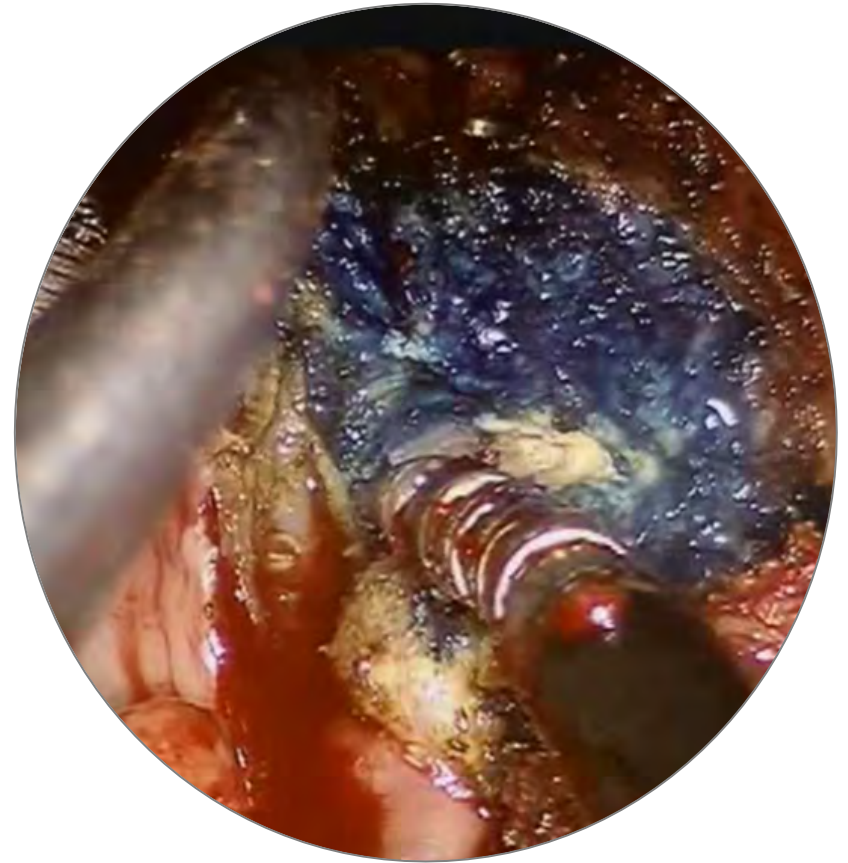
Unique Imaging Agents With Binary Readout:

**Cancer = ON; Healthy tissue = OFF**

## Unmet Needs in Cancer Surgery

- **Residual tumor**
- **Lymph nodes**
- **Tumor margins**

Difficult to identify in real-time during surgery



## Impact of Poor Cancer Surgery

- Tissue and organ damage
  - Paralysis and neurological damage
  - Sexual function damage
  - Incontinence
  - Speech and swallowing function issues
- Re-operations
  - 20-40% breast surgery re-operations
  - Second surgeries for this alone may cost the healthcare system close to \$1B annually
- Recurrence
  - 30% to 55% of patients with NSCLC develop recurrence and die of their disease despite “curative” resection



Effect of Inadequate tumor removal and healthy organ and nerve damage

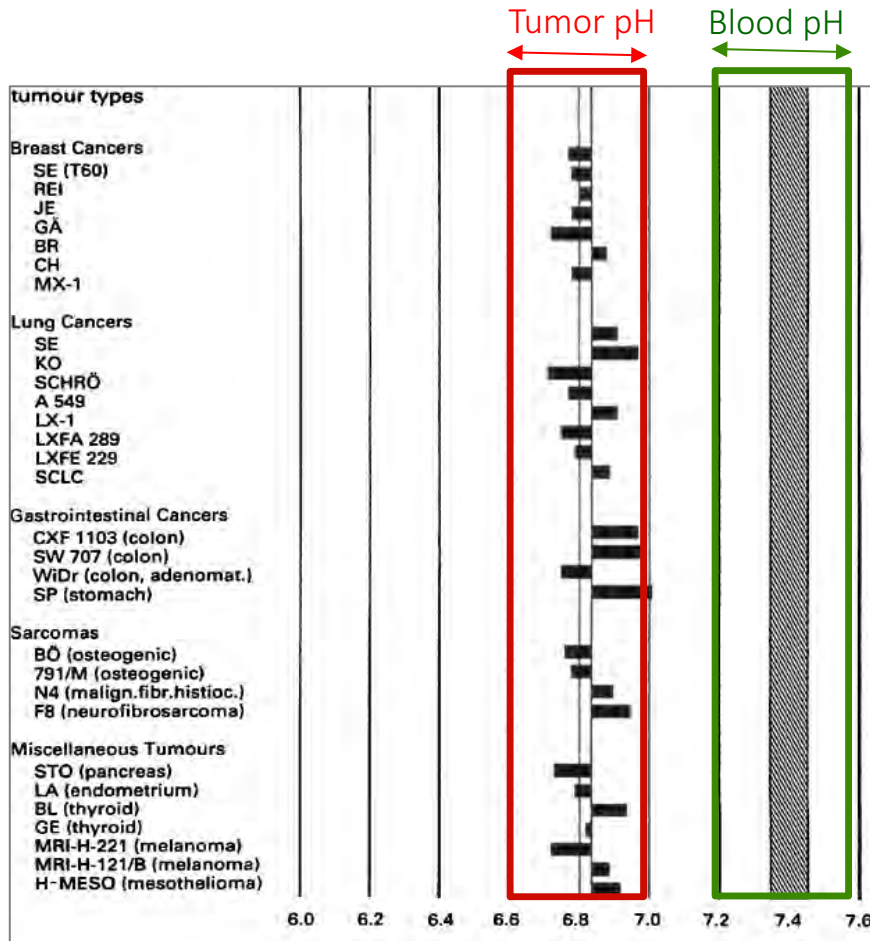




Fixed Baseline



# Key Insight: Tumors Have Acidic pH



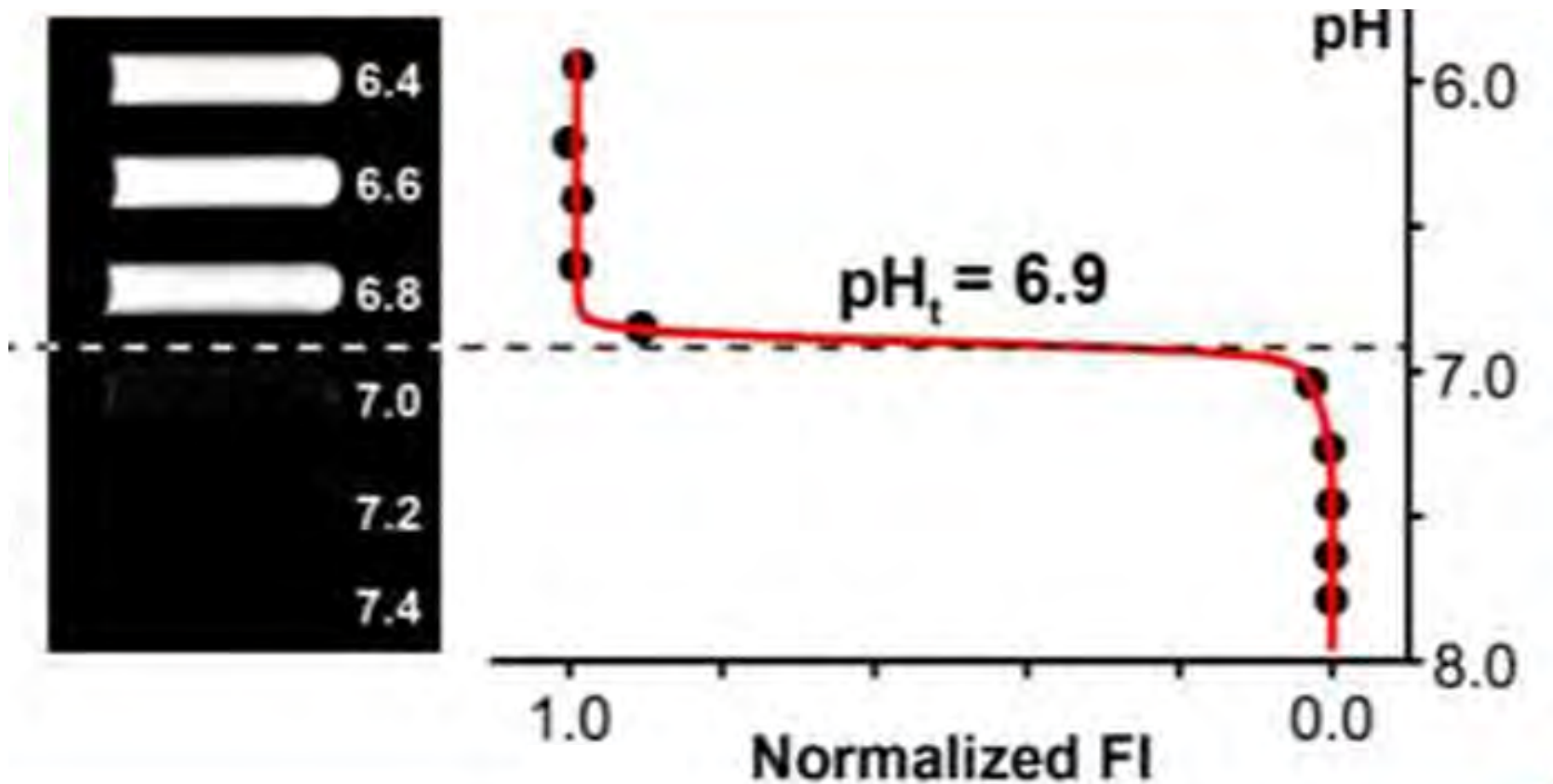
- All 256 human tumors tested were acidic

Tumor pH ~ 6.8

Blood pH = 7.4

Low tumor pH is a universal cancer hallmark across diverse cancer genotypes and histology phenotypes- Due to well known “Warburg effect”

# pH-Transistor Nanoprobe™ Binary Response



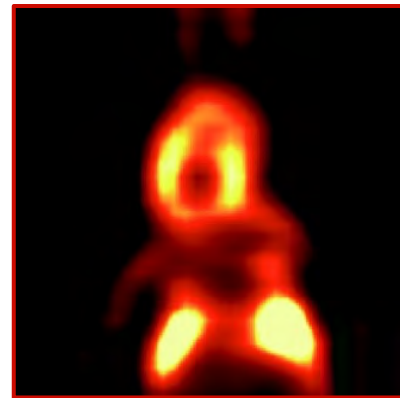
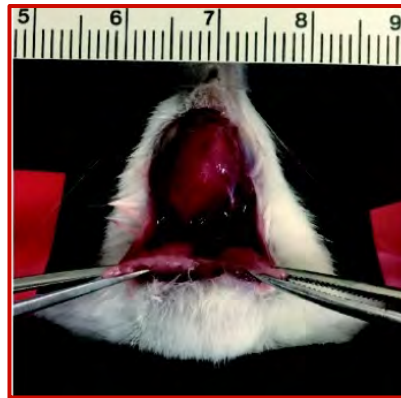
# OncoNano Accuracy and Specificity Superior to State-Of-Art PET Imaging

White Light

PET/<sup>10</sup>FDG

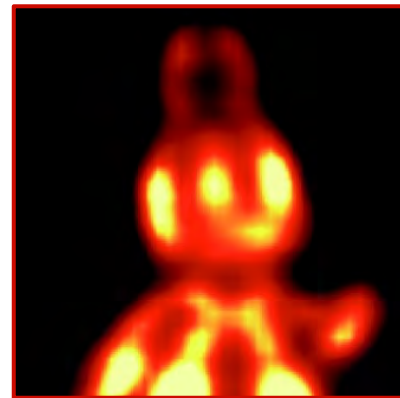
Fluorescence/I-UPS

Big Tumor



PET imaging confounded by “brown fat” limiting resolution

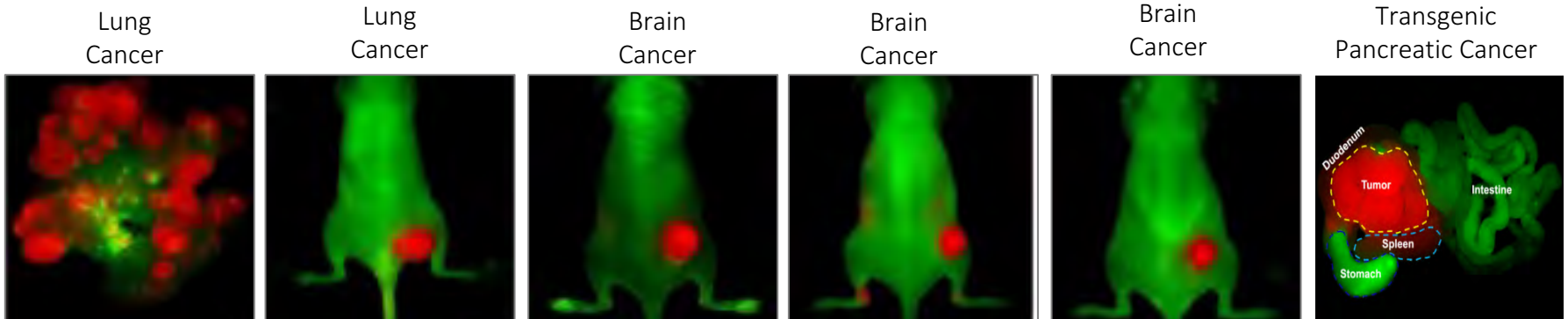
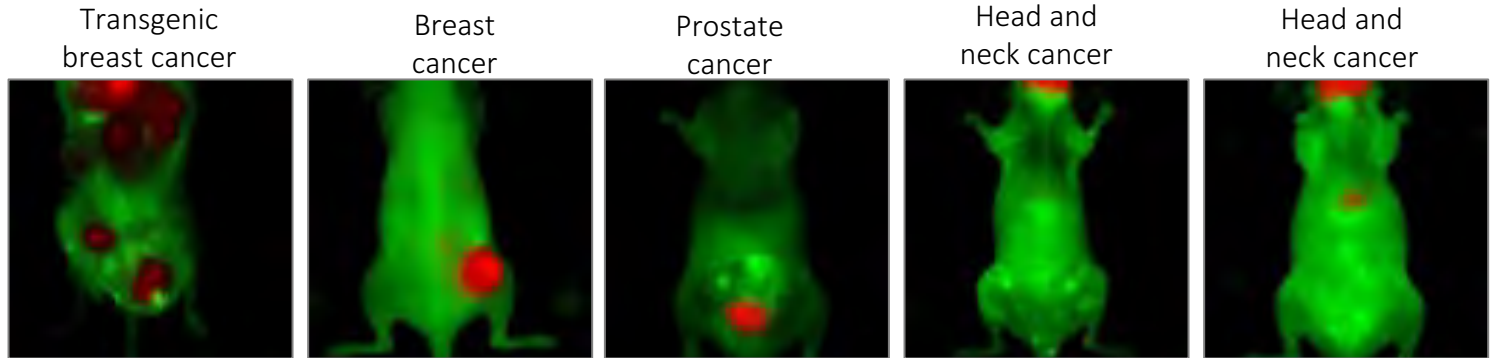
Small Tumor



# ONM-100: Tumor Imaging Across Multiple Cancer Types

**Red:**  
Tumors of  
different types  
and organ sites

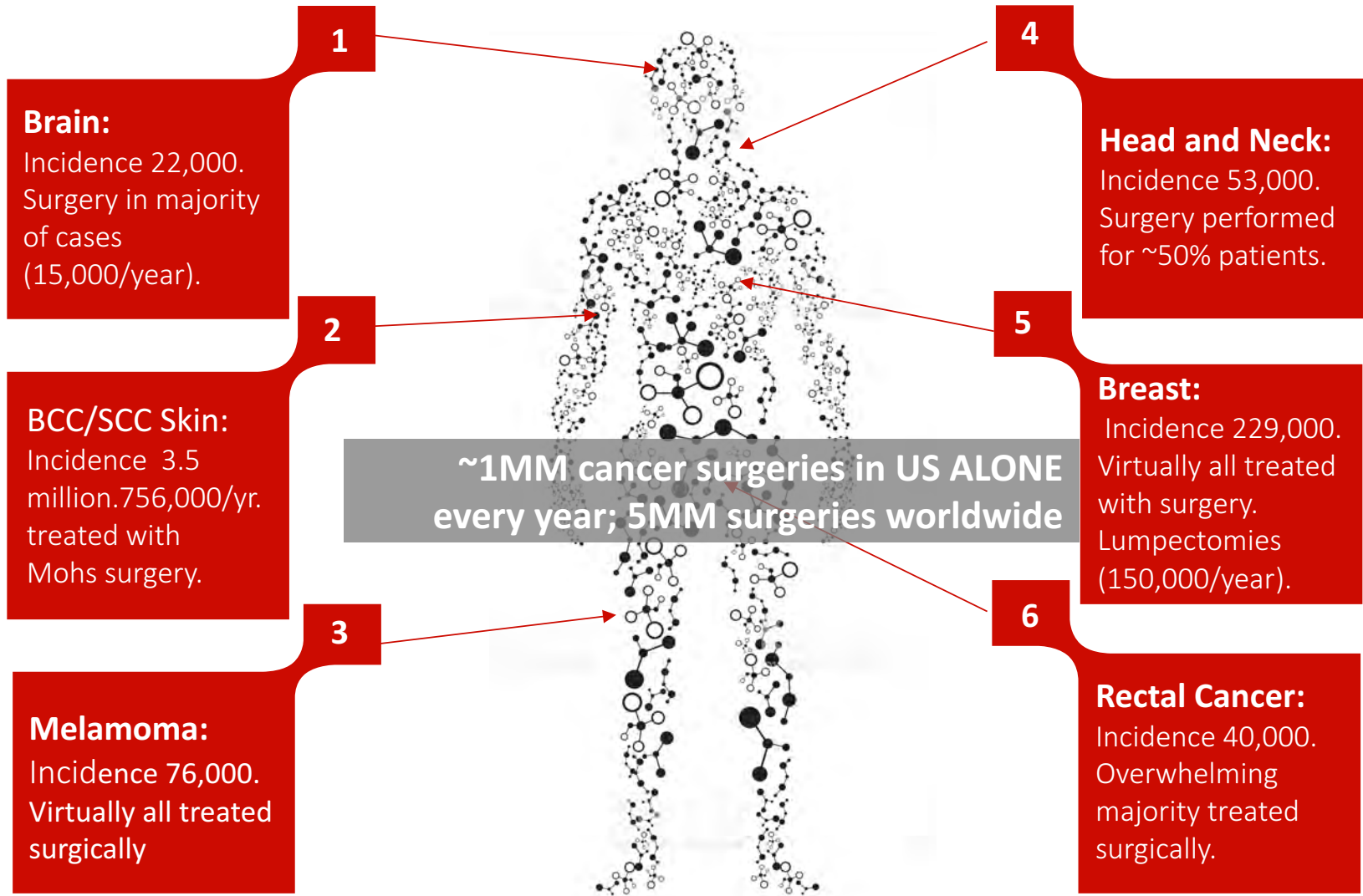
**Green:**  
Normal tissue  
background



Nature Mater., 2014, 13, 204-212



# Surgical Target Market: \$2B Opportunity



# Cancer Precision Medicine And Surgery: Dynamic Sectors for Deals in Last 10 Months

## GRAIL

Spun-out from Illumina

- **\$900MM Series B**

Precision cancer diagnostics and early detection

## SIEMENS

Healthcare GmbH acquired NEO

**New Oncology AG May 17, 2016**

Molecular profiling assays based on NGS (Next Generation Sequencing), both for tissue specimens and body liquids.

## OnTarget

funded by JJDC

**\$40MM**

Oct 2017

INTUITIVE  
SURGICAL®

Medtronic

VERB  
SURGICAL

## Robotic cancer surgery

space very active with  
new entrants

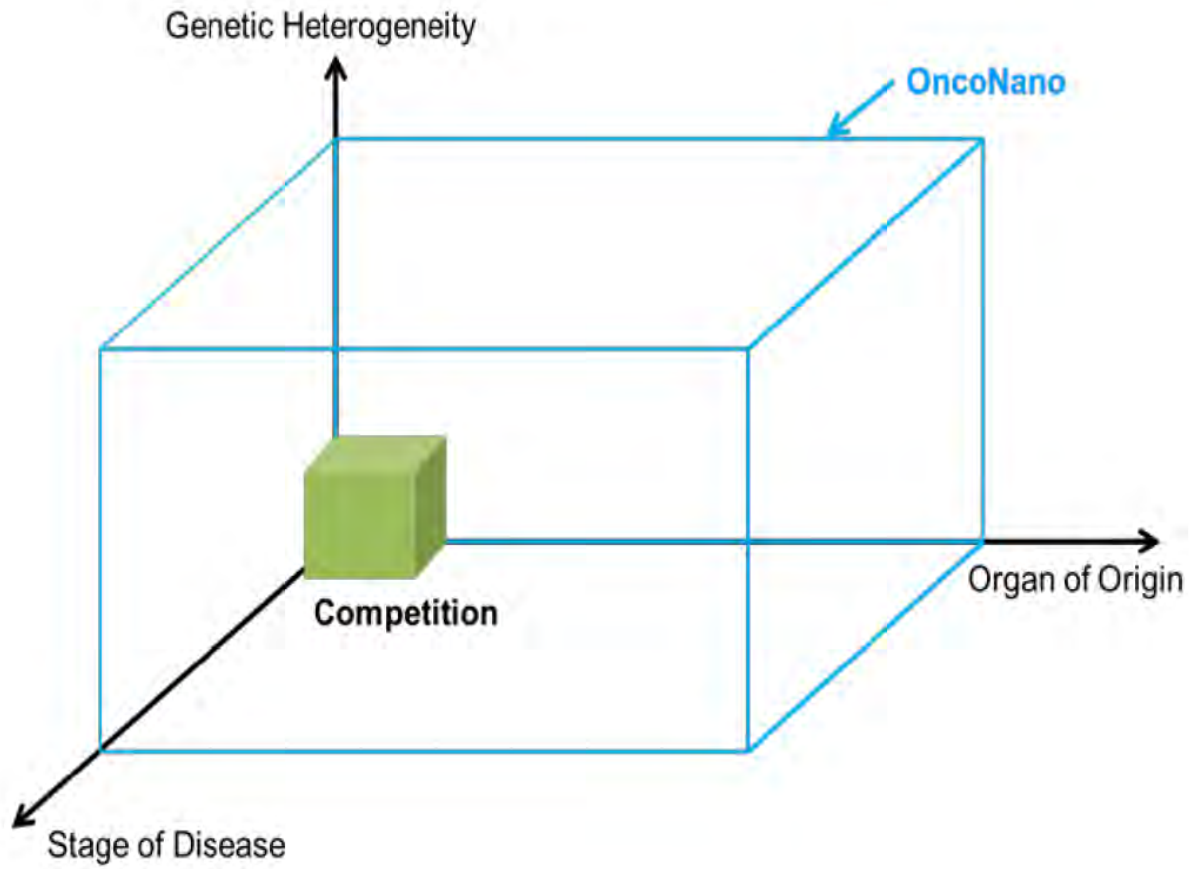
New well-funded competitors  
looking for differentiated  
products

**stryker**

Acquired Novadaq for

**\$700 Million Sept 2017**

# Competition



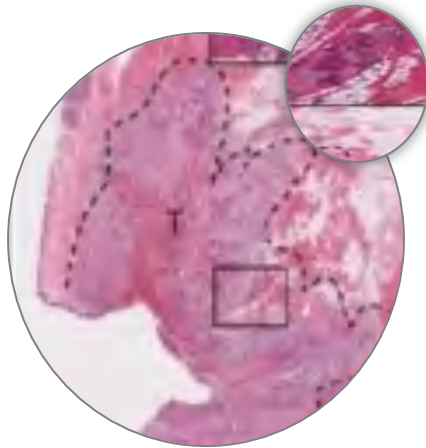
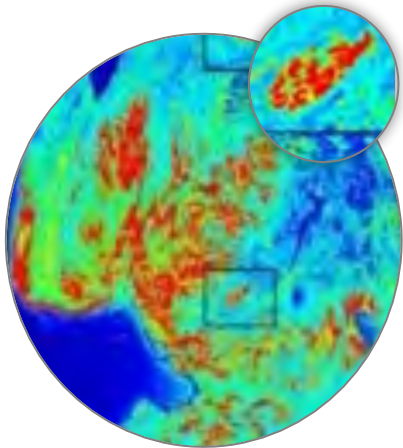
# Sharp Tumor Margins Due to Digital ON-OFF Effect of ONM-100

## EGFR-IR Fluorescent Dye

Traditional “analog  
fluorescent probe”

NIR

H&E

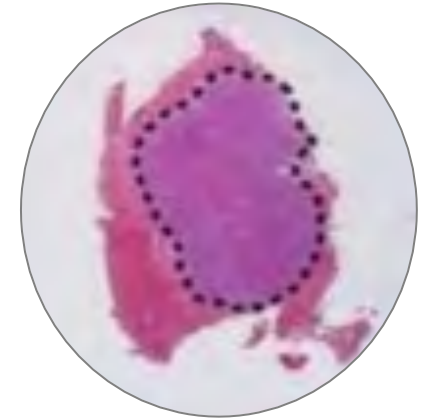
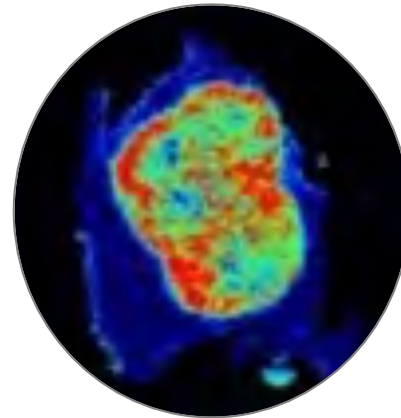


## ONM-100

“digital fluorescent probe”

NIR

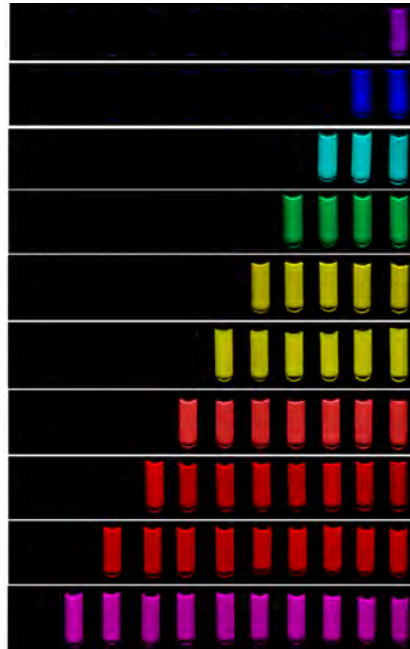
H&E



## Platform Technology With Multiple Product Opportunities

**Cancer  
Surgery**  
(ONM-100)

**Cancer Radio  
nuclide-diagnostics**  
(ONM-200)



**In-Vitro  
Diagnostics**  
(ONM-300)

**Therapeutics**  
(lysosome pH target,  
pancreatic cancer)

**Monetize non-core products va partnerships**



## OncoNano Team Background

- **Ravi Srinivasan**  
PhD – CEO  
Serial healthcare entrepreneur, StrataGent Life Sciences (acquired by Corium-Nasdaq:CORI) and StemPar Sciences (IV oncology therapeutic); ForSight Vision 5 (acquired by Allergan); MIT PhD in Chemical Engineering
- **Yalia Jayalakshmi**  
PhD – Head Clinical Development  
Sr. Dir. Amgen/Onyx, Johnson and Johnson, Genentech. Developed Doxil, Lucentis, TNKase
- **Narmada Shenoy**  
PhD – Head CMC  
CMC head Sugen, Pfizer. Developed Sutent
- **Duane Reaves**  
MD- Regulatory consultant  
Previous Head, Division of Imaging Products FDA
- **Carl Alden, PhD**  
Head Toxicology  
VP Tox Millenium/Takeda. Developed Velcade, Celebrex
- **Frank Lee, PhD**  
Head Pharmacology  
VP Millenium/Takeda. Developed Velcade, Celebrex
- **Tian Zhao**  
PhD – Director of Research  
Inventor of ONM-100



## Scientific Advisory Board

- Prof. Jinming Gao, PhD  
Founder, SAB Member  
Professor of UTSW  
Chair of NIH Gene and Drug Delivery Study Section  
PhD Chemistry Harvard, Post-doc MIT
- Prof. Baran Sumer, MD  
Founder, SAB Member  
Faculty and surgical oncologist at UTSW  
Head and Neck Cancer Team Leader UTSW
- Prof. Charles Balch, MD
- Key Strategic Advisor, SAB Member  
Cancer surgery and immunotherapy thought leader  
Ex-CEO ASCO, ex-CEO City of Hope Hospitals, EVP MD Anderson
- Dr. John Neiderhuber, M.D.  
Key Opinion Leader, SAB Member  
Ex-head, National Cancer Institute  
Ex-head, Department of Surgery at Stanford and Johns Hopkins

## Business Advisors

- Al Guillem, Ph.D.  
Founder ZS Pharma
- Paritosh Dhawale, PhD  
Head of Imaging Business Unit, GE Healthcare
- Steven Shak, M.D.  
Founder, Genomic Health



## Opportunity Summary

- **Unmet Needs Addressed:**  
Tumor & lymph node detection, staging and surgical imaging
- **OncoNano Solutions:**  
IV injectable tumor imaging products that turn ON in tumors and stay OFF in healthy tissue
- **OncoNano Core Technology:**  
Unique micelle nanoprobe based pH nanotransistors ultrasensitive to tumor acidity, a universal tumor biomarker (Warburg effect)
- **Market:**  
Cancer imaging >\$5B and rapidly growing
- **Competition:**  
PET, CT, MRI, ultrasound plus several imaging agents all less sensitive and specific and need expensive hardware purchases
- **Team:**  
Experienced executives and key opinion leaders in the field founding company and driving effort
- **IP:**  
Invention and applications protected, IP issued
- **Exit:**  
Active dealmaking M&A + partnerships + IPO in market space





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**“Most innovative technology seen in  
last 25 years”**

Prof. Charles Balch - ex-CEO ASCO, EVP  
MD Anderson, Past-president Society of  
Surgical Oncology