

# **Genotype-Tissue Expression (GTEx) Project Update**

**National Advisory Council for Human Genome Research  
5635 Fishers Lane, Rockville, MD  
Sep 12-13, 2011**

**Jeff Struewing  
Sep 12, 2011**

# Genotype-Tissue Expression (GTEx)



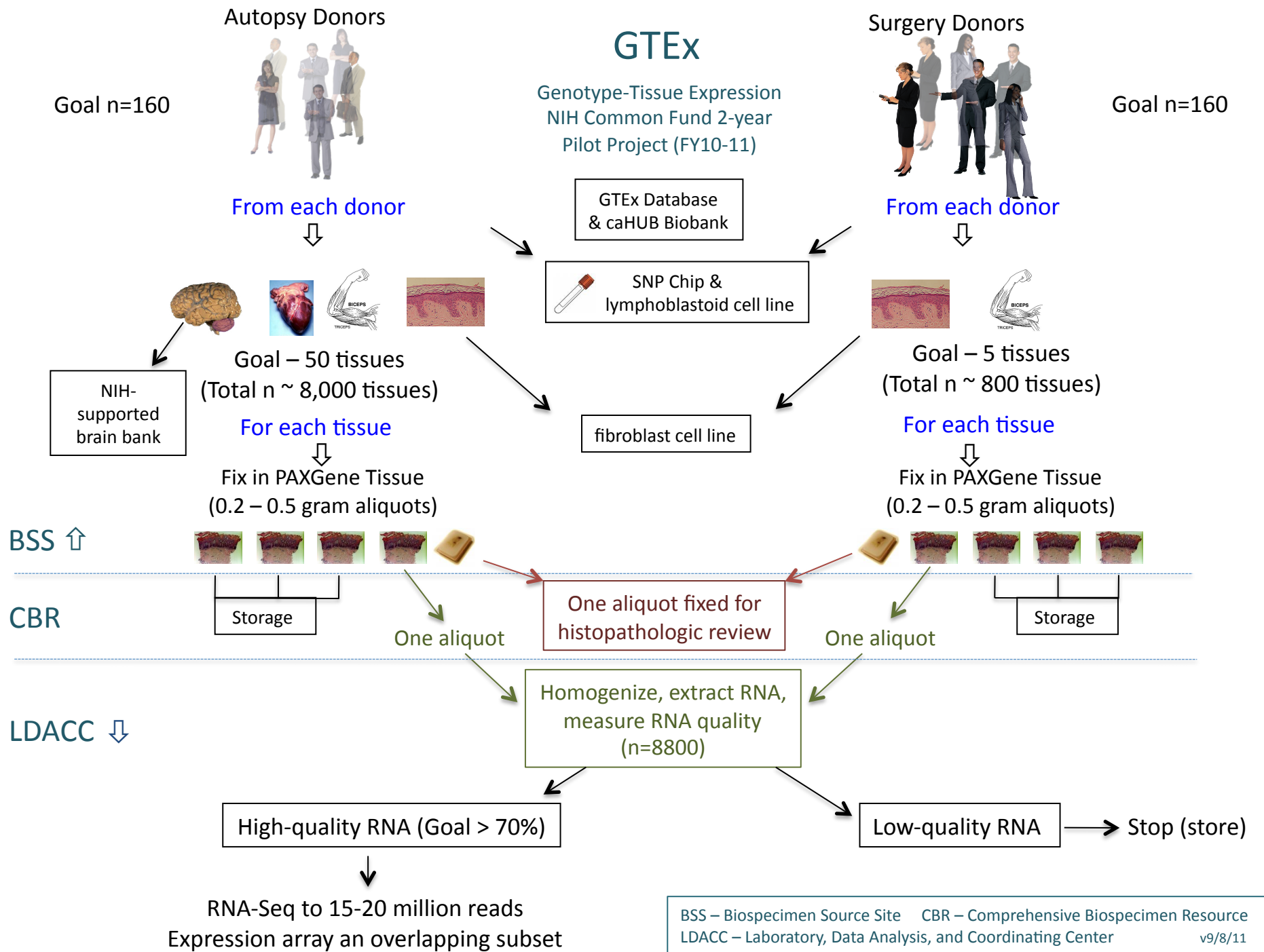
- NIH Common Fund ([commonfund.nih.gov/gtex](http://commonfund.nih.gov/gtex))
- Co-chairs – Eric Green, NHGRI & Tom Insel, NIMH
- Lead ICs (Program Officers)
  - ▣ NHGRI (Jeff Struewing, Simona Volpi, Gary Temple)
  - ▣ NIMH (Su Koester, Roger Little)
  - ▣ NCI (Carolyn Compton)
  - ▣ NHLBI (Weiniu Gan)
- Active participation from many other ICs



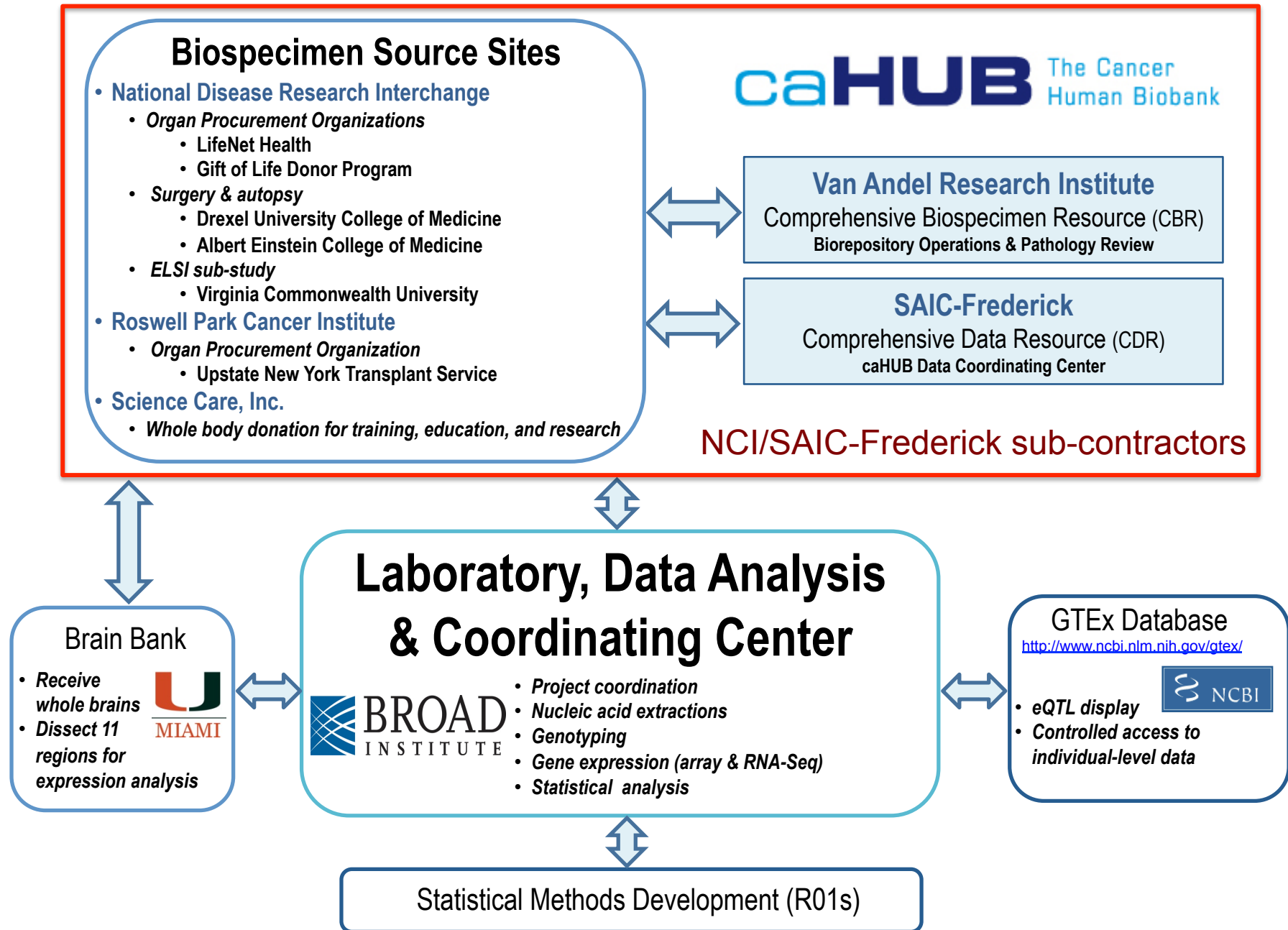
# GTEEx – Overview (II)



- Funded as a 2-year feasibility pilot project
  
- Specific aims:
  - ▣ Enroll 160 post-mortem donors, unselected for disease status
  - ▣ Obtain high-quality RNA from multiple tissues (30-50 per donor)
    - ▣ Parallel series of surgery donors (4-5 tissues)
  - ▣ Measure gene expression and high-density genotypes – identify *cis* eQTLs



# Genotype-Tissue Expression (GTEx) Project: Overview



# GTE<sub>x</sub> – ELSI Sub-study

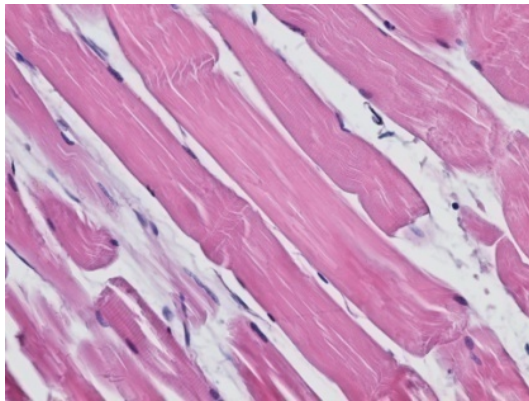


- Laura Siminoff – Virginia Commonwealth Univ
  - NDRI sub-contract
  - To understand the factors affecting consent to tissue donation for biobanking purposes with the goal of guiding and improving the informed consent process in the future

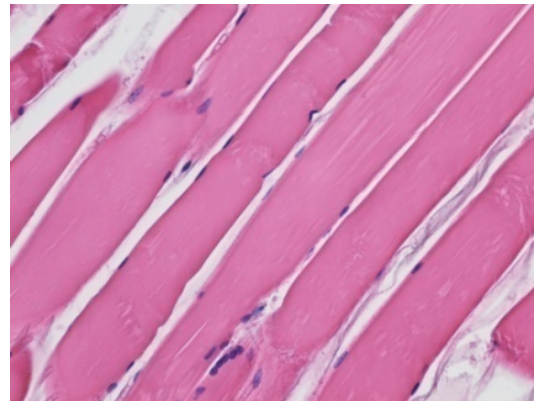
NIH web site for public information: [genome.gov/gtex](http://genome.gov/gtex)

# Fixatives

Formalin



PAXgene

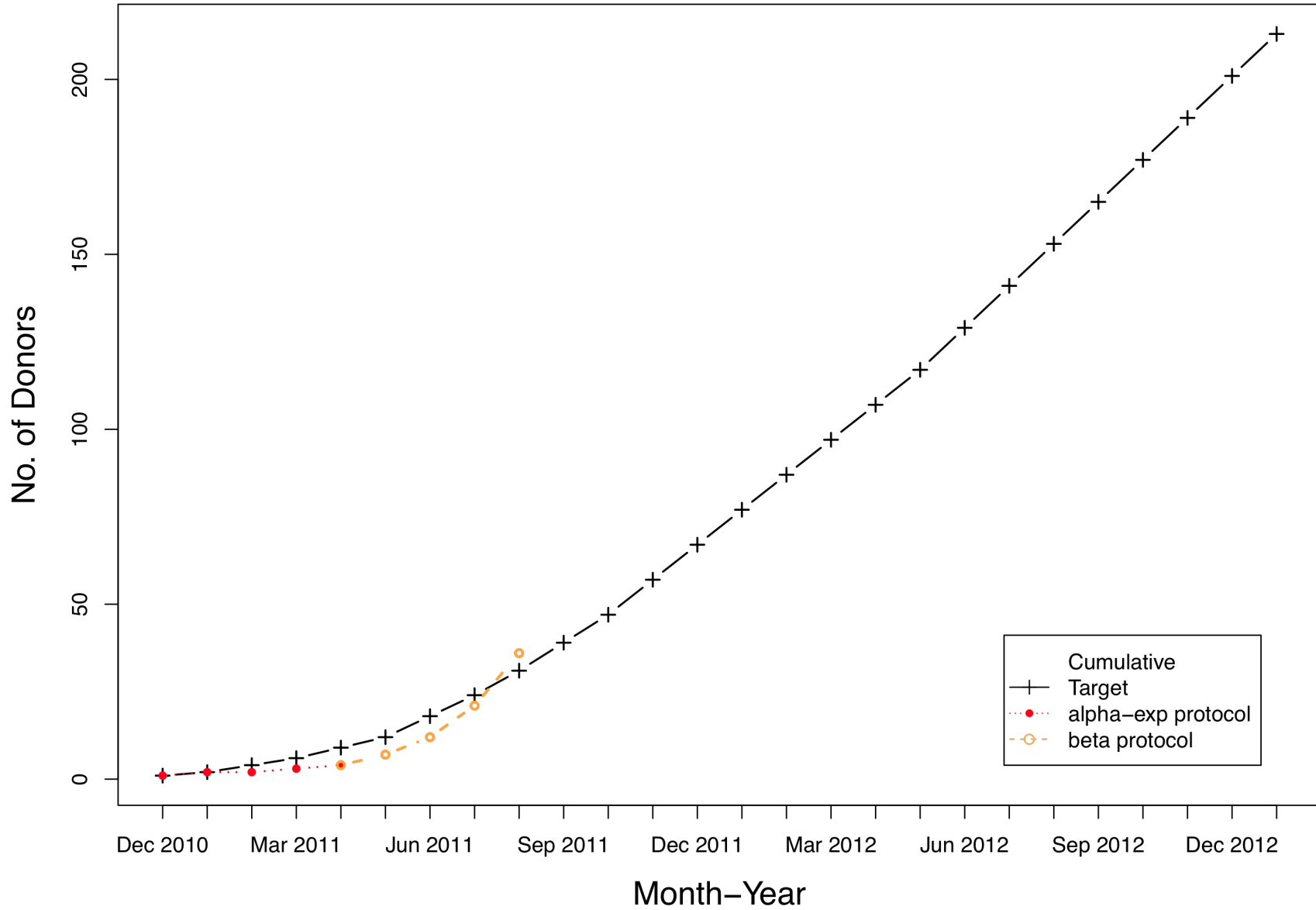


PAXgene is at least as good as Formalin for histology.  
It is now our only morphologic fixative.

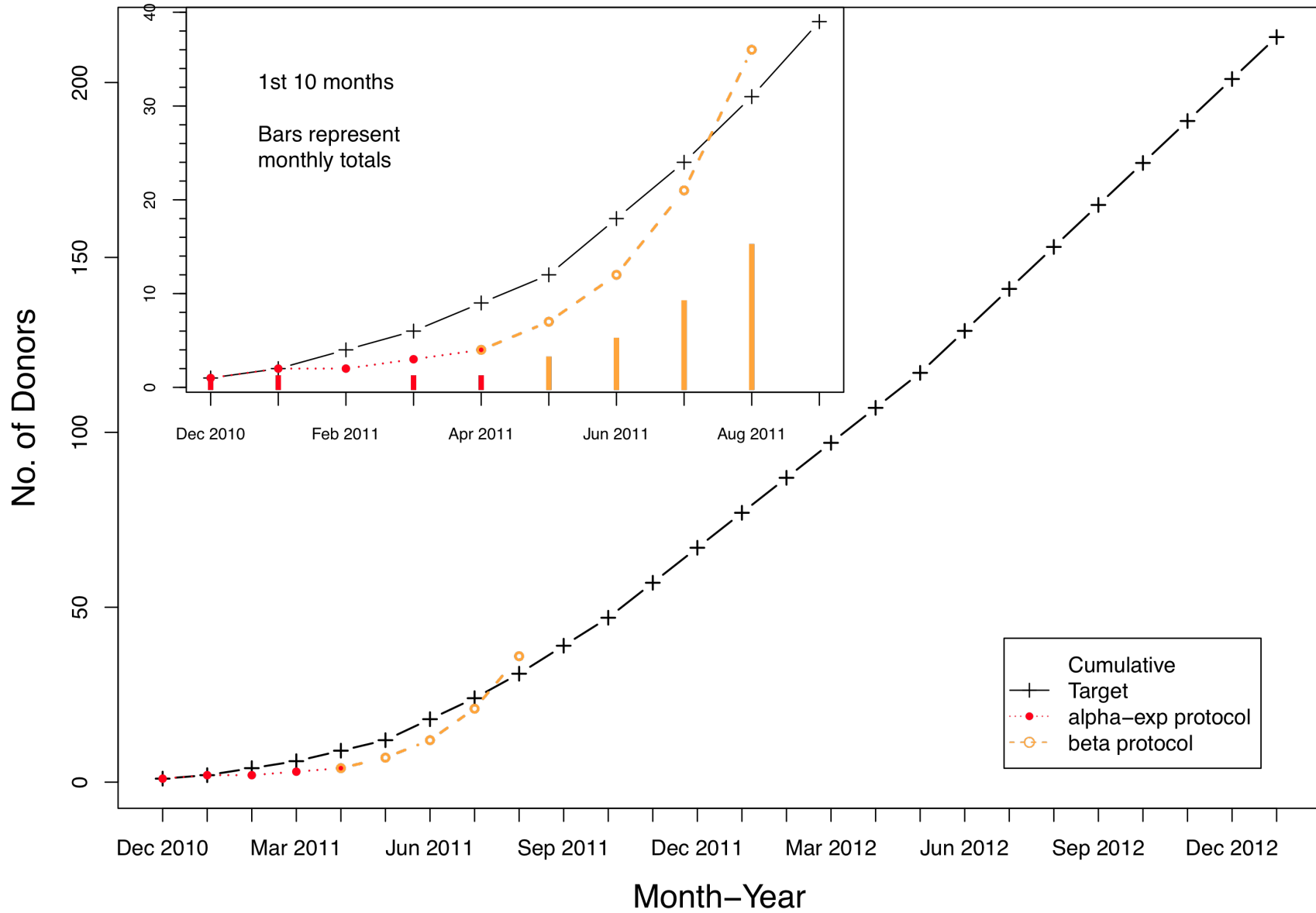
OBBR pathologists Carolyn Compton, Philip Branton,  
John Madden, James Robb, Leslie Sobin



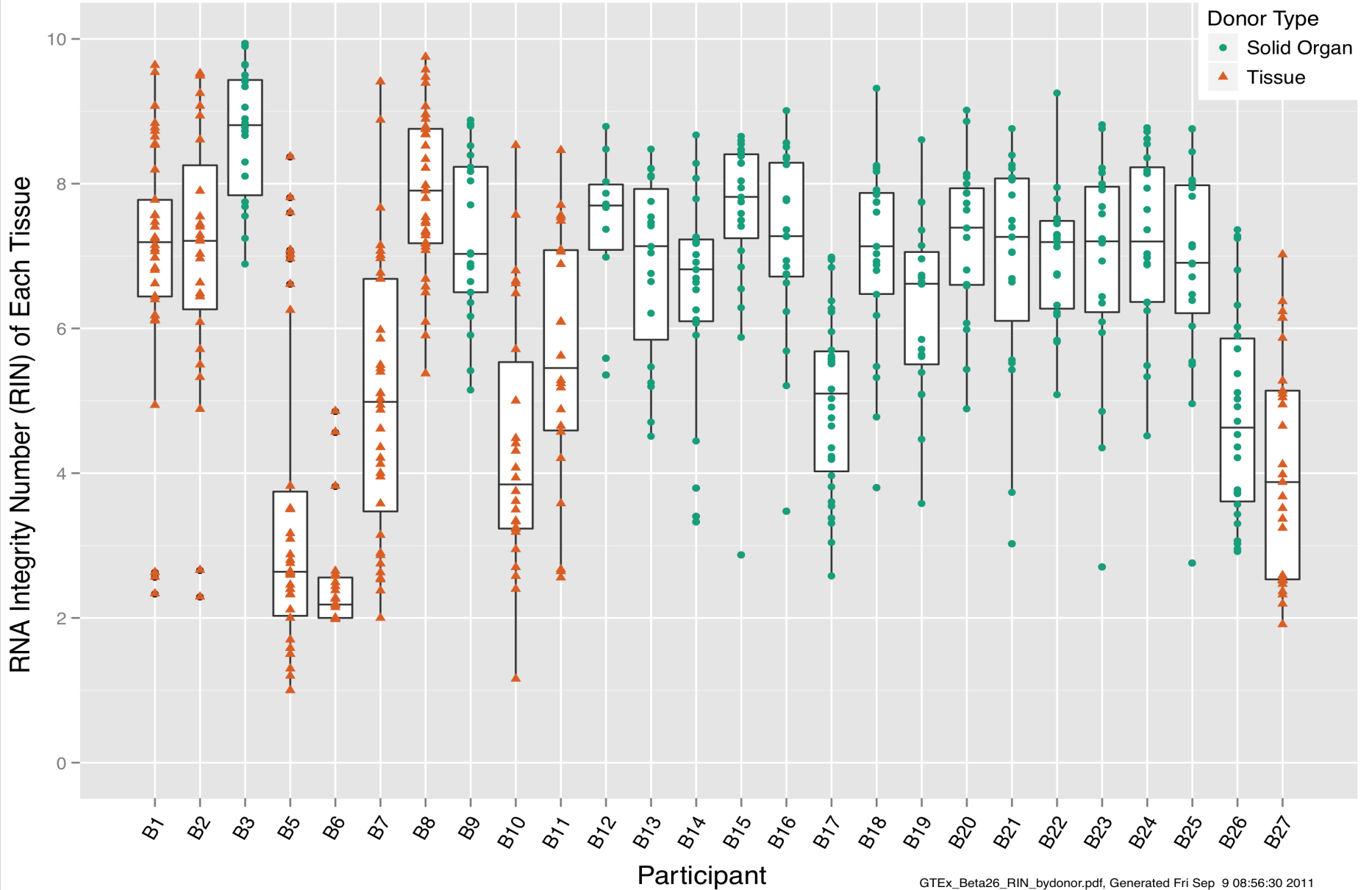
# GTEx Post-mortem Donor Enrollment



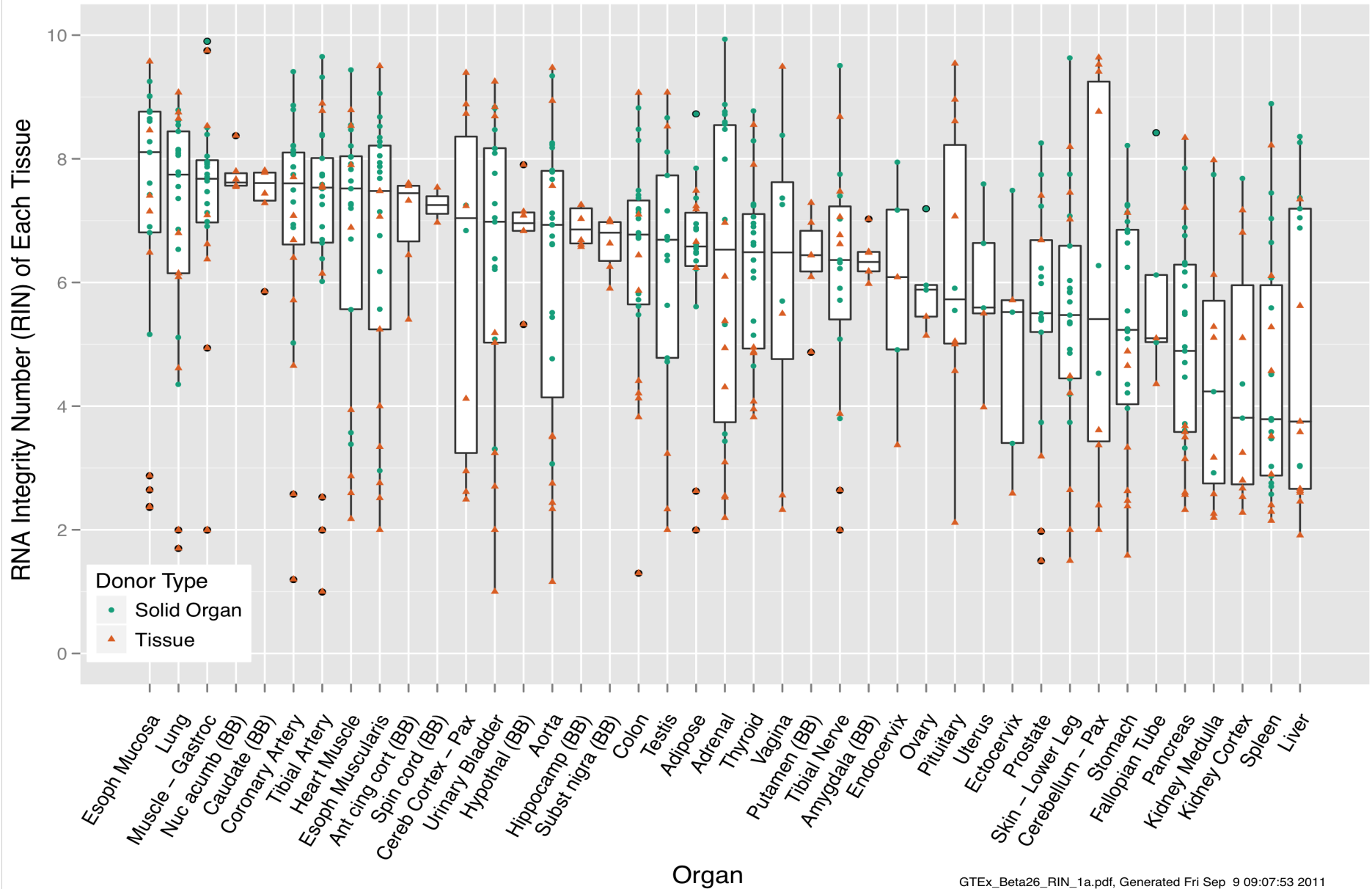
# GTEx Post-mortem Donor Enrollment



# RIN values for 1st 26 GTEx beta phase post-mortem donors (includes brain tissue when available)



# RIN values by Tissue for 1st 26 GTEx beta phase post-mortem donors (BB – Brain Bank isolated tissue)



# GTEEx Data Analysis



- LDACC – Customized “Firehose” Analysis Pipeline
  - Gad Getz, David DeLuca
- Statistical Methods R01 Investigators
  - Cox/Nicolae (Univ Chicago)
  - Dermitzakis/Guigo/Koller/McCarthy (Univ Geneva)
  - Liu (Harvard)
  - Pritchard (Univ Chicago)
  - Rusyn/Nobel/Wright (UNC-Chapel Hill)

# GTEEx Preliminary Gene Expression

- 20 samples from experimental donors (2-3 organs, 3 preservation methods, 3 donors)
  - ▣ Affy arrays -> good correlation of gene expression
  - ▣ RNA-Seq – no difference in preservatives, analysis ongoing
- Experiments with non-GTEEx tissue
  - ▣ -> DSN-lite cDNA prep looks promising over a range or RIN & small input amounts
- 11 Beta phase PAXGene Tissues over a range of RIN values
  - ▣ -> RNA-Seq pipeline

# GTEEx Data Release

- Policies & procedures for data release still being implemented
- Plan quarterly dbGaP releases
  - ▣ Controlled Access
    - Genotypes, RNA-Seq, personal medical and epidemiologic information
  - ▣ Open Access
    - Expression arrays, processing variables, quality metrics, eQTL results, tissue-specific expression values (without links to genotype), etc.

[www.ncbi.nlm.nih.gov/gtex/](http://www.ncbi.nlm.nih.gov/gtex/)

# GTE<sub>x</sub> – ESP



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## GTEEx Acknowledgments (PIs)

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