bioProtonics

INTRODUCING *µTexture*™
A NEW PARADIGM FOR MAGNETIC RESONANCE DIAGNOSIS
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Quantitative Histology Without Biopsy

INDUSTRY:
Technology, Medical Imaging / MRI

FUNDING:
$750K of a $1.1M Preferred Seed equity round closed March '19.

INVESTMENT OPPORTUNITY:
bioProtonics is seeking an additional $350K to fully fund the Preferred Seed offering.

USE OF PROCEEDS:
General Corporate purposes, including resources to drive commercial adoption of *µTexture* across multiple indications. Continued prosecution of the patent portfolio including international applications.

PATENT SUMMARY:
Five core technology patents issued in the US and pending in select international markets; Two additional patent applications filed that expand our portfolio by refinements in clinical application. Ongoing provisional patent filing.

ADVISORS & COLLOBORATORS:
Prof. Garry E Gold MD – Associate Chair for Research, Stanford University Department of Radiology.
Prof. Scott Grafton MD – Director UCSB Brain Imaging Center.
Prof. Arthur Toga PhD – Director USC Mark and Mary Stevens Neuroimaging and Informatics Institute.
Prof. Jean Carlson PhD – Head of the Complex Systems Group, UCSB.
John V Crues MD – Radiologist, Founder /Board Member of RadNet.
Kim Grafton MD – Surgeon; specialist in breast surgery, Santa Barbara Cottage Hospital.

Technology Description

bioProtonics has developed a proprietary Magnetic Resonance (MR) based diagnostic method, **µTexture**™, that provides measurement of biologic tissue changes at resolution far beyond the capability of current clinical diagnostic imaging. As changes in the microstructural fabric of tissue are often the first indicator of disease onset and the most sensitive measure of disease progression, **µTexture** enables early and accurate diagnosis across a broad range of diseases for which sensitive diagnosis is currently unavailable. Despite the impressive capabilities of MR imaging, patient motion limits image resolution—for many neurodegenerative diseases (e.g., Alzheimer's disease) the only definitive diagnosis is post-mortem histology; for many other diseases use of highly invasive and error-prone biopsy-sampled pathology read is also the only way to access tissue microstructure. **µTexture** is a paradigm change in how MR data is acquired, with the potential to greatly improve patient outcomes.

Our Vision

µTexture will revolutionize the use of MR Imaging (MRI) systems by applying our proprietary **µTexture** as a fast add-on to already-scheduled MRI exams. This will unlock the high-information-content/ low-cost data required to expand the use of MR technology into new disease applications including predictive disease modelling and drug development. **µTexture** can be deployed within the entire installed base of MRI units.

The Market:

MRI is a widely used diagnostic imaging modality with $45B of procedures performed annually in the US. With a global installed base of roughly 35,000 MRI scanners, the opportunity for deploying the **µTexture** technology is massive.

µTexture: A breakthrough in diagnostic capability

- Extremely high diagnostic value
- Clinically robust
- Low cost implementation
- Provides desperately needed diagnostic ability for a range of hard to diagnose diseases
- Greatly reduces the need for biopsy
- Output = simple high-sensitivity diagnostic score
- Provides the structured, high resolution data to enhance the power of AI analytics

Business Model:

bioProtonics, having proven its technology, is poised to establish co-development and licensing opportunities with MRI OEMs, PHARMA and Big Data/ Value Based Care providers,. Appropriate value capture modes range from licensing on a per disease and per MRI system basis, to pay per use SaaS models, to a broad technology license and continued development alliance, to outright IP sale. Multiple concurrent models are likely and varied depending on the specific strategic alliance partner's need. A confluence of healthcare drivers facilitates rapid adoption: 1) The prodigious installed base of MRI scanners and the rapidly expanding use of MRI both in established applications and new clinical indications, 2) the high diagnostic value and low cost of our measurement dovetails with the mandate for Value Based Care, and 3) the need for previously unavailable high-resolution structured data to enable application of machine learning techniques towards deriving robust disease biomarkers. Adoption ensures a myriad of new and compelling applications in the research, pharma, and clinical arenas, with the potential to be a definitive diagnostic for devastating diseases such as cancer, Alzheimer's, MS, and myocardial fibrosis.

The company has active collaborations at three leading universities. The technology, and our approach to validation, is endorsed by key opinion leaders in the field of MR imaging.

"MR·based measurements of the fine tissue textures pertinent to pathology, down to the tens of microns range, is by definition a game-changer in diagnostics."
Garry Gold, Professor of Radiology and Bioengineering, Associate Chair for Research, Stanford University; Past President ISMRM (International Society for Magnetic Resonance in Medicine)

"If the potential of the MR-based *µTexture* diagnostic technology is realized, it will be the only non-invasive, direct measure of tissue texture available, enabling early stage diagnosis and monitoring in many heretofore inaccessible brain pathologies, thereby greatly improving outcomes."
Prof. Arthur Toga, collaborator, Head of the USC Mark and Mary Stevens Institute of Neuroimaging and Bioinformatics

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LEADERSHIP:

Timothy W. James, Ph.D. – CEO/CTO, 35+ years experience in technology and product development, from semiconductor IR detectors through medical imaging devices and techniques. 30+ US patents

Kristin E. James, Ph.D. – Executive VP R&D/ Business Development, 25+ years experience designing and managing R&D projects for semiconductor sensor and medical device development, including defining and directing clinical studies. 6 patents in the field of medical diagnostics.

Daniel R. Doiron, Ph.D. – Executive Chairman, 35 years of entrepreneurial experience in early stage medical technology companies, including two IPOs. Extensive experience in IP and technology licensing with large pharmaceutical and medical device companies.

Contact:
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Disease happens quietly. Changes begin at the very smallest levels of the anatomy, affecting the microscopic structure of the biologic tissue of which organs are composed. The greatest unmet need in healthcare is the ability to assess these very fine changes, before they lead to irreversible pathology accumulation. Currently, the only way to measure changes in biologic tissue texture is biopsy—a highly invasive procedure that is fraught with both read and sampling errors, its invasiveness ruling out longitudinal disease tracking. MR (Magnetic Resonance) imaging, a non-invasive procedure, is the diagnostic of choice in a wide range of diseases, due to its ability for tunable tissue contrast to highlight disease-induced changes. However, spatial resolution in MR imaging is limited by blurring caused by patient motion during data acquisition, making it impossible to image the microscopic changes in tissue texture that indicate disease onset and progression.

The *µTexture* diagnostic technology developed by bioProtonics is a paradigm change in how MR-data is acquired. This novel technology enables extension of MR resolution into the tens of microns range, even in the presence of significant patient motion, allowing measurement and tracking of the pathological tissue changes that are the earliest indicators of disease. As such, it has the potential to be a game changer in both disease treatment and in drug discovery, for a range of debilitating diseases currently stymied by lack of a robust and sensitive diagnostic (liver disease, lung diseases, prostate disease, brain cancer, breast cancer, bone disease, dementia...) Our initial diagnostic validation targets are Alzheimer's disease (AD) and prostate disease. The barrier to adoption is low, as the diagnostic adds negligible time/effort to an MR exam, requires no additional hardware, yet greatly increases diagnostic information. The output data is direct, quantitative, and highly structured, facilitating sensitive biomarker development through use of machine learning analytics. The diagnostic is poised to have huge societal impact due to enabling sensitive, accurate, and early stage diagnosis across a broad range of crippling diseases, significantly improving outcomes and facilitating therapy discovery.

bioProtonics, Inc. is positioned to pursue co-development and licensing opportunities with PhRMA, with Big Data analytics providers, and with MRI OEM's. A confluence of healthcare drivers facilitates rapid adoption: 1) The prodigious installed base of MRI scanners and the rapidly expanding use of MRI both in established applications and new clinical indications, with a clear push to quantitative MR, 2) the high diagnostic value & low cost of the measurement dovetails with the mandate for Value Based Care, and 3) the need for high-resolution, structured data to enable AI-based data analytics-derived robust biomarkers. Adoption ensures myriad new and compelling applications in the research, PhRMA, and clinical arenas, with the potential to be a definitive diagnostic. The market is the entire installed base of MR scanners.

The bioProtonics team has an impressive track record in the field of diagnostic technology, including extensive patent and publication portfolios. We have formed development alliances with internationally recognized researchers and institutions.