NUCLEIC ACID TESTING (NAT) FOR HIV-1 AND HCV OF ORGAN AND TISSUE DONORS
A 3+ YEARS EXPERIENCE AT THE NATIONAL INSTITUTE OF TRANSPLANTATION

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Background

Previous reports and NIT Laboratory data support the existence of persistent HCV RNA viremia in the absence of detectable anti-HCV[1]. Experience from blood donor screening suggests that the nucleic acid testing (NAT) can reduce so-called "window period" donations from organ donors during the antibody negative phase of acute HCV or HIV-1 infections[2]. In Sep 04' the NIT laboratory decided to augment existing donor screening algorithm and introduced NAT testing using the *Procleix* HIV-1/HCV Assay (Chiron Corporation, Emeryville, CA). Accurate donor HCV and HIV-1 status is important in prevention of viral infection transmissions; HCV+ donors may be considered for HCV+ recipients. Infection must be identified in timely manner because of limited life of the donor organ.

Aim

To share the NIT laboratory's experience with NAT testing and it's impact on turnaround time necessary to complete evaluation of prospective organ and tissue donors.

Methods

Based on initial retrospective screening of 663 randomly chosen anti-HCV negative organ donors showing 0.9% of donors with detectable HCV RNA[1] (TMA HCV Assay, Gen-Probe Inc., San Diego, CA), we decided to augment the existing HCV and HIV-1 screening algorithm with NAT testing using TMA-based *Procleix* HIV-1/HCV assay (Chiron, Emeryville, CA) performed in "real time". NAT testing began on September 1st, 2004 after proficiency training of the laboratory technicians by the manufacturer, assay and instrumentation validation, and distribution of new testing algorithm to the organ procurement organizations.

Results

To date 9 laboratory technicians performed 3215 NAT runs. We tested pecimens from 4251 prospective organ and tissue donors. During the 3.5 years of testing we identified 166 HCV RNA+, 9 HIV-1 RNA+ and 9 HIV-1/HCV RNA+ donors among tested specimens (Table 1).

Table 1. Summary of Testing Results (2004-2008)

Year	Total Donors Tested	Reactives			
		HCV RNA+	HIV-1 RNA+	HIV-1 & HCV RNA+	Un-discriminated HIV-1 and/or HCV RNA +
2004	269	15	2	0	2
2005	903	34	4	2	3
2006	968	51	1	2	1
2007	1428	58	1	5	0
2008*	683	8	1	0	0
Total (%)	**4251**	**166 3.9%**	**9 0.21%**	**9 0.21%**	**6 0.14%**

*up to the end of February 2008

Median reporting time (Turn-around Time, TAT) was 4hrs13min prior to NAT implementation, 4hrs57min after the first year (2005) and is now (2008) down to 4hrs24min (Table 2).

Table 2. TAT by year

Year	Median TAT (hrs)
2001	4:17
2002	3:56
2003	4:05
2004*	4:13
2005	4:57
2006	4:51
2007	4:24
To date	**4:26**

*NAT implementation in September 2004

Majority of technical problems were due to calibrators (52%), >10% of reactions (37%) or specimen (3.7%) being invalid (Table 3).

Table 3. Summary of Invalid Runs

Year	No. runs	% Invalid	% of Invalids due to			
			Not Enough Calibrators	10% Rule	Tech Error	Other Assay Problems
2004	285	16	31.9	55.3	2.1	10.7
2005	892	17	43.3	48.7	0	4
2006	932	14	69	21	2	8
2007	925	8	69.8	14	4.7	11.7
To date*	**3215**	**13**	**51.9**	**37**	**7.3**	**3.7**

* data collected up to the end of February 2008

Conclusion

* **Initially the average reporting time increased by 45 minutes. However, after manufacturer introduced changes to the test (i.e. updated assay's software) the median TAT dropped to almost pre-NAT levels.**
* **Introduction of NAT testing provides an additional measure of safety against transplant-transmitted HCV and HIV-1 infections.**

References

1. Role of nucleic acid testing in cadaver organ donor screening: detection of hepatitis C virus RNA in seropositive and seronegative donors. J. Viral Hepat. 2005 Nov;12(6):627-34
2. Probability of Viremia with HBV, HCV, HIV and HTLV among Tissue Donors in the United States. N Engl. J. Med. 2004; 351:751-9