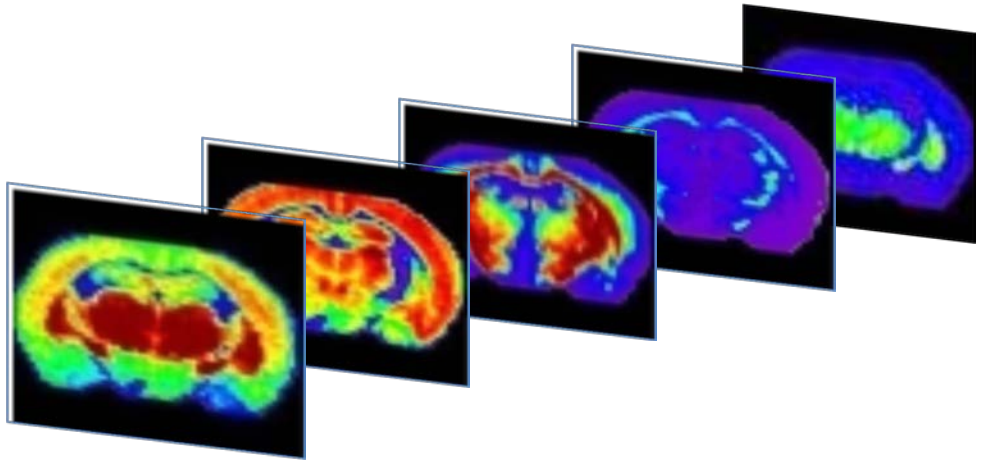

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Q2 2017

Disclaimer and Safe Harbor

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Our Business Is Molecular Information

- **We develop proprietary technology that can rapidly and comprehensively identify the molecules that are produced by all living cells:**
    - Data can be available in seconds to minutes, instead of days to weeks
    - 2D and 3D Direct Molecular Imaging is achieved
    - Only technology that can “drill” into cells to identify molecules
    - Analysis of living cells is enabled
    - 13 patents have been issued and >50 publications to date
    - Permanent molecular databases are created and stored for future datamining

- **We apply our technology to provide services that improve new pharmaceutical development:**
    - Our clients know that better data means better commercial outcomes
    - Our clients include many Fortune 500 pharma and biotech companies

The Need For Better Molecular Information

- **Drug developers need precise understanding of how their drug is functioning, at the molecular level, where it counts:**
  - "Is my drug reaching its molecular target"?
  - "How much reached the cells and over what period of time"?
  - "How long does it remain biologically active"?
  - "What other molecular changes are occurring in our drug's target cells"?

- **Currently, Molecular information is too limited in scope, takes too long to generate, and falls short of the needs of drug developers for precise, reproducible molecular information, rapidly available:**
  - Days or weeks turnaround time is required to completion
  - Highly-trained specialists are required to interpret data
  - Only limited amounts of data are generated

Market Profile

- **The global market for preclinical drug services is estimated to be $11 Billion [1,2] Of this market, we estimate approximately $1.5 Billion is spent on molecular information used to guide new drug development[5]**

- **Molecular Information Market Drivers:**
  - The emerging importance of therapeutic proteins (biopharmaceuticals) , now representing one-third of the pharmaceutical industry, growing at 10% per year, and estimated to be $386 Billion in revenue by 2020[3,4]
  - Biopharmaceuticals are complex molecules that require greater amounts of molecular information data.
  - The increasing costs of drug development demand faster and more precise data to assess drug activity and efficacy ("fail early, fail cheap").
  - There are multiple markets for molecular information, including AgBio, consumer products and medical devices

1. *2014 Annual Pharmaceutical Research and manufacturers of America Member Survey*
2. *SDI 12 Global Analytical Report October 2012*
3. mAbs 7:1, 9--14; January/February 2015; © 2015 BioProcess Technology Consultants, Inc.
4. Biologic Therapeutic Drugs: Technologies and Global Markets,January 2015,Report Code: BIO079
5. *Protea in-house estimates*

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The Management Team

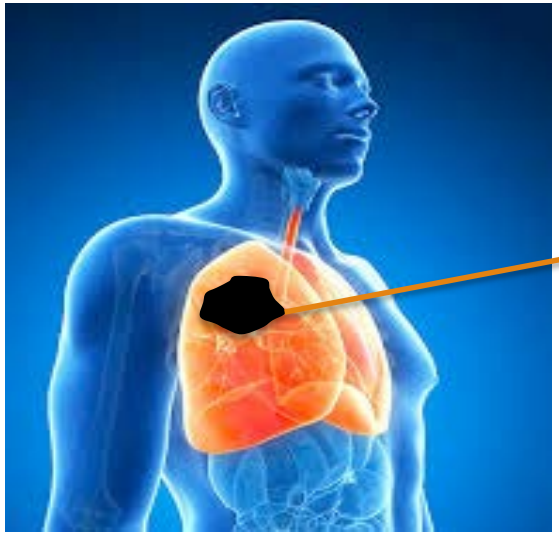
Name & Title	Background
Stephen Turner Chairman & CEO	• Founder OncorMed (Gene Logic) - genomic cancer products • Founder Quorum Sciences (Sold to Vertex) • Founder Bethesda Research Laboratories (BRL - Life Technologies)
David Halverson President	• Exec. Director, Key Accounts for MPI Research • Head, U.S. Sales, Huntingdon Life Sciences • Dir. North America Bus. Dev,, Quintiles
Matthew Powell, Ph.D. V.P. & CSO	• Technology Co-developer • Analytical Chemistry (WVU)
Haddon Goodman V.P., CBO	• Thermo Fisher,
Mark Szewc, Ph.D. Director of Laboratory Operations	• Thermo Fisher , Laboratory Director • Pfizer, researcher
Science Advisory Board Mark Poznansky, MD,PhD Akos Vertes, Ph.D. Glen Jackson, Ph.D. Peter Nemes, Ph.D.	 • Head, MGH/Harvard Cancer Vaccine Division • Prof. of Chemistry, GWU & Co-inventor of the LAESI technology • WVU Prof., expert in mass spec forensics • Prof. of Chemistry, GWU, formerly FDA, LAESI co-inventor

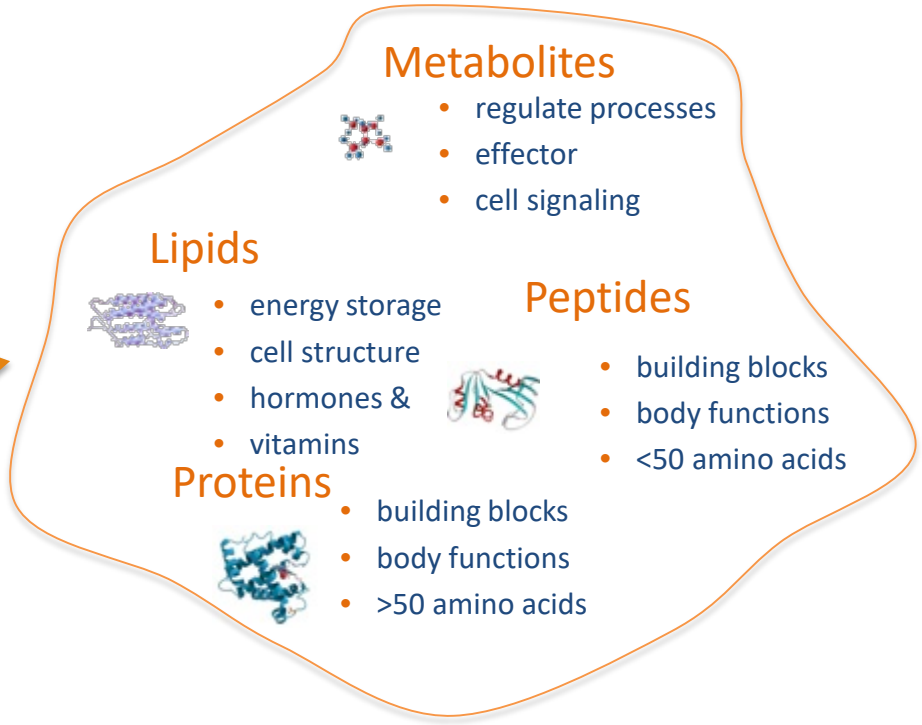
Molecular Information Is the ultimate "Big Data"

- Trillions of cells in the human body continuously produce billions of biologically-active molecules that define our health and our disease
  - Protea identifies the molecular output of living cells
  - >1,000 molecules can be identified in a single analysis

Image of a tumor within a lung

Source: PhRMA 2014 Industry Profile, Alkinhibitors.com





- Protea technology identifies all these classes of molecules that are produced by human cells

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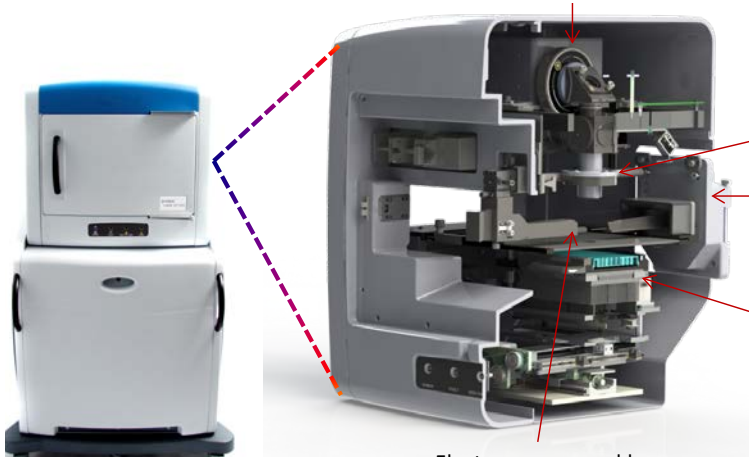
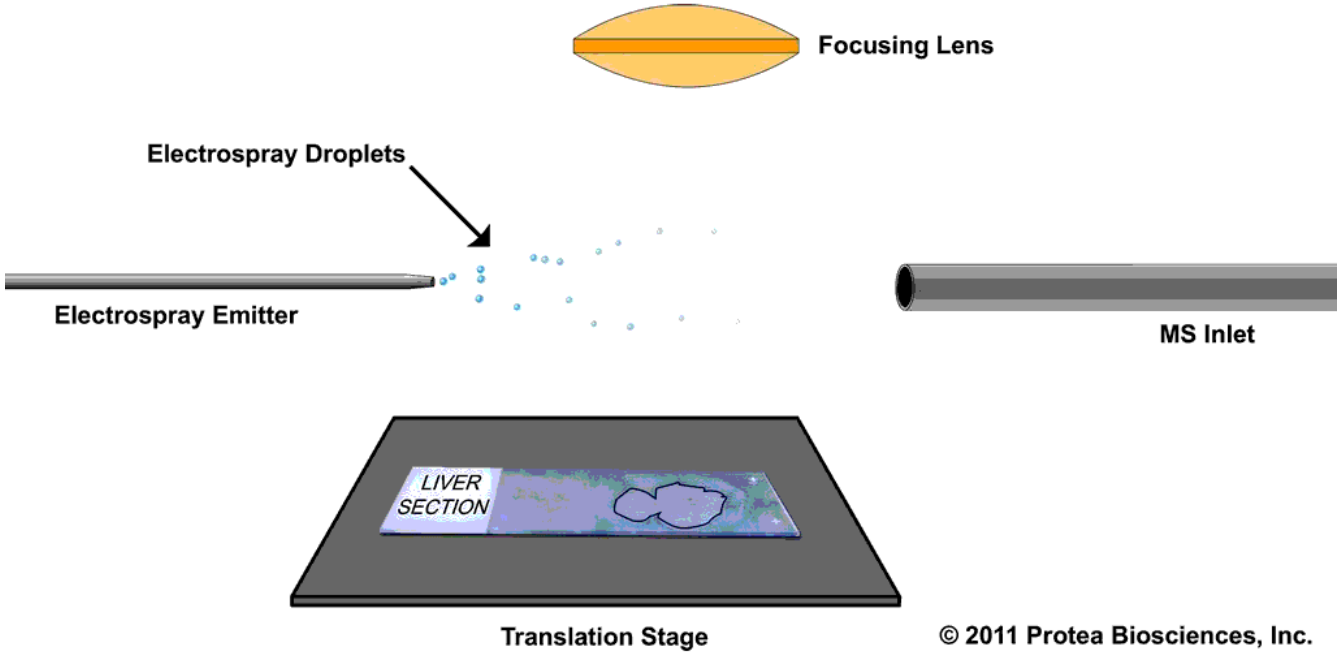
LAESI: Revolutionary Molecular Information Technology

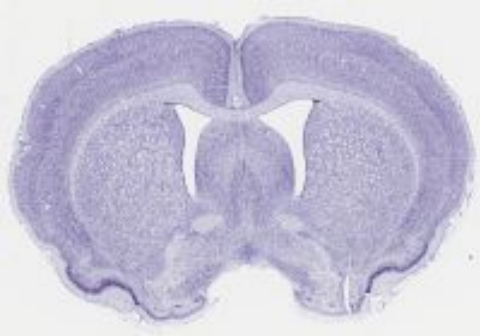


- Rapid - analysis takes seconds to minutes
- No sample prep = unbiased data
- 2D & 3D imaging of biomolecules in tissue
- Permanent molecular databases are created for future data mining
- First technology to “drill” into tissue samples for molecular analysis

- LAESI can generate and analyze samples at the rate of one per second.

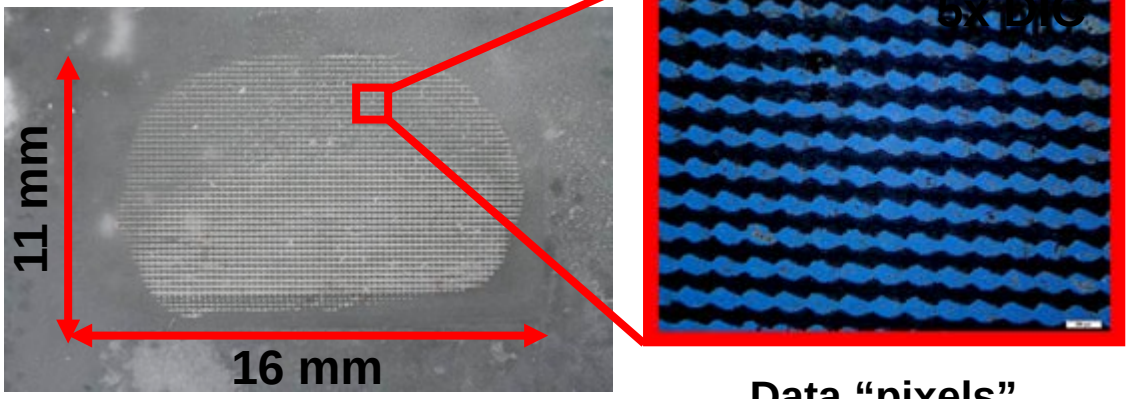


LAESI: Direct Molecular Imaging in Tissue



100 µm coronal section of rat brain

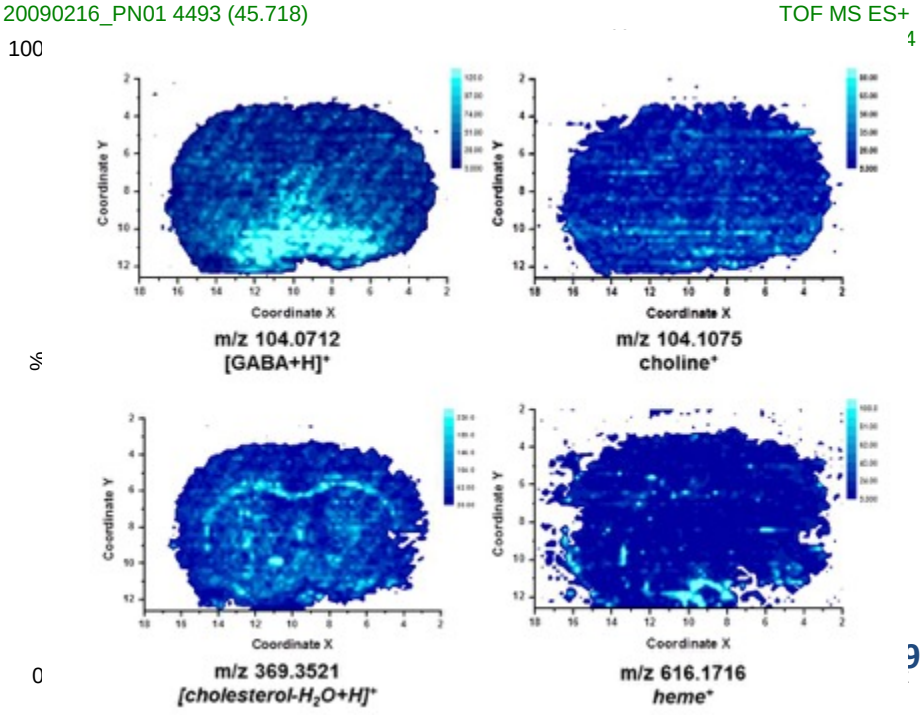
LAESI



LAESI molecular data "grid" works like pixels in a camera

Data "pixels"

- Fully automated, results in 60 minutes
- Direct – no antibodies or radiolabels
- LAESI software mines "pixel" data files and displays biomolecules in the tissue sections
- Large molecular databases are created for storage and data mining



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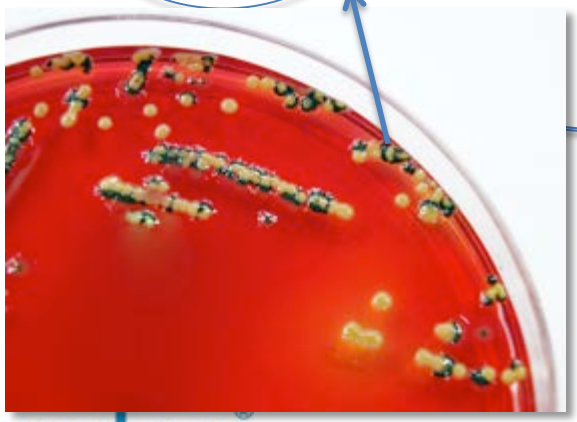
LAESI Case Study: 2D molecular imaging in bacterial colonies

Optical image of a bacterial colony that has a new antibiotic introduced

Molecular image of the antibiotic molecule

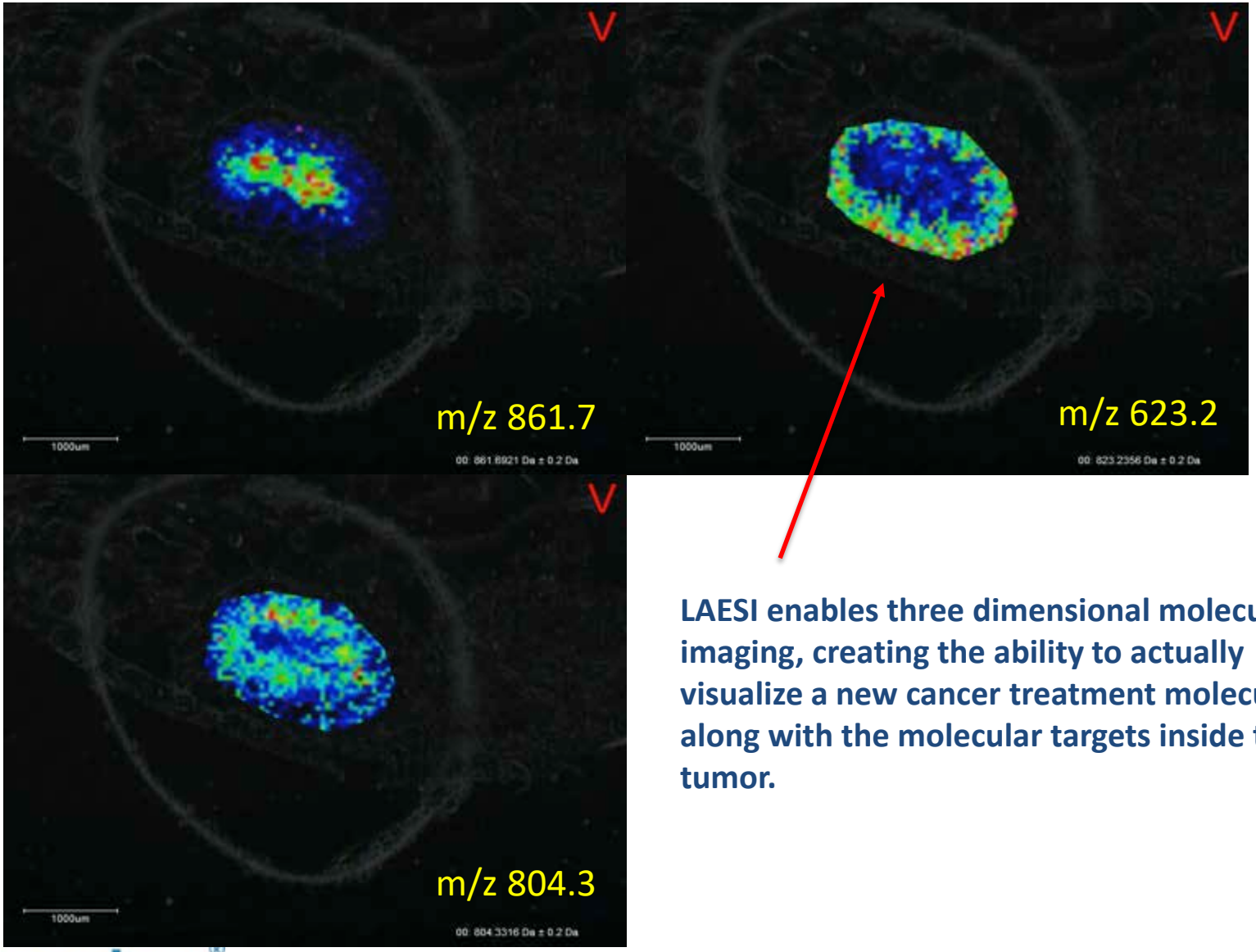
Image of a bacterial molecule that promotes its growth

Molecular image both of the bacterial molecule and the new antibiotic



With LAESI, the bacterial colony remains viable after analysis, so that it can be monitored and analyzed over time, improving the ability to assess a new antibiotic's effectiveness.

LAESI Case Study: 3D molecular imaging of tumors



A lipid molecule is imaged in a colon cancer tissue – note the molecule is not present in the necrotic core of the tumor

LAESI enables three dimensional molecular imaging, creating the ability to actually visualize a new cancer treatment molecule, along with the molecular targets inside the tumor.

microtissues provided by InSphero

The Molecular Profiling of Cancer

Yale University

Protea is applying its technology to "look inside" cancer cells and produce "molecular fingerprints" that will improve the diagnosis and management of cancer.

We are developing a molecular test that enables the accurate detection and diagnosis of malignant melanoma:

- **We collaborate with the Yale Dept. of Pathology**
- **Results have been published at the American Society of Dermatopathology, indicating >90% accuracy**
- **An extensive follow on clinical study is underway, and will be completed in 2017**

Summary

Protea is building a major corporate franchise by providing the pharmaceutical industry access to proprietary molecular technology with unmatched capabilities to meet their analytical needs:

- **We are already achieving successful market adoption and an expanding customer base**
- **Technology and infrastructure is already in place to support continued revenue growth**
- **We have collaborative partnerships with Agilent Technologies, Protein Metrics, DARPA (GWU, GE Research, SRI), MSKCC ,WVU, Yale and others in development.**
- **Protea is well-positioned for successful, long term participation in the expanding global market for molecular information services**