

# A NATIONAL RAPID AUTOPSY TISSUE BANK FOR CANCER RESEARCH

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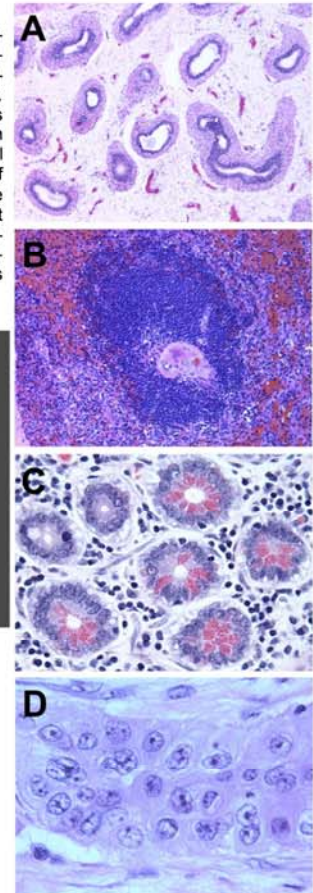
## Abstract

New technologies such as genomics, gene expression arrays, proteomics and metabolomics, are directed at molecular-level analyses of normal and diseased human tissues. These methods offer tremendous promise. However, the relative lack of suitable tissue for this work is a critical roadblock. Tissue is collected at the time of therapeutic surgical interventions, such as biopsy, or at the time of death, by autopsy. Biopsy is only done on individuals with disease and therefore normal control tissues are generally not obtained. Additionally, the biopsy tissue is often completely used for diagnostic purposes or is insufficient in quantity to constitute a shared resource. Both diseased and normal control tissue could potentially be obtained at autopsy, but this tissue is generally not suitable due to autolytic changes resulting from a long postmortem interval between death and tissue retrieval. There is therefore a critical need for a national rapid autopsy tissue bank; we present here our preliminary work towards establishing such a resource. The bank is located at the not-for-profit Sun Health Research Institute (SHRI) in Sun City, Arizona, where a rapid autopsy brain bank has been in operation since 1987. The median post-mortem interval, for more than 1150 autopsies, has been about 3 hours over this time period. We have significantly aided the national neurodegenerative brain research effort by distributing brain tissue to hundreds of US and international researchers. We expanded to full body donation and tissue banking three years ago and have already banked tissue from all major bodily organs and tissues from more than 130 subjects. Our rapid autopsy tissue has high RNA integrity, with 85% of all cases yielding RNA quality suitable for all types of analysis. We are currently supplying normal prostate glands to a multi-center NCI-funded SPECS prostate cancer project (Dan Mercola, PI, U. California Irvine) and are seeking collaborations and/or core funding to expand our services to other cancer researchers.

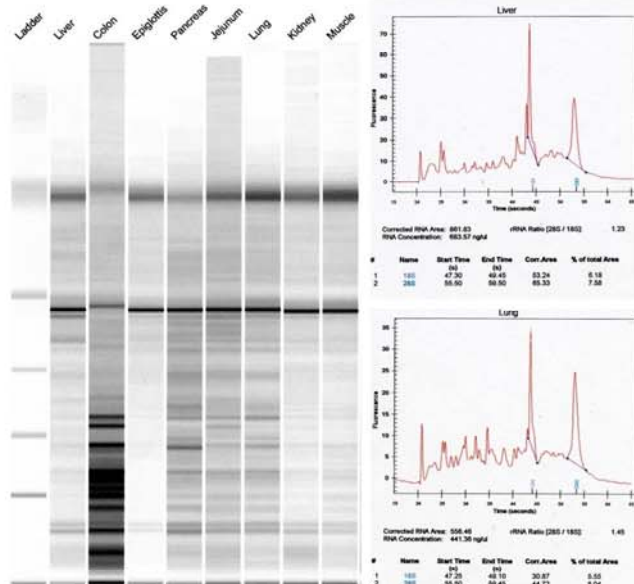
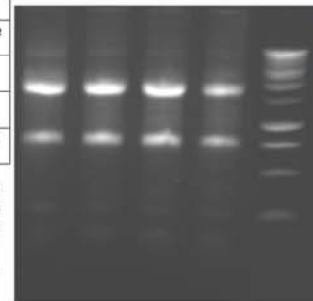
**Structure Inventory** At present our inventory consists of the following organs and tissues from more than 100 subjects. Researchers' requests are quickly filled, as compared with programs that prospectively collect tissue only after a request is received.

Epiglottis	Jejeunum	Uterus	Skin, scalp
Larynx	Ileum	Cervix	Skin, abdom
Thyroid gland	Colon	Vagina	Mesentery
Parathyroid gl.	Rectum	Ovary	Lymph node
Esophagus	Liver	Fallopian tube	Brain
Bronchus	Gallbladder	Bladder	Spinal cord
Lung	Pancreas	Prostate	Periph. nerve
Heart	Kidney	Testicle	Aorta
Stomach	Adrenal	Bone	Adrenal gl.
Duodenum	Spleen	Skel muscle	Submand. gl.

**Tissue Quality – Light Microscopy** Tissue quality, as assessed by light microscopic examination of paraffin-embedded, hematoxylin and eosin-stained sections, is generally excellent. The figure on the right depicts sections of epididymis (A), spleen (B), jejeunum (C) and pancreatic carcinoma (D). All organs showed little or no evidence of autolytic change. Rapidly-frozen tissue blocks are free of ice crystal artefact and so tissue morphology may be assessed directly adjacent to tissue regions used for biochemistry, such as gene expression microarray analysis.



**RNA Quality** Automated RNA quality assessment using the Agilent 2100 Bioanalyzer (lower left) and standard RNA gel electrophoresis (right). Overall, about 85% of samples are suitable for gene expression studies, with electrophoretic traces showing distinct 28s and 18s rRNA bands. Mean rRNA ratios (28S/18S) are typically about 1.35.



## Sun Health Research Institute Brain and Body Donation Program Facts and Figures

- is the only consistently rapid autopsy program in the world (3 hr PMI)
- a not-for-profit organization devoted to the study of diseases of aging
- established in Sun City, Arizona in 1987 for Alzheimer's research
- recruitment from surrounding retirement community volunteers
- annual physical, neurological examinations, medical records requests
- tissue very comparable to surgical biopsy in terms of RNA quality
- 85% of samples have RNA quality suitable for extensive analysis
- formalin-fixed and fresh-frozen tissue available, no freezing artefact
- all tissue examined by a board-certified pathologist
- 49 grants (25 NIH) served for brain research in a recent 4 yr period
- whole-body donation started in 2005, > 130 body donations since
- current autopsy rate ~ 90/yr of which ~ 60 are whole-body donations
- most valuable role at present is as supplier of normal tissue
- could supply 100 or more researchers/yr with normal tissue
- over next 10 years will develop an inventory of common cancers

## Support

The Sun Health Research Brain and Body Donation Program has been supported by user fees as well as grants received from the National Institute on Aging (P30 AG19810 Arizona Alzheimer's Disease Core Center), the Arizona Department of Health Services (contract 211002 to the Arizona Alzheimer's Research Consortium), the Arizona Biomedical Research Commission (contracts 4001, 0011 and 05-901 to the Arizona Parkinson's Disease Consortium) and the Prescott Family Initiative of the Michael J. Fox Foundation for Parkinson's Research.