

## **Point-of-Care Precision Medicine: Real-time Radiomics-Genomics in the Reading Room**

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### **Background/Problem Being Solved**

Emerging digital electronic data for molecular characteristics of tumor biology are increasingly available in a standard fashion following the TCGA initiative. There are limited available tools to cross correlate these with structural and functional medical imaging studies. We propose a solution to integrate digital pathology and genomic data into the enterprise medical imaging workflow in real time.

### **Interventions**

Our experience with architectural design of data structure and implementation of tools to incorporate digital pathology and genomic data into the oncologic imaging workflow will be presented. Our approach organizes the data according to enterprise compliant interoperable standards. We demonstrate the database architecture and the modular programming design to dynamically query, organize, and represent the data during medical image interpretation. We then integrate this information with the medical imaging data into a structure for storage to a registry or data repository.

### **Outcome**

Digital pathology and genomic data will become increasingly accessible in the day to day practice of medicine. Clinicians until now have had limited ability to interact with and incorporate these data sources into routine patient care. As data scientists, researchers, and clinicians begin to tackle the problems of “Big Data” challenges, many of the useful new insights in patient management may come from real time integration of massive amounts of available data. This exhibit demonstrates one approach to address digital pathology and genomic data integration with molecular and structural imaging.

### **Conclusion**

The Cancer Genome Atlas data structures can be utilized successfully to provide a means of integrating digital pathology and genomic data into the routine enterprise medical imaging workflow.

### **Statement of Impact**

It is important for radiologists to be actively involved in the process of knowledge discovery and data representation in the era of Precision Medicine. This is especially important because of the emergence of new types of clinically relevant digital healthcare data such as genomic and digital pathology that is not currently considered to be part of the clinical electronic medical record. Enterprise healthcare institutions solutions should focus on open and interoperable solutions to avoid isolated and difficult to access data silos. New solutions that follow interoperable standards will allow increased ability to democratize data repositories and improve personalized approaches to cancer care.

### **Keywords**

precision medicine, radiomics, genomics, digital pathology, cancer, molecular data, multi-scale modelling, knowledge representation