Translating the PAM50 Gene Expression Assay from LDT to FDA-cleared Test

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Conflict of Interest

I’m an inventor of the PAM50 signature and a stakeholder in BioClassifier LLC, a company that licensed the PAM50 know-how to Nanostring Inc. for commercialization of Prosigna®.
The Four Pillars of a Successful Diagnostic Test

- **SCIENCE**: Analytical & Clinical Validation
- **COVERAGE**: Patient Reimbursement
- **MARKETING**: Sales Force $$ Reaching Physicians
- **GUIDELINES**: Recommended by Professional Organizations
NIH “Strategic Partnering to Evaluate Cancer Signatures”
the four institution team funded by the NCI to develop a breast cancer test ...

Phil Bernard
University of Utah

Matthew Ellis
Washington University

Torsten Nielsen
University of British Columbia

Chuck Perou
UNC-Chapel Hill
1. Took prototypical samples and subtype assignments from microarray
2. Used qRT-PCR data for 160 genes
3. Selected optimal gene subset for subtype classifications using 10-fold CV
4. Identified 50 optimal genes, and samples, giving a robust training set (PAM50)

Parker JS et al. J Clin Oncol 2009
**MILESTONES:**
**PAM50 Discovery to Commercialization**

**2005**
- **U01 NIH/NCI**
  - SPECs funding for breast cancer subtyping signature

**2009**
- **JCO Article**
  - PAM50 Discovery Subtyping and RoR score

**2010**
- **Bioclassifier LLC**
  - Licenses PAM50 to NanoString Inc

**2011**
- **ARUP Inc**
  - PAM50 launched as qPCR LDT for breast cancer subtyping
- **NanoString Inc**
  - Commercial launch of Prosigna in Europe and Israel

**2013**
- **NanoString Inc**
  - Completion of first clinical validation study on nCounter for Prosigna for RoR
  - Prosigna receives FDA 510(k) clearance for prognosis in ER+ breast cancer

**2015-2017**
- **NanoString Inc**
  - Reimbursement: Local Coverage Determinations across US

**2018-**
- **NanoString Inc**
  - More Guidelines: NICE, AJCC, etc
  - More Indications: Prediction

**2009**
- **ARUP Inc**
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**2015-2018**
- **NanoString Inc**
  - Prosigna incorporated into national and international guidelines for breast cancer
COMMERCIALIZING PAM50

Do DIFFERENT
• May not have spent effort and money on the qPCR LDT platform at ARUP
• May not have gone to the FDA with Prosigna due to claim restrictions and marketing disadvantage

Do the SAME
• Establish a strong scientific foundation for the signature beyond the initial offering
• License technology from the Universities
• Seek a platform that could be de-centralized allowing worldwide distribution