

A Shared Pathology Informatics Network

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Background

Introduction:

- Diagnosis and prognosis on the basis of visual examination of tissue on the microscopic level is well established [1].
- Objective, quantifiable criteria are missing [2-5], although the potential inherent in digital image analysis as a histological tool has been described [6-8].
- Our increasing ability to measure and classify biologic phenomena on the molecular level offers substantial opportunities to further develop and quantify these diagnostic and prognostic parameters.
- Development and application of quantitative techniques requires the availability of tissues, of which millions are available through local and regional hospital pathology departments

Relevance:

- Fine molecular stratification may uncover new information about treatment or prognosis:

UNSTRATIFIED				
		5 year survival		
		Survived	Died	
Study Arm	Treatment	32	18	50
	Placebo	31	19	50
		63	37	Odds ratio: 1.09

Raw data suggests that there is apparently no treatment effect

STRATIFIED				
		5 year survival		
		Survived	Died	
Study Arm	HYP positive:	6	1	7
	HYP negative:	7	4	11
		13	5	Odds ratio: 3.43
Study Arm	Treatment	26	17	43
	Placebo	24	15	39
		50	32	Odds ratio: 0.96

However, stratification on a hypothetical new marker reveals subgroup of patients for whom treatment is highly efficacious.

Current Resources:

- Distribution networks and repositories for human specimens and corresponding data already exist—and others are under development [9-13]
- Also under development are tools to facilitate tele-pathology [14, 15].
- Model systems to track specimens and associated data within an institution have been described as well [16].

SPIN Implementation

Opportunities for Progress:

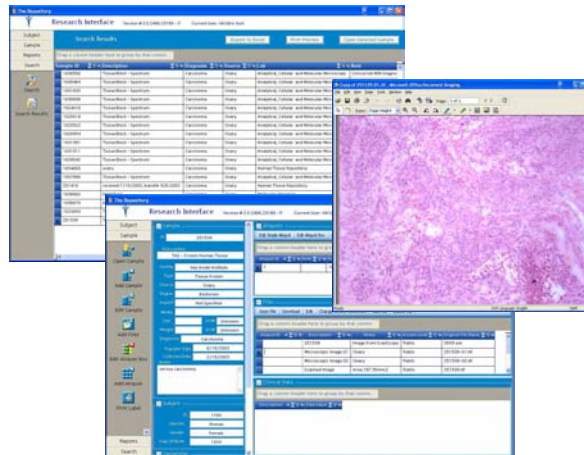
- Existing systems are disparate and require duplication of efforts
- An integrated, web-based access portal to human tissues (a "virtual repository") would streamline access while enforcing uniform procedures.
- A web-based system would also serve as a data repository reducing duplication and expediting advancement.

Challenges:

- A web-based data and tissue portal would need to specifically address challenges in the following areas:
 - Patient anonymity and confidentiality
 - Technology
 - Legal requirements
 - Distribution of specimens
 - Scientific analysis & dissemination of data arising from use of network specimens

Pathology network at VARI (SPIN/VATR):

- A web based query portal to the human tissue repository at VAI (currently around 200,000 specimens) has been developed to prototype this technology.
- The following screen shots summarize the capabilities of the system.

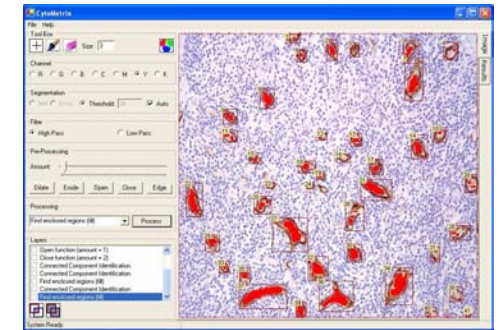


Application

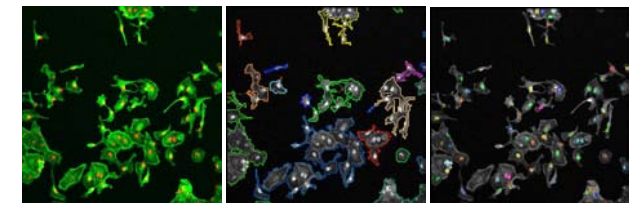
Use of Tissues:

Following are example technologies that can be applied to acquired tissues to quantify molecular markers for inclusion in statistical models of disease etiology and progression

Quantitative IHC



Cytometry:



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