HCV NATs for Organ-Donor Screening

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Disclosures

- Scientific Advisory Boards:
  - Roche Diagnostics, Quidel, Idaho Technologies
- Consultant: Biotrin/Diasorin
- Clinical Trials: Roche Molecular, Qiagen

HCV NATs for Screening

- Available assays (blood screening)
- Problems adapting blood screening technology to organ donors
- What we really need moving forward

NAT: HCV Organ-Donor Screening

- Procleix HIV-1/HCV
- Procleix ULTRIO Assay HIV-1, HCV, HBV
- Gen-Probe, distributed by Chiron
  - TMA technology
  - Semi-automated system
  - Automation of nucleic acid extraction (Tecan)

Procleix Tests

- Qualitative tests
- Beating heart and cadaveric testing
- Individual samples (no pooling)
- Assays do not discriminate between HIV/HCV/HBV
  - Discriminatory tests run separately
- Kits with1000 or 5000 tests

NAT: HCV Organ-Donor Screening

- COBAS Ampliscreen HCV Test v2.0
  - Roche Molecular Diagnostics
  - Conventional PCR based assay, manual extraction, COBAS instrument
  - HBV and HIV-1 tests also available

- COBAS TaqScreen MPX
  - Ampliprep and Cobas s 201
  - Multiplex real-time PCR and RT-PCR
  - HIV-1/HCV/HBV

Amplicor Cobas Tests

- Qualitative tests
- Beating heart and cadaveric testing
- Individual samples (no pooling)
- Amplicor separate assays HIV/HCV/HBV
- COBAS TaqScreen MPX
  - Do not discriminate HIV/HCV/HBV
  - Follow up testing in separate assays
- Kits with 96 tests

HCV Nucleic Acid Amplification Tests

Blood Screening

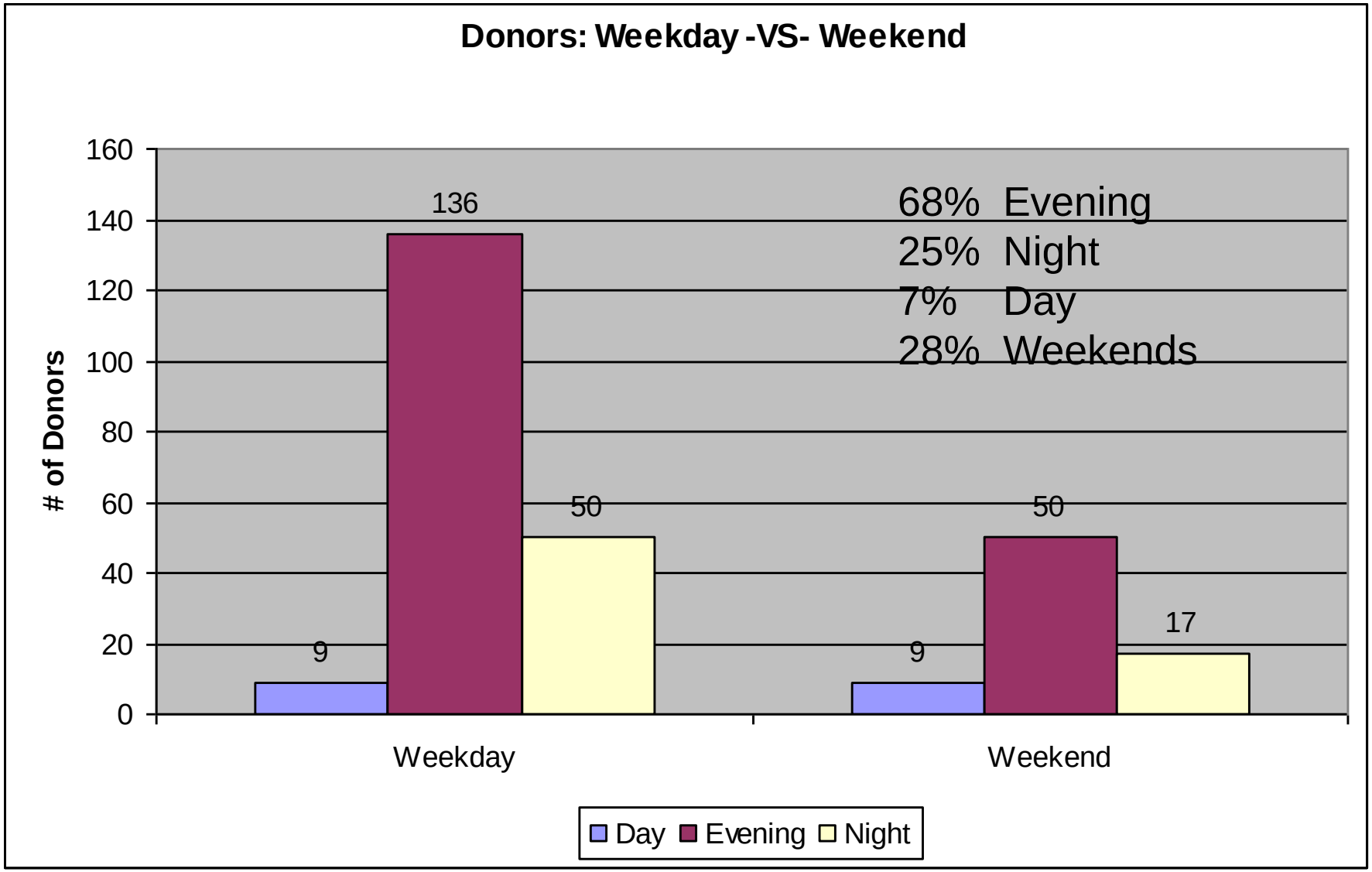
- Designed for high volume, high throughput
- Turnaround time 24 hrs
- Batch testing, regional laboratories

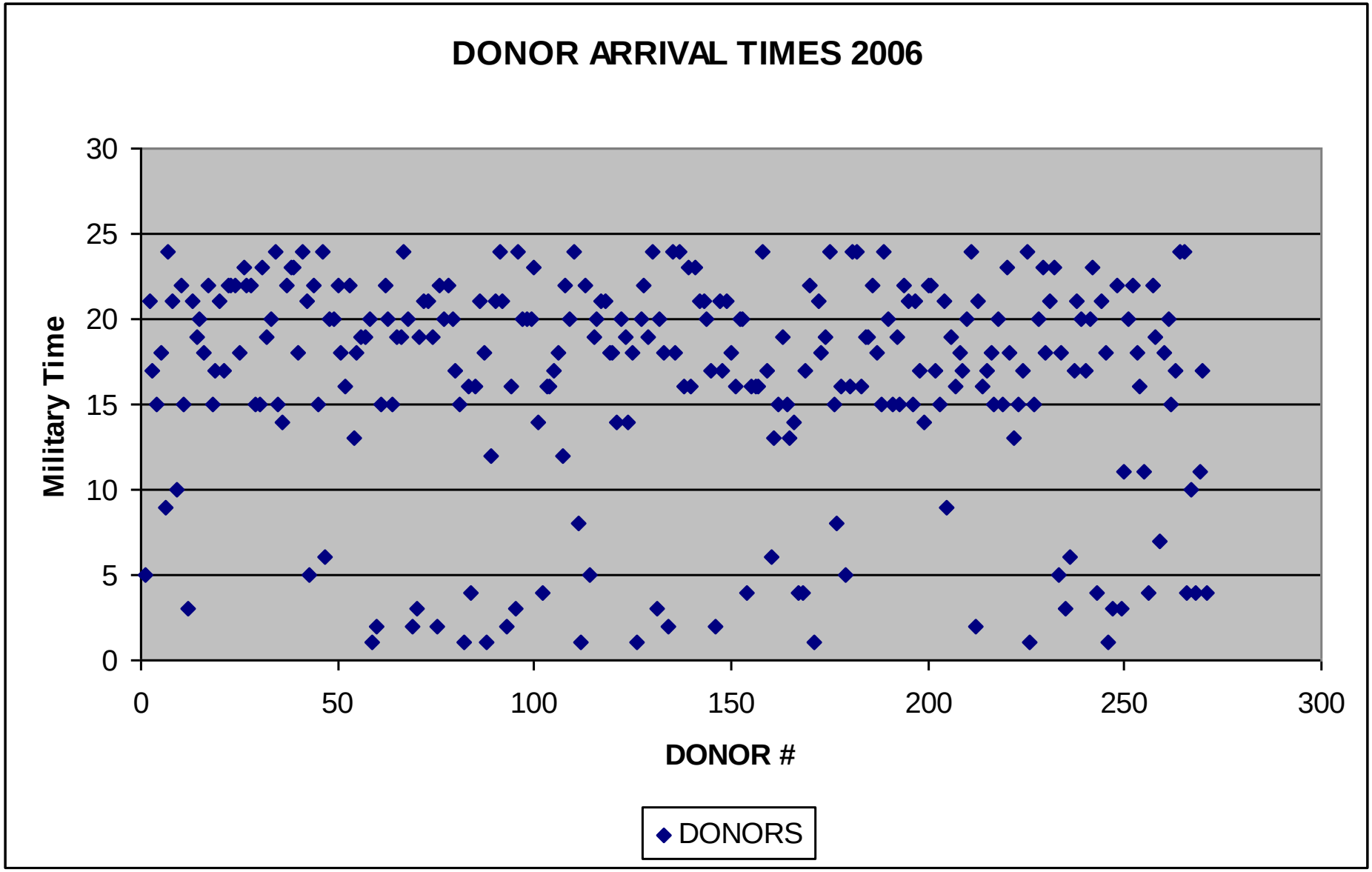
Organ Donor Screening

- Low volume of testing, random access
- Rapid TAT: 1 to 2 hours
- Individual testing, local laboratories

Emory Experience

- Goal to bring HIV and HCV NAT testing to all organ donors
- Approximately 300 donors per year
  - High risk donors 3 to 8 per month
- Plan Molecular Lab days and evening and HLA Lab night testing and weekends


Donors: Weekday -VS- Weekend
# of Donors
160
140
120
100
80
60
40
20
0
136
50
9
50
17
9
68% Evening
25% Night
7% Day
28% Weekends
Weekday
Weekend
Day
Evening
Night


DONOR ARRIVAL TIMES 2006
Military Time
30
25
20
15
10
5
0
0
50
100
150
200
250
300
DONOR #
DONORS

Emory Experience

- Testing platform AmpliScreen HIV and HCV
  - 96 tests per kit
  - Go into reagents 10 times
  - 4 controls/run: neg, pos, indep HCV and HIV
- Requires 3 Cobas instruments
  - Will need a fourth if HBV added
  - Instrument reliability (frequency of use)
- Cost per test: ~$410 for each virus

Emory Experience

- Modify assay: use EZ-1 automated extraction method (QIAGEN) replaced manual extraction
  - Required validation
  - Tremendous improvement for technologists, maintaining proficiency, quality of results
  - 1 hour hands on time
  - Time to result 4 to 4.5 hours
- Takes time to become proficient with testing

Emory Experience

- After several weeks the HLA laboratory staff could not keep up with the volume on the night shift

- Moved to high risk donor testing only
  - Now volume is 3 to 8 per month
  - Cost per test even higher, reagents expire
  - All testing done in Immunology

Emory Experience

- 1/1/11 to 11/11/11
- HCV serology screening: 269 samples
- NAT-HCV: 41

Total Tested HCV NAT	Neg Ab, Neg NAT	Pos Ab, Pos NAT	Pos Ab, Neg NAT	Neg Ab, Pos NAT
41	30	7	3	1*
	73.2%	17.1%	7.3%	2.2%

*Testing in HCV Viral Load assay (TaqMan), <LLOD

How can laboratories make this work?

- Increase volume of testing will decrease cost
- Other sources of testing volume
  - Testing all donors, not just high risk
  - Become a regional laboratory
  - Apheresis center
  - Infertility clinics
  - Eye Bank, Tissue donors
- Technology change: directed at the testing needs

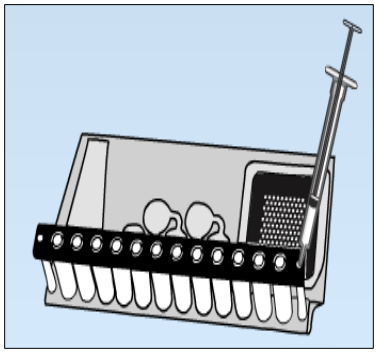
Ideal Molecular Test

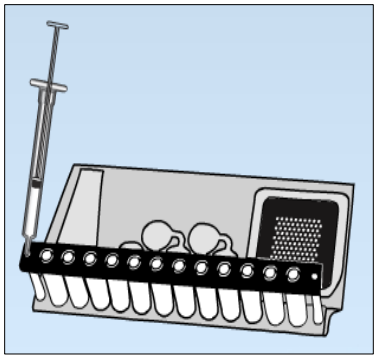
- Sensitive and specific
- Rapid: within about an hour
  - Include extraction of nucleic acid, amplification and detection
- Simple: add specimen to a device
- Random access
- Closed system: avoid carry-over contamination

Technology is Available

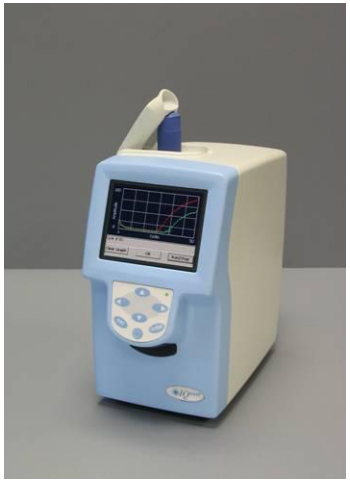
Xpert Assay System (Cepheid)

Film Array (Idaho Technologies)





LAIT (IQuum)



Barriers to Advances in Technologies

- Funding – these are low volume tests
  - Provide incentives (small company)
- Commitment to use the product if it meets specifications
- HCV patent
- Manage the liability

Summary

- NAT testing for organ donors –tests are available, designed blood screening
  - Batching, high volume of testing
- Logistics of testing are very challenging for hospital based laboratories
- Different technologies needed to address the organ donor testing
  - Rapid, simple, random access
- Consider labs that need to operationalize the recommendations