The Effect of Postmortem Interval on Human Cadaveric Tissue Seropositivity: A retrospective donor chart review.

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Introduction

Human cadaveric tissue donation has drastically increased in recent times, paralleling medical and scientific advancements in the field. It is estimated that over 500,000 bone graft procedures are performed annually in the United States alone, with that number easily being doubled when taking into consideration such procedures on a global scale.[1,2,3] Other than blood, musculoskeletal allografts are the most frequently transplanted human tissue. With this increase in cadaveric tissue donation, there is naturally a greater strain on the screening process of donors.

All cadaveric tissue donors are serologically tested for a panel of infectious diseases. Seropositivity is knowingly correlated with high-risk behavior, as sexual promiscuity or intravenous drug use (IVDU) provide for potential routes of infection. One variable which we postulate may have an effect on donor seropositivity that has not been greatly investigated is the postmortem interval in regards to time of refrigeration or serology draw. In this study, we investigated the correlation between the length of the postmortem interval to time of refrigeration and time of serology collection, in an effort to determine if an increased postmortem interval leads to in an increased rate of donor false seropositivity.

Materials & Methods

Information from 1030 consecutive tissue donors was recorded at the University of Miami Tissue Bank. A variety of parameters were assessed, with particular attention paid to the serologic status of all donors in regards to hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBcAg), hepatitis C virus (HCV), HIV 1/2, syphilis RPR and confirmatory IgG, HTLV ab and confirmatory chemiluminescence, and nucleic acid testing for HBV, HCV and HIV. The time of death, time of refrigeration, time of serology draw and time of initial incision were noted in minutes and used for our analysis. All serological data was broadly grouped according to disease specificity and further separated by serologic status. The specific groups upon which statistical analysis was conducted were the false positive versus true positive outcomes for HCV, HBcAg and HBsAg, HIV 1/2, HTLV and syphilis. The false positives were those donors that returned a positive screening test with a subsequent negative confirmatory result. The true positives were those that screened positive and returned a positive confirmatory result. A students t-test was conducted comparing donor serologic status (separated into false positive and true positive groups) for all diseases, to the length of the postmortem interval for both time to refrigeration and time to serology collection.

Results

A total of 1030 cadaver donor charts that were examined at the University of Miami Tissue Bank. Of those, 44 donors did not meet inclusion criteria and hence were excluded from the study, yielding a total of 986 donors. All of those donors were included in the analysis of elapsed time between time of death and the time of serology collection. Of the 986 donors, 48 were further excluded from the analysis of postmortem interval to time of refrigeration because the time was not recorded due to direct transport from the hospital to the recovery facility without prior refrigeration. This ultimately resulted in a total of 938 donors that were included in our assessment of elapsed time from time of death to point of refrigeration.

Our results indicated no statistically significant effect of length of postmortem interval prior to serolgoy collection for false positive as compared to true positive results, across all disease cohorts. Similarly, there was no statistically significant effect of length of postmortem interval prior to refrigeration for false positive versus true positive results for all disease cohorts.

		False Positives		True positives	
		PMI (refrigeration)	PMI (serology)	PMI (refrigeration)	PMI (serology)
HCV	Mean	322	862	229	1046
	SD	161	425	187	80
	Number	9	9	3	3
HBV	Mean	250	1036	1437	1
	SD	145	267	n/a	n/a
	Number	48	48	1	1
HIV	Mean	153	1265	211	945
	SD	31	97	83	419
	Number	3	3	3	3
Syphilis	Mean	299	1087	248	899
	SD	214	354	159	448
	Number	7	7	927	975
HTLV	Mean	463	461	331	723
	SD	517	435	n/a	n/a
	Number	25	25	1	1

Table 1. Postmortem intervals and their relation to donor seropositivity forscreening of HCV, HBV, HIV, Syphilis and HTLV.

Discussion

There ultimately remains a lack of information in the literature in regards to the effect of an increased postmortem interval on donor serologic testing. This is an important issue in tissue banking, as it is imperative that all efforts be made to reduce the risk of disease transmission to patients and to optimize the screening process such that only true seronegative tissues are procured for donation. Moreover, it has been documented that through processes such as postmortem hemolysis from body cavities, the quality of cadaveric specimens can be affected.

Our analysis did not return a statistically significant difference between the length of postmortem interval and donor false-seropositivity across all diseases studied, due to the small number of donor false positive results yielded during our review. Future studies are required on a larger scale to truly examine this issue, as this was the primary limiting factor of our study. Tissue procurement facilities should additionally make efforts to minimize the period of time between death and screening of tissues for donation.

References

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