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(54) **RAPID, REPRODUCIBLE, NON-INVASIVE PREDICTOR OF CADAVERIC DONOR LIVER GRAFT UTILIZATION**

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(52) **U.S. Cl.**

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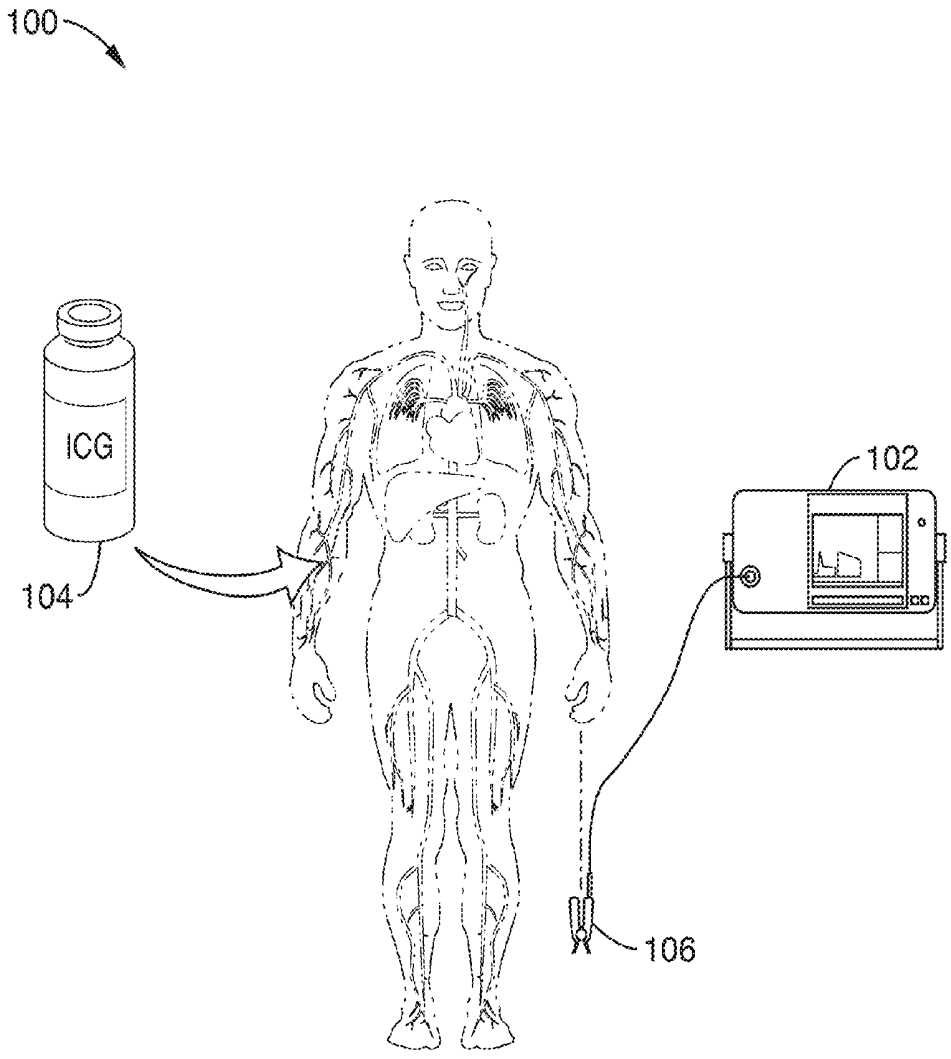
(57) **ABSTRACT**

A method for rapid, non-invasive assessment of liver function in a brain-dead donor, prior to procurement is presented. Quantitative assessment of liver function can be measured in brain-dead donors in the local donor service area prior to organ procurement by measuring indocyanine green plasma disappearance rates (ICG-PDR). This method can be performed with devices that use a non-invasive finger probe to obtain the ICG-PDR using pulse-densitometry.



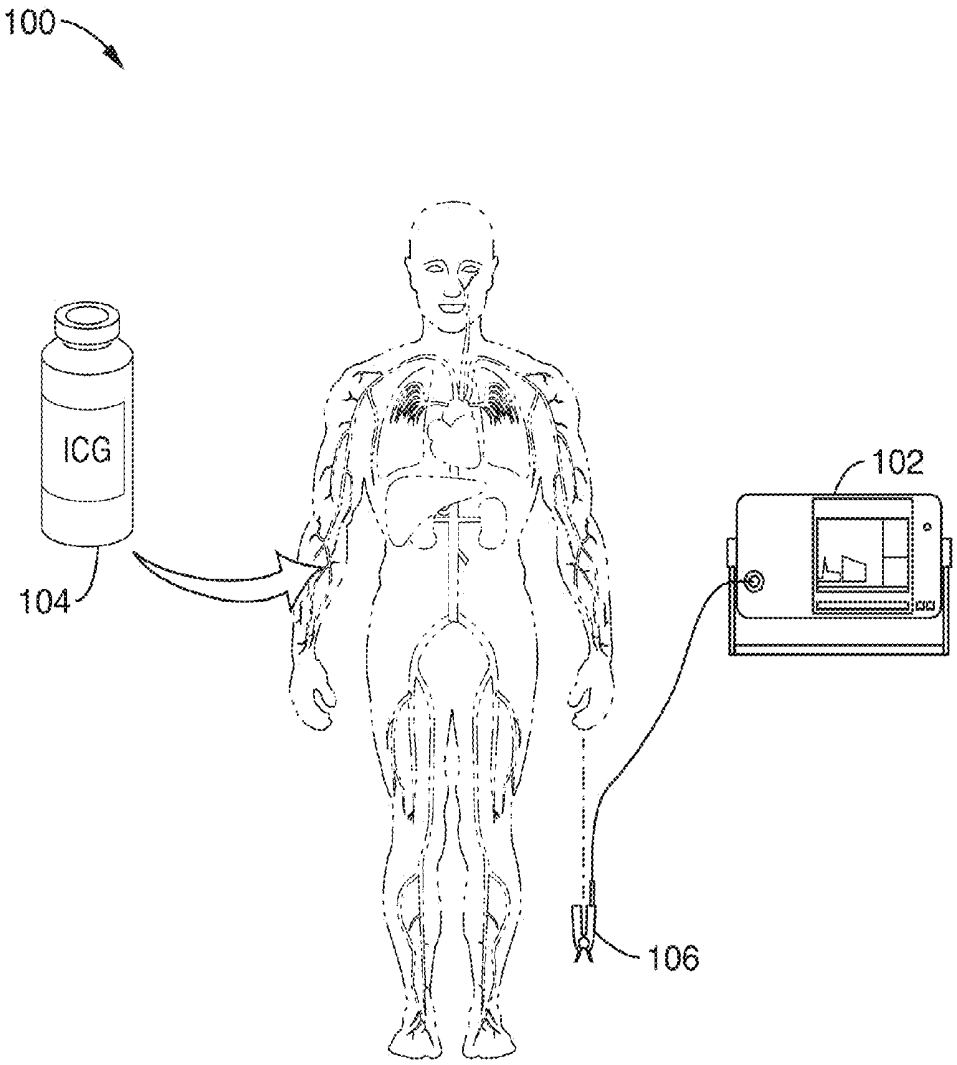


FIG. 1

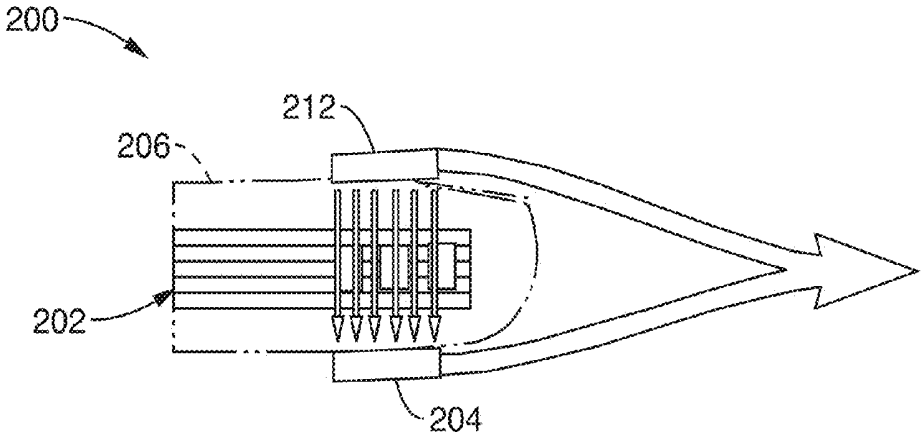


FIG. 2A

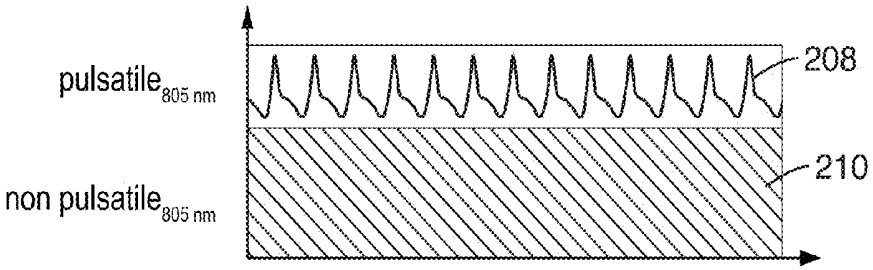


FIG. 2B

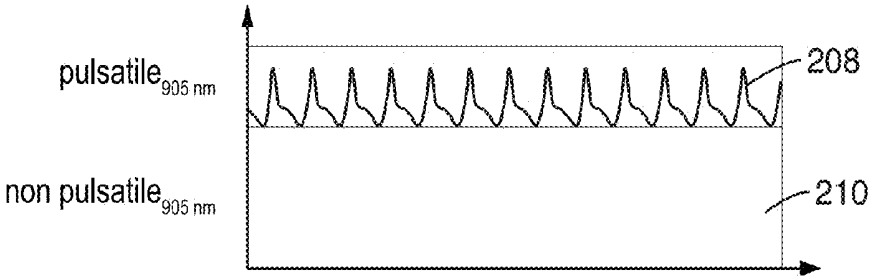


FIG. 2C

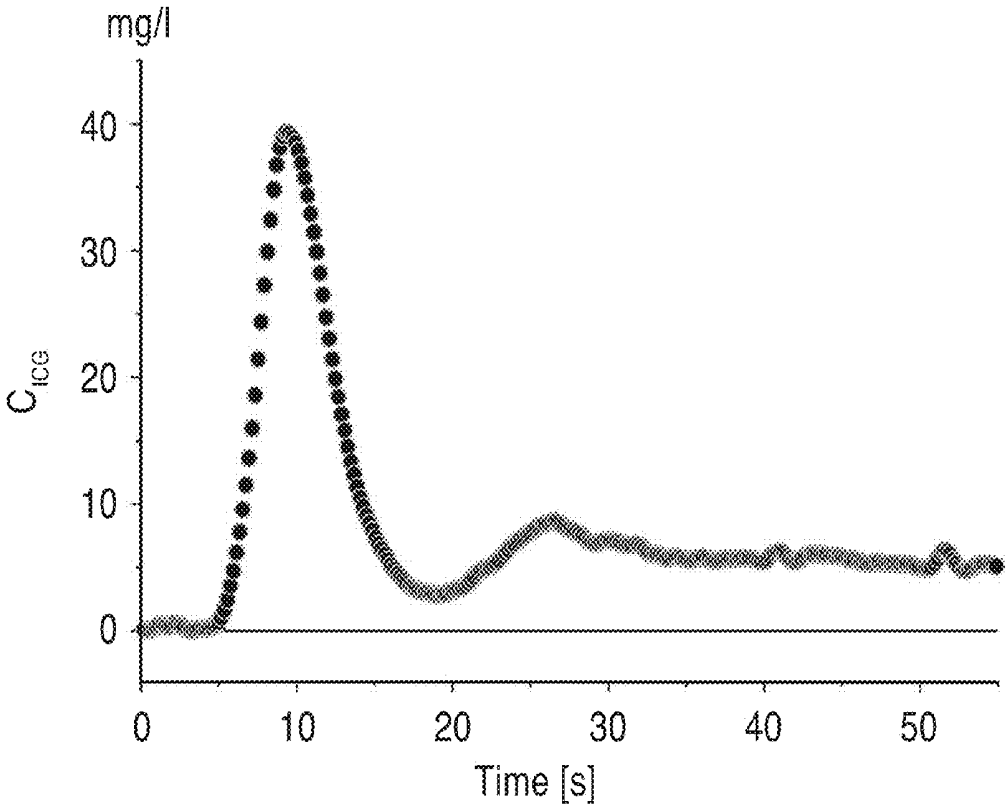


FIG. 3

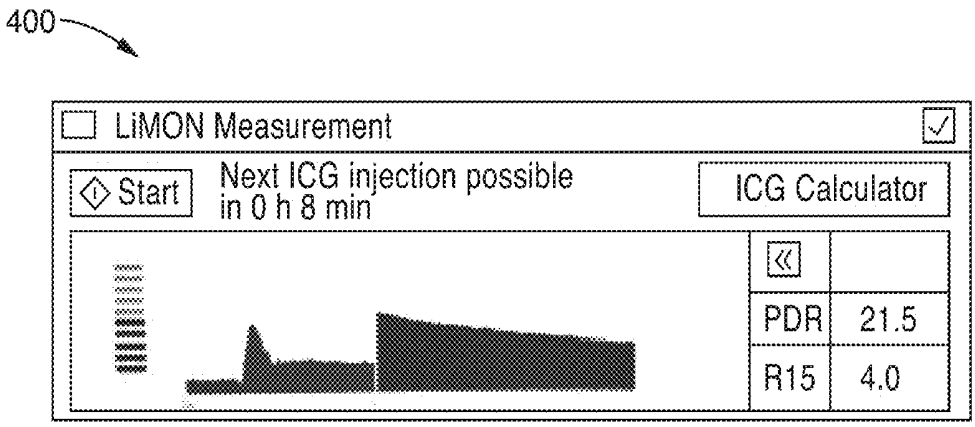

400
LiMON Measurement
Start
Next ICG injection possible
in 0 h 8 min
ICG Calculator
PDR
21.5
R15
4.0

FIG. 4A

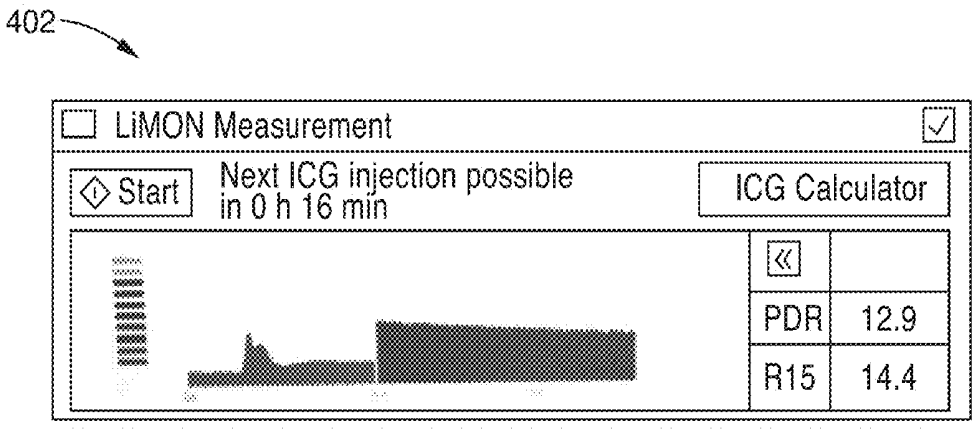

402
LiMON Measurement
Start
Next ICG injection possible
in 0 h 16 min
ICG Calculator
PDR
12.9
R15
14.4

FIG. 4B

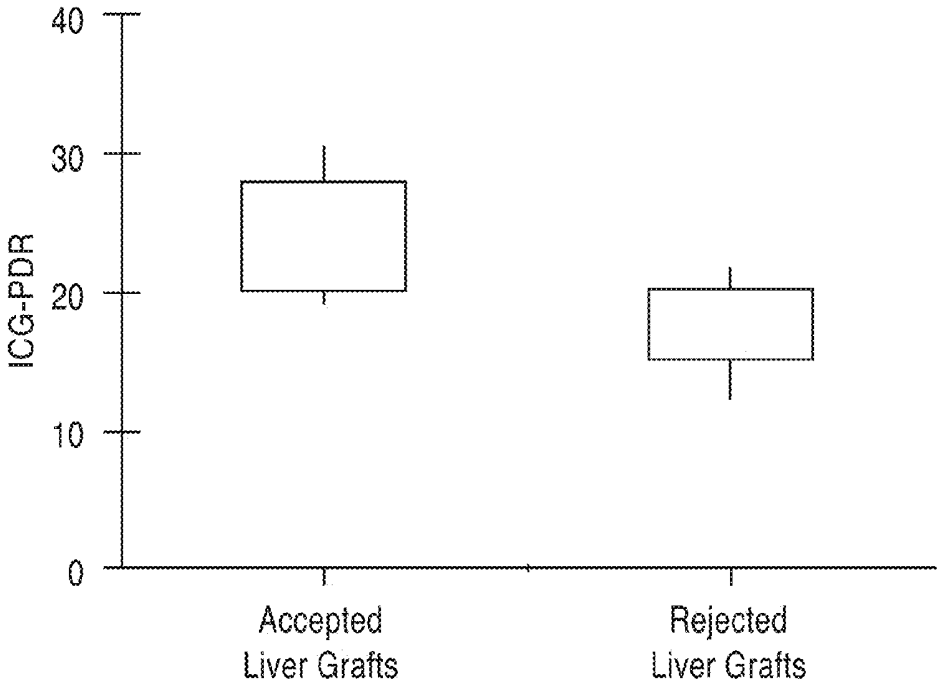

40
30
20
10
0
ICG-PDR
Accepted
Liver Grafts
Rejected
Liver Grafts

FIG. 5

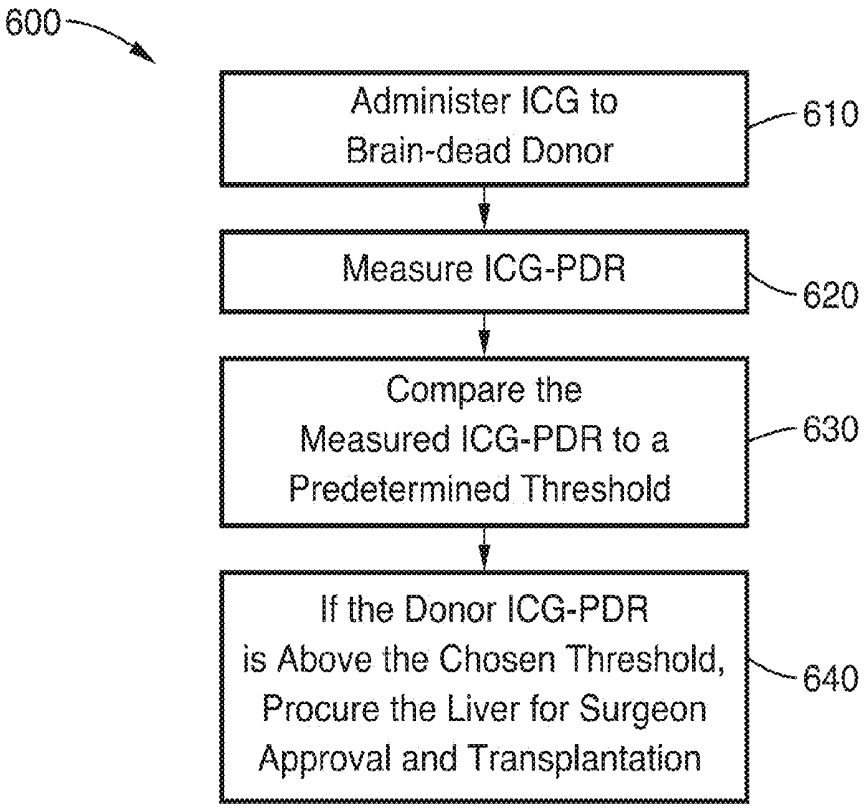

600
Administer ICG to
Brain-dead Donor
610
Measure ICG-PDR
620
Compare the
Measured ICG-PDR to a
Predetermined Threshold
630
If the Donor ICG-PDR
is Above the Chosen Threshold,
Procure the Liver for Surgeon
Approval and Transplantation
640

FIG. 6

RAPID, REPRODUCIBLE, NON-INVASIVE PREDICTOR OF CADAVERIC DONOR LIVER GRAFT UTILIZATION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a 35 U.S.C. §111(a) continuation of PCT international application number PCT/US2015/012582 filed on Jan. 23, 2015, incorporated herein by reference in its entirety, which claims priority to, and the benefit of, U.S. provisional patent application Ser. No. 61/930,860 filed on Jan. 23, 2014, incorporated herein by reference in its entirety. Priority is claimed to each of the foregoing applications.

[0002] The above-referenced PCT international application was published as PCT International Publication No. WO 2015/112795 on Jul. 30, 2015, which publication is incorporated herein by reference in its entirety.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0003] Not Applicable

INCORPORATION-BY-REFERENCE OF COMPUTER PROGRAM APPENDIX

[0004] Not Applicable

NOTICE OF MATERIAL SUBJECT TO COPYRIGHT PROTECTION

[0005] Not Applicable

BACKGROUND

[0006] 1. Technical Field

[0007] The technology of this disclosure pertains generally to the assessment of liver tissue function, and more particularly to the rapid quantification of liver tissue function in brain dead donors to determine if liver tissue is acceptable for transplantation.

[0008] 2. Background Discussion

[0009] Liver transplantation is the standard treatment for end-stage liver disease. Although the number of listed patients continues to grow, organ availability has plateaued resulting in increasing wait-list mortality. The donor pool has been somewhat expanded through the use of living donors, cadaveric split livers, and "extended criteria donors" (ECD). Used judiciously, the liver grafts from these sources provide an opportunity for addressing the organ shortage. However, these methods also predispose recipients to poor initial graft function and/or increased long-term risk. Factors that have been shown to affect graft utilization and function include advanced donor age, hypernatremia, prolonged warm ischemia time, pressor requirements, and donation after cardiac death.

[0010] Optimizing the use of these grafts while minimizing recipient risk requires accurate and reproducible assessments of graft quality. Clinical and laboratory criteria to measure liver quality are not reliable predictors. Therefore, the gold standard for assessing livers for transplantation remains the subjective decisions of surgeons. Attempts to evaluate all possible donors leads to inefficient use of resources, either by having surgeons evaluate many livers, only some of which are suitable for transplantation, or by having surgeons evaluate too few livers, thus forgoing useable grafts.

BRIEF SUMMARY

[0011] Using a portable, non-invasive device, indocyanine green plasma disappearance rates (ICG-PDR) can be measured in brain-dead donors in the local donor service area prior to organ procurement. This quantitative assessment of the donor's liver function can allow for an important initial assessment of a donor's liver prior to the surgeon's assessment for transplantation.

[0012] This quantitative assessment of liver function can save time and costs associated with the transportation of non-acceptable organs for transplantation. This initial evaluation may also save the surgeon time in trying to assess livers that are not functioning at optimal levels according to the ICG-PDR. Furthermore, because ICG-PDR is such a rapid test, unlike lengthy laboratory tests, it can be applied to measuring liver function repeatedly (~20 measurements may be performed in a 24 hour period), if there is a suspicion that the liver has suffered damage before it is procured.

[0013] Non-invasive probes, such as finger probes, may be used to perform real time measurements without added risk to the donor's liver from invasive techniques. As an example, the LiMON by PULSION may be used.

[0014] In one embodiment, a threshold ICG-PDR value can be set at 18%, whereby livers with a measured ICG-PDR of at least 18% are procured for transplantation.

[0015] In another embodiment, a threshold ICG-PDR value can be set at 24%, whereby livers with a measured ICG-PDR of at least 24% are procured for transplantation.

[0016] Further aspects of the technology described herein will be brought out in the following portions of the specification, wherein the detailed description is for the purpose of fully disclosing preferred embodiments of the technology without placing limitations thereon.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0017] The technology described herein will be more fully understood by reference to the following drawings which are for illustrative purposes only:

[0018] FIG. **1** is a schematic diagram of how Indocyanine Green Plasma Disappearance Rates (ICG-PDR) may be measured, according to an embodiment of the described technology.

[0019] FIG. **2**A is a close up view of a schematic diagram of ICG-PDR being measured using a non-invasive finger probe, according to an embodiment of the described technology.

[0020] FIG. **2**B is a graph of fractional pulsatile changes in optical absorption at 805 nm.

[0021] FIG. **2**C is a graph of fractional pulsatile changes in optical absorption at 905 nm.

[0022] FIG. **3** is an example graph of clearance of ICG (C_{ICG}) over time, used in the calculation of ICG-PDR.

[0023] FIG. **4**A is a schematic diagram of a screen shot for a PULSION-LiMON ICG trace of an acceptable graft, according to an embodiment of the described technology.

[0024] FIG. **4**B is a schematic diagram of a screen shot for a PULSION-LiMON ICG trace of a non-acceptable graft, according to an embodiment of the described technology.

[0025] FIG. **5** is a graph illustrating ICG-PDR in donors with acceptable and non-acceptable grafts.

[0026] FIG. **6** is a flow chart of the method of measuring the ICG-PDR in a brain-dead donor, according to an embodiment of the described technology.

DETAILED DESCRIPTION

[0027] Referring more specifically to the drawings, for illustrative purposes, embodiments of the methods for assessing livers in brain-dead donors using indocyanine green plasma disappearance rates (ICG-PDR) to determine liver function before a liver is procured for graft transplantation are described herein and depicted generally in FIG. **1** through FIG. **6**. It will be appreciated that the methods may vary as to the specific steps and sequence without departing from the basic concepts as disclosed herein. The method steps are merely exemplary of the order that these steps may occur. The steps may occur in any order that is desired, such that it still performs the goals of the claimed technology.

[0028] Using portable, finger-probe based devices or other similarly non-invasive devices, ICG-PDR can be measured in adult brain-dead donors in the local donor service area prior to organ procurement. The method described herein provides a quantitative technique for assessing liver function in association with liver graft utilization.

Example

[0029] To evaluate the method for rapid, non-invasive, quantitative assessment of liver function, performed before liver graft procurement, a LiMON liver function monitor, manufactured by Pulsion Medical Systems, Munich, Germany, was used for the assessment of brain-dead donor livers by measuring Indocyanine Green Plasma Disappearance Rates (ICG-PDRs). Referring to FIG. **1**, a schematic diagram **100** of how the ICG-PDR was measured in this example is presented. The LiMON monitor **102** measures Indocyanine Green (ICG) **104** clearance from the blood, after the ICG is administered intravenously to the donor, by non-invasive pulse-densitometry using, for example, a finger probe **106**.

[0030] Referring to FIG. **2**A through FIG. **2**C, a close-up view **200** of ICG-PDR measurement by a non-invasive pulse-densitometry finger probe is presented. Injected ICG **202** is detected by a sensor **204** on the finger **206** from fractional pulsatile changes **208**, **210** in optical absorption using LED lights **212**. The optical peak absorption of 805 nm as shown in FIG. **2**B and 905 nm as shown in FIG. **2**C allows continuous measurements of ICG-PDR. The clearance of the injected dye from the blood (mg/l) can be calculated as:

$$C_{ICG} = \frac{\text{pulsatile}_{905\ nm}/\text{non pulsatile}_{905\ nm}}{\text{pulsatile}_{805\ nm}/\text{non pulsatile}_{805\ nm}}$$

The ICG-PDR is calculated as the ICG clearance (C_{ICG}) over time, as shown in the graph in FIG. **3**.

[0031] Consecutive adult brain-dead donors in the local donation service area, whose livers were offered to the study center, were assessed for liver function using the methods of the current disclosure, after permission was acquired. Immediately prior to organ procurement, indocyanine green elimination tests were conducted using the non-invasive liver function monitoring system shown in FIG. **1** and FIG. **2**A. Each patient received an ICG finger clip connected to a liver function monitor. A dose of 0.25 mg/kg ICG (ICG—PULSION, Pulsion Medical Systems) was given through a central vein as a bolus and immediately flushed with 10 mL of normal saline. All of the ICG-PDR measurements were acquired using the LiMON liver function monitor manufactured by Pulsion Medical Systems, Munich, Germany. FIG. **4**A shows a sample PULSION-LiMON ICG trace of an accepted liver **400** (PDR=21.5% clearance per minute). FIG. **4**B shows a sample PULSION-LiMON ICG trace of a non-acceptable liver **402** (PDR=12.9% clearance per minute).

[0032] ICG-PDR measurements were performed on 53 consecutive brain-dead donors. Eleven liver grafts were declined due to quality and one was declined for size. Univariate analysis showed ICG-PDR to be the only factor associated with acceptance of an organ for transplantation. Donor Risk Index, donor age, and transaminase levels at peak or procurement were not significantly associated with utilization of liver grafts.

[0033] Additionally, there were no recipients who suffered from primary non-function and ICG-PDR was not associated with any post-operative outcome measures including POD7 AST (post-operative day 7 aspartate transaminase), ALT (alanine transaminase), Bilirubin, or INR (International Normalized Ratio—a measure of coagulopathy).

[0034] Results were correlated with surgeons' assessments and the decision to implant a graft. Both donor and recipient surgeons were blinded to ICG-PDR measurements. Post-transplantation labs of the recipient were recorded and correlated with the donor ICG-PDR.

[0035] Table 1 shows univariate predictors of liver graft utilization based on the data shown in Table 2 through Table 16. The data collected for the recipients of the liver grafts is presented in Table 2 through Table 7. The data collected for the donors of the liver grafts is presented in Table 8 through Table 16.

[0036] Table 2 shows the data for ICG-PDR, r15 (residual % of ICG at 15 minutes), Accept (graft accepted for transplant by primary center), TxAge (age of recipient at time of transplant), Gender, Expired 8/23/13 (recipient expired by 8/23/13), Dx1 (primary diagnosis) and Dx2 (secondary diagnosis) for the 53 recipients of the 53 donor liver grafts assessed. Table 3 shows the data for Race, Phys MELD (physiologic model for end stage liver disease score), INR (international normalized ratio—a measure of coagulopathy), Cr (creatinine), Tbili (total bilirubin), Plts (platelet count), Alb (albumin), and PAlb (prealbumin) for the 53 recipients of the 53 donor liver grafts assessed. Table 4 shows the data for Pressors, HD (hemodialysis), Vent (ventilator dependence), Redo (recipient is a redo liver transplant candidate), #OLT (number of liver transplant—i.e. first, second, third, etc.), L/K (combined liver/kidney transplant), HT (height), WT (weight), and BMI (body mass index) for the 53 recipients of the 53 donor liver grafts. Table 5 shows the data for Takeback# (number of times recipient was taken back to OR after transplantation), ReOLT (recipient was retransplanted after this graft), 7 d surv (7 day survival), 30 d surv (30 day survival), 6 m surv (6 month survival), 1 yr surv (1 year survival), Rpfn Bx (description of the reperfusion biopsy, and LD 1 d (lactate dehydrogenase on postoperative day 1) for the 53 recipients of the 53 donor liver grafts assessed. Table 6 shows the data for AST 1 d (aspar-

tate transaminase on postoperative day 1), ALT 1 d (alanine transaminase on postoperative day 1), Tbili 1 d (total bilirubin on postoperative day 1), INR 1 d (INR on postoperative day 1), LD 7 d (day 7), AST 7 d (day 7), ALT 7 d (day 7), and Tbili 7 d (day 7) for the 53 recipients of the 53 donor liver grafts assessed. Table 7 shows the data for INR 7 d (day 7), LD 30 d (day 30), AST 30 d (day 30), ALT 30 d (day 30), Tbili 30 d (day 30), and INR 30 d (day 30), Age, and Male for the 53 recipients of the 53 donor liver grafts assessed.

[0037] For the 53 donor livers assessed, Table 8 shows the data for the donors' Age, Male, Race, ABO (blood type), Wt (weight), and Ht (height). Table 9 shows the data for BMI, Cause of Death, LOH (length of hospitalization), and Dopa (Dopamine) for each of the 53 donors assessed. Table 10 shows the data for Vaso (vasopressin), NE (norepinephrine), Phenyl (phenylephrine), Total Pressors, Insulin, DM (diabetes mellitus) and HTN (hypertension) for each of the 53 donors assessed. Table 11 shows the data for EtOH Abuse, Other Drugs, HgbA1c (Hemoglobin A1c level), HepB Core and HepC for the 53 donors assessed. Table 12 shows the data for whether the donor suffered Cardiac Arrest, Respiratory Arrest, the Total Downtime, CPR Duration and MAP range (mean arterial pressure range). Table 13 shows the data for MAP at Procurement of the liver grafts, Na Peak (sodium at peak), Na Proc (sodium at procurement), Cr Peak, Cr Proc, (creatinine at procurement) and TBili Peak (peak total bilirubin). Table 14 shows the data for TBili Proc (total bilirubin at procurement), AST Peak, AST Proc, ALT Peak and ALT Proc for each of the 53 donors assessed. Table 15 shows the data for INR Peak, INR Procurement, pH at Admission, pH at Procurement, pCO_2 at Admission and pCO_2 at Procurement for each of the 53 donors assessed. Finally, Table 16 shows the data for pO_2 at time of Admission, pO_2 at Procurement, HCO_3 at time of Admission, HCO_3 at time of Procurement, whether pO_2 was less than 60 and whether the donor's liver was Abnormal on Imaging.

[0038] FIG. **5** is a graph that illustrates ICG-PDR in donors with accepted and rejected liver grafts according to their ICG-PDR.

[0039] Referring to FIG. **6**, a flow chart **600** that details a preferred embodiment of the disclosed method is presented. At box **610**, ICG is administered to the brain-dead organ donor. Indocyanine green (ICG) is a water-soluble anionic compound. It can be administered intravenously and binds mainly albumin and β-lipoproteins in the plasma. ICG is selectively absorbed by hepatocytes, independent of adenosine triphosphate (ATP), and is later excreted unaltered into the bile via an ATP-dependent transport system. It is not metabolized and does not undergo enterohepatic recirculation. Thus, ICG is particularly useful for the assessment of liver function.

[0040] At box **620**, the ICG-PDR is measured using a device such as the LiMON liver function monitor. The measurement is preferably performed non-invasively, such as with the finger probe sensor previously described. Once the ICG-PDR is measured, the result is compared to a threshold value **630**. If the ICG-PDR falls below the threshold, the liver can be rejected for graft transplant. The surgeon can set a particular threshold and then procure and evaluate only those donors whose ICG-PDR meets the selected threshold **640**.

[0041] The successful use of a portable, quantitative means of assessing liver function in association with graft utilization is described. The data collected thus far warrant further exploration in a variety of settings to evaluate acceptable values for donated organs. At a time of increasing regional and national organ sharing, the methods described herein can assist in increasing liver graft utilization while decreasing travel risk and expense.

[0042] From the description herein, it will be appreciated that that the present disclosure encompasses multiple embodiments which include, but are not limited to, the following:

[0043] 1. A method for determining whether liver tissue will be acceptable for transplantation, the method comprising: (a) measuring indocyanine green plasma disappearance rates (ICG-PDR) in a brain-dead donor prior to organ procurement; and (b) designating liver tissue in the donor as acceptable for transplantation if the ICG-PDR is greater than about 18%.

[0044] 2. The method of any preceding embodiment, further comprising designating the liver tissue as acceptable for transplantation if the ICG-PCR is greater than about 24%.

[0045] 3. The method of any preceding embodiment, wherein ICG-PDR is measured non-invasively.

[0046] 4. The method of any preceding embodiment, wherein ICG-PDR is measured using a PULSON LiMON liver function monitor.

[0047] 5. A method of determining whether liver tissue will be acceptable for transplantation, the method comprising: (a) measuring indocyanine green plasma disappearance rates (ICG-PDR) in a brain-dead donor prior to organ procurement; (b) comparing measured ICG-PDR to a threshold; and (c) designating liver tissue in the donor as acceptable for transplantation if the ICG-PDR exceeds the threshold.

[0048] 6. The method of any preceding embodiment, wherein the threshold is about 18%.

[0049] 7. The method of any preceding embodiment, wherein the threshold is about 24%.

[0050] 8. The method of any preceding embodiment, wherein ICG-PDR is measured non-invasively.

[0051] 9. The method of any preceding embodiment, wherein ICG-PDR is measured using a PULSON LiMON liver function monitor.

[0052] Although the description herein contains many details, these should not be construed as limiting the scope of the disclosure but as merely providing illustrations of some of the presently preferred embodiments. Therefore, it will be appreciated that the scope of the disclosure fully encompasses other embodiments which may become obvious to those skilled in the art.

[0053] In the claims, reference to an element in the singular is not intended to mean "one and only one" unless explicitly so stated, but rather "one or more." All structural, chemical, and functional equivalents to the elements of the disclosed embodiments that are known to those of ordinary skill in the art are expressly incorporated herein by reference and are intended to be encompassed by the present claims. Furthermore, no element, component, or method step in the present disclosure is intended to be dedicated to the public regardless of whether the element, component, or method step is explicitly recited in the claims. No claim element herein is to be construed as a "means plus function" element unless the element is expressly recited using the phrase "means for". No claim element herein is to be construed as

a "step plus function" element unless the element is expressly recited using the phrase "step for".

TABLE 1

Univariate Predictors of Liver Graft Utilization

	Mean (SD)		
	Rejected	Accepted	P
IGG-PDR (%/min)	17.9 (4.7)	24.1 (6.7)	0.006
Donor pH at Admission	7.40 (0.12)	7.31 (0.41)	0.06
Donor Length of Hospitalization (days)	18 (36)	6.4 (5.8)	0.06

TABLE 1-continued

Univariate Predictors of Liver Graft Utilization

	Mean (SD)		
	Rejected	Accepted	P
Donor Vasopressors (#)	2 (0.77)	1.6 (0.69)	0.10
Procurement ALT (U/L)	65 (39)	48 (47)	0.28
Peak ALT(U/L)	98 (73)	114 (186)	0.77
Donor Age (years)	47.9 (15.3)	43.8 (16.3)	0.48
Donor Risk Index	1.53 (0.39)	1.56 (0.40)	0.82

TABLE 2

Recipient	ICG-PDR	r15	Accept	TxAge	Gender	Expired Aug. 23, 2013	Dx1	Dx2
1	no read	no read	0	25	F	1	Chronic Rjxn	
2	23.1	3.1	0	25	F	1	Chronic Rjxn	
3	no read	no read	0	27	M	0	9930	9940
4	18.3	6.4	0	56	M	0	HepC	HCC
5	12.6	15.2	0	68	M	0	4202	HCC
6	16.9	7.9	0	24	F	0	4212	
7	14.1	12.1	0	68	F	0	NASH	HCC
8	16.3	8.7	0	49	M	1	EtOH	
9	27.7	1.6	0	45	M	0	HepB	
10	22.2	3.6	0	46	M	0	HepC	HCC
11	size	size	0	74	F	0	EtOH	
12	16.5	8.4	0	51	M	1	HepC	HCC
13	12.4	15.6	0	62	M	0	HepC	HCC
14	17.3	7.5	0	66	M	0	4213	
15	no read	no read	0	60	M	0	Chronic Rjxn	
16	28.7	1.4	1	52	M	0	HepC	HCC
17	28.7	1.4	1	65	M	0	EtOH	HCC
18	26.8	1.8	1	42	F	0	4100	
19	no read	no read	1	59	F	0	HepC	NASH
20	28.4	1.4	1	66	F	0	HepC	HCC
21	10.3	21.3	1	26	M	0	4100	
22	19.5	5.4	1	64	M	0	NASH	HCC
23	27.5	1.6	1	60	F	1	NASH	
24	25.3	2.2	1	44	M	0	HepC	
25	36.2	0.4	1	56	M	0	4403	4245
26	28.3	1.4	1	61	M	1	9911	
27	21.2	4.2	1	46	M	0	EtOH	
28	18.3	6.4	1	52	M	0	4241	
29	28.6	1.4	1	51	F	1	HepC	HCC
30	32.9	0.7	1	42	M	0	4241	
31	23.9	2.8	1	52	M	0	4260	
32	5.4	44.5	1	63	M	0	HepC	HCC
33	19.3	5.5	1	49	M	0	EtOH	
34	27.7	1.6	1	44	M	0	HepC	
35	19.9	5.1	1	63	M	0	HepC	HCC
36	20.2	4.8	1	50	M	0	HepC	
37	24.9	2.4	1	60	M	1	HepC	
38	25.8	2.1	1	45	M	1	4430	
39	24.8	2.4	1	71	M	0	4216	HCC
40	16.2	8.8	1	52	M	0	EtOH	
41	27.1	1.7	1	22	M	0	4100	
42	33.8	0.6	1	57	F	0	EtOH	
43	21.5	4	1	64	M	0	EtOH	HCC
44	14.8	10.9	1	62	F	0	4220	HCC
45	22.2	3.6	1	63	M	0	HepB	
46	22	3.7	1	62	M	0	NASH	HCC
47	19.6	5.3	1	53	F	1	EtOH	
48	23.9	2.8	1	68	F	0	4102	HCC
49	36.6	0.4	1	62	M	0	HepC	HCC
50	29.7	1.2	1	56	M	0	HepC	HCC
51	29	1.3	1	59	M	0	4213	

TABLE 2-continued

Recipient	ICG-PDR	r15	Accept	TxAge	Gender	Expired Aug. 23, 2013	Dx1	Dx2
52	15.6	9.6	1	65	M	0	HepC	HCC
53	27.6	1.6	1	65	M	0	Acute Rjxn	

TABLE 3

Recipient	Race	Phys MELD	INR	Cr	TBili	Plts	Alb	PAlb
1	White	39	1.5	4	44.1	41	3	6
2	White	39	1.6	4	41.2	47	3.7	4
3	Hispanic	33	1.5	4	9	62	3.2	11
4	White	16	1.5	1	3.8	30	2.2	na
5	Asian	8	1.1	1	1.2	141	4	19.2
6	Hispanic	33	3.7	1	24	86	3.2	21.2
7	Hispanic	7	1.1	1	1	131	3.3	na
8	Hispanic	46	3.2	4	32.6	26	4	16
9	Asian	33	3.6	1	28.4	50	2.6	17.5
10	Hispanic	9	1.3	1	1	92	3.1	20.7
11	Black	39	3.2	2.2	25.1	76	3.2	4.2
12	White	19	1.7	1	6.1	59	2.3	3.3
13	White	7	1.1	1	1	82	3.4	25.3
14	Other	42	2.4	4	26.8	68	2.9	na
15	White	43	2.3	4	40.5	27	4	7.2
16	White	14	1.4	1	2.5	107	1.8	na
17	White	11	1.2	1	1.8	228	2.6	na
18	White	34	1.9	4	6.4	59	4	13
19	Hispanic	38	1.9	4	17.7	38	4.8	5
20	Hispanic	7	1.1	1	1	77	3.6	29
21	White	35	2.4	4	4	74	3.3	34
22	White	12	1.2	1	2.6	50	3.2	17
23	Hispanic	42	2.2	4	37.8	25	5.5	6
24	Black	30	2.3	1.5	14.2	36	3	13.2
25	Black	30	3.2	1	16.3	154	3.3	21.1
26	Hispanic	42	2.2	4	34	74	4.8	8.8
27	White	38	1.8	4	21.3	45	2.9	23.4

TABLE 3-continued

Recipient	Race	Phys MELD	INR	Cr	TBili	Plts	Alb	PAlb
28	White	13	1.2	1	3.3	64	2.8	9.7
29	White	34	2	4	6.2	85	4.1	14.2
30	White	30	1.7	1.5	33.5	65	2.6	24
31	Hispanic	33	1.3	4	14.3	102	2.6	16.8
32	Hispanic	8	1.1	1	1.1	69	3.3	13
33	Hispanic	24	2.1	1	11	59	2.2	20.2
34	Hispanic	32	1.8	3	9.9	35	2.5	16.2
35	White	15	1.3	1.1	3.3	50	3	21.4
36	Hispanic	39	3.1	4	6.1	39	5	3.4
37	Other	42	2.2	4	38.3	57	3.1	5.1
38	Hispanic	9	1.1	1.2	1	224	4.6	26.7
39	Hispanic	8	1.1	1	1.1	57	3.7	19
40	Hispanic	16	1.4	1.5	1.6	74	3.5	26.3
41	White	42	3.3	4	11	61	3	10.5
42	White	32	2.4	1.7	15.8	74	2.4	17.1
43	White	10	1.3	1	1.3	64	3.3	na
44	Hispanic	9	1.1	1.1	1.2	62	3.2	12.5
45	Other	39	1.6	4	40.4	89	3.6	3.3
46	White	29	1.2	4	6.6	58	3.4	11.3
47	White	22	1.8	1.5	3.9	43	3.6	7.8
48	Asian	6	1	1	1	116	4.6	na
49	White	7	1.1	1	1	64	3.4	25.3
50	Hispanic	13	1.3	1	2.9	47	3.5	na
51	White	11	1.3	1	1.6	47	3.4	20
52	Black	8	1.2	1	1	144	3.9	12.1
53	Other	43	2.1	4	55.2	102	3.2	24.2

TABLE 4

Recipient	Pressors	HD	Vent	Redo	#OLT	L/K	HT	WT	BMI
1	0	1	0	1	4	1	152.4	53.1	22.86
2	0	1	0	1	4	1	152.4	53.1	22.86
3	0	1	0	1	3	0	167.64	62	22.06
4	0	0	0	0	1	0	188	96	27.16
5	0	0	0	0	1	0	162.56	65	24.60
6	0	0	0	0	1	0	162.56	100	37.84
7	0	0	0	0	1	0	152.4	70.91	30.53
8	2	1	1	0	1	0			
9	0	0	0	0	1	0	170.18	97.27	33.59
10	0	0	0	0	1	0	160.02	75	29.29
11	0	0	0	0	1	0	165.1	56.7	20.80
12	0	0	0	0	1	0			
13	0	0	0	0	1	0	180.34	90.73	27.90
14	0	0	0	0	1	0	170.18	60	20.72
15	0	1	0	1	2	1	190.5	76	20.94
16	0	0	0	0	1	0	175.26	76.36	24.86
17	0	0	0	0	1	0	203.2	109.09	26.42
18	0	1	1	0	1	0	154.94	76.32	31.79
19	1	1	1	0	1	0	167.64	110.45	39.30
20	0	0	0	0	1	0	160.02	94.09	36.75
21	1	1	1	0	1	0	177.8	85	26.89
22	0	0	0	0	1	0	172.72	98.18	32.91
23	3	1	1	0	1	0	160.782	67.64	26.16
24	0	0	0	0	1	0	185.42	79.55	23.14
25	0	0	0	0	1	0	180.34	75	23.06
26	1	1	1	1	2	0	167.64	83	29.53
27	1	1	1	0	1	0	177.8	68.4	21.64
28	0	0	0	0	1	0	177.8	84.09	26.60
29	0	1	0	0	1	0	152.4	56.7	24.41

TABLE 4-continued

Recipient	Pressors	HD	Vent	Redo	#OLT	L/K	HT	WT	BMI
30	0	0	0	0	1	0	180.34	79	24.29
31	1	1	1	1	2	1	165.1	68	24.95
32	0	0	0	0	1	0	182.88	95	28.40
33	0	0	0	0	1	0	177.8	110.45	34.94
34	0	0	0	0	1	0	170.18	117.27	40.49
35	0	0	0	0	1	0	187.96	74.27	21.02
36	0	1	0	0	1	0	167.6	79.4	28.27
37	0	1	0	0	1	0	167.6	71.2	25.34
38	0	0	0	0	1	0	175.26	112.27	36.55
39	0	0	0	0	1	0	162.56	69.45	26.28
40	0	0	0	0	1	0	165.1	80.45	29.52
41	0	1	1	0	1	0	172.72	68.4	22.92
42	0	0	0	0	1	0	167.64	72.91	25.94
43	0	0	0	0	1	0	162.56	83.64	31.65
44	0	0	0	0	1	0	154.94	78.27	32.60
45	0	1	1	0	1	0	162.56	72.27	27.35
46	0	1	0	0	1	1	182.88	110.45	33.03
47	0	0	0	0	1	0	162.6	66	24.96
48	0	0	0	0	1	0	157.48	71.81	28.96
49	0	0	0	0	1	0	180.34	90.72	27.90
50	0	0	0	0	1	0	165.1	64.64	23.71
51	0	0	0	0	1	0	170.18	81.82	28.25
52	0	0	0	0	1	0	180.34	88.64	27.25
53	0	1	0	1	2	1	172.7	65.6	21.99

TABLE 5

Recip	Takeback#	ReOLT	7 d surv	30 d surv	6 m surv	1 yr surv	Rpfn Bx	LD 1 d
1	na	na	na	na	na	na	na	na
2	na	na	na	na	na	na	na	na
3	na	na	na	na	na	na	na	na
4	na	na	na	na	na	na	na	na
5	na	na	na	na	na	na	na	na
6	na	na	na	na	na	na	na	na
7	na	na	na	na	na	na	na	na
8	na	na	na	na	na	na	na	na
9	na	na	na	na	na	na	na	na
10	na	na	na	na	na	na	na	na
11	na	na	na	na	na	na	na	na
12	na	na	na	na	na	na	na	na
13	na	na	na	na	na	na	na	na
14	na	na	na	na	na	na	na	na
15	na	na	na	na	na	na	na	na
16	0	0	1	1	1	1	Min IR, Min St	969
17	1	0	1	1	1	1	Mod IRI	2645
18	2	0	1	1	1	?	mild ir mild st 20	2170
19	0	0	1	1	1	?	Min IR, no st	169
20	0	0	1	1	1	1	Min IR, min st	550
21	0	0	1	1	1	1	0	1837
22	0	0	1	1	1	?	Min IR	337
23	3	0	1	1	0	0	mild ir	585
24	0	0	1	1	1	1	min IR mld St	535
25	0	0	1	1	1	1	mod IR min st	412
26	1	0	0	0	0	0	Sev nec, no st, no fib	5132
27	0	0	1	1	1	1	mild ir mild st 30	904
28	1 (wound)	0	1	1	1	1	Min IR	223
29	4	0	1	1	0	0	mild st 15-20 md iri	1395
30	0	0	1	1	1	1	No macro, 80% micro	202

TABLE 5-continued

Recip	Takeback#	ReOLT	7 d surv	30 d surv	6 m surv	1 yr surv	Rpfn Bx	LD 1 d
31	0	0	1	1	1	?	min ir no st	198
32	0	0	1	1	1	?	no st min IR	378
33	0	0	1	1	?	na	0	204
34	0	0	1	1	1	m	no st	298
35	0	0	1	1	?	na	mild st 10	1156
36	0	0	1	1	1	na	mild st	431
37	0	0	0	0	0	0	min st	na
38	4	1	1	0	0	0	min St min IR	5060
39	1	0	1	1	1	na	min St min IR	319
40	0	0	1	1	na	na	mild ir min st 10	359
41	2	0	1	1	1	na	Min IR, min st	1141
42	1	0	1	1	na	na	min ir min st	238
43	0	0	1	1	n	na	min IR	429
44	1	0	1	1	na	na	min IR	331
45	0	0	1	1	na	na	min ir	175
46	2	0	1	1	na	na	min IR	221
47	0	0	1	1	0	0	mild st 20 min ir fib	1158
48	0	0	1	1	na	na	na	440
49	1	0	1	1	na	na	mild ir	2295
50	0	0	1	1	na	na	0	435
51	0	0	1	1	na	na	mild st 20 mod ir	2560
52	0	0	1	1	na	na	no st mod IR	3984
53	1 wnd	0	1	1	na	na	mild ir	303

TABLE 6

Recipient	AST 1 d	ALT 1 d	Tbili 1 d	INR 1 d	LD 7 d	AST 7 d	ALT 7 d	Tbili 7 d
1	na	na	na	na	na	na	na	na
2	na	na	na	na	na	na	na	na
3	na	na	na	na	na	na	na	na
4	na	na	na	na	na	na	na	na
5	na	na	na	na	na	na	na	na
6	na	na	na	na	na	na	na	na
7	na	na	na	na	na	na	na	na
8	na	na	na	na	na	na	na	na
9	na	na	na	na	na	na	na	na
10	na	na	na	na	na	na	na	na
11	na	na	na	na	na	na	na	na
12	na	na	na	na	na	na	na	na
13	na	na	na	na	na	na	na	na
14	na	na	na	na	na	na	na	na
15	na	na	na	na	na	na	na	na
16	742	374	4	1.1	266	37	127	1.8
17	2463	1018	4	1.5	250	46	311	2.8
18	1579	1957	3.9	1.1	279	45	186	5.7
19	100	119	3.7	1.1	154	14	38	1.8
20	273	327	2.6	1.2	468	117	411	1.2
21	4087	2688	1.5	1.1	323	43	341	1.7
22	669	561	3.4	1.2	190	36	157	1.5
23	791	463	14.7	1.3	354	45	126	28.8
24	530	360	2.3	1.2	413	49	108	2.8
25	681	672	5.7	1.3	575	53	204	3.6
26	6536	1985	5.3	1.5	na	na	na	na
27	1191	505	7.1	1.6	239	23	63	4.3
28	176	193	3.2	1.2	173	17	49	1.9
29	1642	1126	1.4	2.2	314	37	106	2.3
30	268	406	10.3	1.4	188	21	77	9.1
31	176	143	4.4	1.3	361	30	40	4.2
32	854	477	4	1.4	236	38	102	4.3
33	138	86	5.6	1.2	194	26	63	3.1
34	307	186	6.9	1.2	400	270	433	5.7
35	2374	1451	5.6	1.5	631	1605	1136	3.8
36	431	259	5.1	1.3	204	27	57	2.8
37	na	na	na	na	na	na	na	na
38	3385	2010	3.1	1.3	259	20	133	1.2
39	181	189	1.8	1.2	229	15	37	0.6
40	485	356	3.8	1.3	201	33	113	1.1
41	851	1546	10.5	1.4	399	59	379	3.1
42	344	527	3.4	1.2	190	20	59	5.8
43	839	846	0.9	1.3	251	25	104	0.6
44	268	256	22	1.1	549	114	136	2.7
45	89	179	6.4	1.2	363	15	31	3.5
46	347	141	5.1	1.5	157	11	20	1.4
47	992	296	4.3	1.5	240	39	62	4.7
48	293	406	0.6	1	349	38	111	0.6
49	1730	1112	2	1.5	306	59	204	2.5
50	466	523	2.3	1.3	382	55	147	1.4
51	3948	1645	3.4	1.3	286	43	266	1.7
52	3792	1505	3.1	1.5	191	67	202	1.5
53	197	103	20.8	1.1	257	26	75	16.3

TABLE 7

Recip	INR 7 d	LD 30 d	AST 30 d	ALT 30 d	Tbili 30 d	INR 30 d
1	na	na	na	na	na	na
2	na	na	na	na	na	na
3	na	na	na	na	na	na
4	na	na	na	na	na	na
5	na	na	na	na	na	na
6	na	na	na	na	na	na
7	na	na	na	na	na	na
8	na	na	na	na	na	na
9	na	na	na	na	na	na
10	na	na	na	na	na	na
11	na	na	na	na	na	na
12	na	na	na	na	na	na

TABLE 7-continued

Recip	INR 7 d	LD 30 d	AST 30 d	ALT 30 d	Tbili 30 d	INR 30 d
13	na	na	na	na	na	na
14	na	na	na	na	na	na
15	na	na	na	na	na	na
16	1.1	na	42	79	0.6	1.1
17	1.1	231	36	85	0.9	1
18	1.1	309	15	15	1.2	2.6
19	1	195	9	8	1.1	1.1
20	1.2	255	57	163	0.8	1.1
21	1.5	313	22	28	0.8	1.1
22	1.2	142	12	20	0.5	1.1
23	1.2	388	101	236	7.4	1.1
24	1.1	248	13	17	0.7	1
25	1.1	177	21	21	1.6	1.1
26	na	na	na	na	na	na
27	1.1	136	14	7	0.9	1.2
28	1.3	na	12	12	0.8	1.2
29	1.3	298	113	90	18.4	1.2
30	1.3	120	17	43	2	1.1
31	1.1	266	16	14	1.5	1.1
32	1.2	165	34	26	1.2	1
33	1.1	na	16	13	1.8	na
34	1.2	186	144	354	1.4	1.5
35	1.3	na	23	25	1.2	na
36	1.2	218	12	8	0.9	1.1
37	na	na	na	na	na	na
38	1.3	na	na	na	na	na
39	1.2	160	9	7	0.5	1.1
40	1.2	na	8	10	0.7	na
41	1.1	215	24	40	1.1	1.2
42	1.1	221	12	11	0.9	1
43	1.2	na	13	16	0.4	na
44	1.1	468	28	19	0.9	1
45	1.1	178	15	5	1.8	1
46	1.3	na	12	10	0.8	1.1
47	1.2	128	16	9	1	1.2
48	1.1	305	42	76	0.5	1
49	1.2	253	129	328	0.6	1
50	1.2	na	26	35	0.9	na
51	1.2	195	17	38	0.6	1.1
52	1.1	na	32	43	0.5	na
53	1.3	202	9	8	1.3	1.1

TABLE 8

Donors	Age	Male	Race	ABO	Wt (kg)	Ht (cm)
1	24	1	Latino	A	55	167.64
2	29	0	Latino	A	73	165.1
3	39	1	White	O	80	172.72
4	49	1	White	O	80	177.8
5	68	1	Asian	O	41	162.56
6	53	0	Latino	O	80	160.02
7	55	0	Latino	O	60	167.64
8	0	1	Asian	O	70	180.34
9	25	0	Black	A	80	162.56
10	65	1	White	B	73.5	170.18
11	57	0	White	A	49.2	160.02
12	30	1	White	O	120	188
13	59	1	White	A	102.5	180.34
14	46	1	White	O	80	170.18
15	50	0	White	O	65	167
16	22	1	White	O	85	180.34
17	54	1	White	A	115	187.96
18	43	1	Latino	A	77	172.72
19	20	1	Black	O	91.8	190.5
20	47	1	Latino	O	69.3	160.02
21	51	0	Latino	O	84	165.1
22	55	1	White	A	114	180.34
23	62	1	Asian	A	72	162.56
24	57	1	Latino	O	81.8	172.72

TABLE 8-continued

Donors	Age	Male	Race	ABO	Wt (kg)	Ht (cm)
25	65	1	White	O	102	180.34
26	26	1	Asian	A	80	177
27	52	0	Latino	O	66	154.94
28	20	0	Black	B	81.8	182.88
29	45	0	Latino	A	86	170.18
30	22	1	White	B	73	177.8
31	41	1	White	A	70	180.34
32	67	1	Latino	A	80	170.18
33	32	0	Latino	B	65	165.1
34	22	1	Latino	A	71	170.18
35	69	0	Black	O	137	175.26
36	48	1	Latino	O	50	172.72
37	43	1	Latino	A	73	162.56
38	44	1	White	A	80	183
39	59	0	Latino	A	81	160.02
40	65	1	White	AB	85	185.42
41	49	1	Latino	A	84	167
42	17	1	Latino	B	83.6	182.88
43	23	1	Latino	O	79.4	170.18
44	61	1	Latino	O	66	157.48
45	51	1	Black	O	118	165.1
46	36	0	Latino	B	91.7	162.56
47	54	1	Latino	O	59.6	162
48	22	1	Asian	B	78	168
49	23	1	Latino	A	95	175
50	64	1	White	AB	69.1	162.56
51	25	1	White	A	77	170.18
52	60	1	Latino	O	87	161
53	26	1	White	A	64.6	175.26

TABLE 9

Donor	BMI	Cause of Death	LOH	Liver Trauma	Dopa
1	19.6	ICH	4	0	1
2	26.8	ICH	6	0	1
3	26.8	Anoxia	4	0	1
4	25.3	ICH	4	0	1
5	15.5	ICH	3	0	1
6	31.2	ICH	125	0	0
7	21.3	ICH	3	0	0
8	21.5	ICH	4	0	0
9	30.3	ICH	17	0	0
10	25.4	ICH	7	0	0
11	19.2	ICH	3	0	0
12	34.0	Blunt Head Trauma	20	1	0
13	31.5	Blunt Head Trauma	4	1	1
14	27.6	Blunt Head Trauma	5	1	0
15	23.3	ICH	5	0	0
16	26.1	Penetrating head injury	4	0	1
17	32.6	ICH	33	0	1
18	25.8	Penetrating head injury	5	0	0
19	25.3	Blunt Head Trauma	8	1	1
20	27.1	Penetrating head injury	6	0	1
21	30.8	ICH	4	0	1
22	35.1	Anoxia	6	0	1
23	27.2	ICH	3	0	0
24	27.4	ICH	4	0	1
25	31.4	ICH	2	0	0
26	25.5	Penetrating head injury	4	0	0

TABLE 9-continued

Donor	BMI	Cause of Death	LOH	Liver Trauma	Dopa
27	27.5	ICH	6	0	0
28	24.5	Blunt Head Trauma	2	1	0
29	29.7	ICH	4	0	0
30	23.1	Blunt Head Trauma	4	1	0
31	21.5	Blunt Head Trauma	4	1	0
32	27.6	ICH	4	0	0
33	23.8	ICH	5	0	0
34	24.5	Anoxia	7	0	0
35	44.6	ICH	4	0	0
36	16.8	ICH	4	0	0
37	27.6	Anoxia	14	0	0
38	23.9	ICH	8	0	0
39	31.6	ICH	3	0	0
40	24.7	ICH	6	0	1
41	30.1	ICH	22	0	0
42	25.0	Penetrating head injury (GSW homicide)	8	0	0
43	27.4	Blunt Head Trauma	10	1	0
44	26.6	ICH	3	0	0
45	43.3	ICH	6	0	1
46	34.7	Anoxia	7	0	0
47	22.7	Blunt Head Trauma	8	1	0
48	27.6	Blunt Head Trauma	5	1	0
49	31.0	Penetrating head injury	3	0	0
50	26.1	Anoxia (suicide)	8	0	0
51	26.6	GSW (homicide)	3	0	0
52	33.6	ICH	5	0	1
53	21.0	Blunt Head Trauma	3	1	0

TABLE 10

Donor	Vaso	NE	Phenyl	Total Pressors	Insulin	DM	HTN
1	1	0	0	2	1	0	0
2	1	0	0	2	1	0	0
3	1	0	0	2	1	0	0
4	1	0	0	2	0	0	0
5	1	1	1	4	1	0	1
6	1	0	1	2	1	0	0
7	0	1	0	1	1	1	1
8	1	1	0	2	1	0	0
9	1	1	0	2	1	0	0
10	1	1	0	2	0	0	0
11	1	1	0	2	0	0	0
12	1	0	0	1	1	0	0
13	1	0	0	2	1	0	1
14	1	1	0	2	1	0	0
15	1	1	0	2	1	0	1
16	0	0	0	1	1	0	0
17	0	0	1	2	0	0	1
18	0	0	0	0	1	0	0
19	1	0	0	2	1	0	0
20	1	0	0	2	1	0	0
21	0	0	0	1	1	0	0
22	1	0	0	2	0	0	0
23	1	1	0	2	0	0	0
24	1	0	0	2	1	0	1
25	1	1	0	2	0	0	0

TABLE 10-continued

Donor	Vaso	NE	Phenyl	Total Pressors	Insulin	DM	HTN
26	1	1	0	2	1	0	0
27	0	0	0	0	1	1	1
28	1	0	0	1	1	0	0
29	1	1	0	2	1	0	0
30	1	1	1	3	0	0	0
31	0	1	0	1	0	0	0
32	1	1	0	2	0	0	1
33	1	1	0	2	1	0	0
34	1	0	0	1	1	0	0
35	1	1	0	2	1	0	1
36	1	0	1	2	0	0	0
37	1	0	0	1	1	0	0
38	1	1	0	2	0	0	1
39	1	1	0	2	0	0	1
40	1	0	0	2	1	0	1
41	1	1	0	2	1	0	0
42	1	0	1	2	0	0	0
43	1	0	0	1	0	0	0
44	1	0	0	1	1	1	1
45	1	1	0	3	0	0	1
46	1	1	0	2	0	0	0
47	0	1	0	1	1	0	0
48	1	0	0	1	1	0	0
49	1	1	0	2	1	0	0
50	0	1	0	1	1	1	1
51	1	0	0	1	1	0	1
52	0	1	0	2	1	1	1
53	0	0	1	1	0	0	0

TABLE 11

Donor	EtOH Abuse	Other Drugs	HgbA1c	HepB Core	HepC
1	0	none	5.8	0	0
2	0	none	5.1	0	0
3	0	opiates	5.8	0	0
4	unk	IVDA, meth, heroine, marijuana	5.8	0	1
5	1	none	not done	0	0
6	0	none	6.0	0	0
7	0	none	8.9	0	0
8	0	none	5.3	0	0
9	0	meth, marijuana	5.5	1	0
10	0	none	not done	0	0
11	1	marijuana	not done	0	0
12	0	marijuana	5.6	0	0
13	0	marijuana	not done	0	0
14	1	mar, benzos	4.8	0	0
15	0	amphetamine	5.5	0	0
16	0	marijuana	5.2	0	0
17	0	none	5.1	0	0
18	0	none	5.5	0	0
19	0	amphetamine, THC	5.5	0	0
20	1	cocaine, meth	6.3	0	0
21	0	none	9.6	0	0
22	0	crack	6.8	0	0
23	0	none	not done	0	0
24	1	opiates, marijuana	not done	0	1
25	0	none	not done	0	0
26	0	none	5.3	0	0
27	0	none	13.9	0	0
28	0	none	5.5	0	0
29	0	none	6.3	0	0
30	0	none	5.1	0	0
31	0	IVDA, meth, prescript Rx	5.7	0	0

TABLE 11-continued

Donor	EtOH Abuse	Other Drugs	HgbA1c	HepB Core	HepC
32	unk	none	not done	0	0
33	0	cocaine, opiates	5.2	0	0
34	0	cocaine, marijuana	not done	0	0
35	0	none	not done	0	0
36	1	none	6.0	0	0
37	0	none	6.1	0	0
38	1	none	5.0	0	0
39	0	none	not done	0	0
40	0	none	6.0	0	0
41	0	none	6.4	0	0
42	0	none	5.4	0	0
43	0	marijuana	5.6	0	0
44	0	none	not done	0	0
45	0	none	5.7	0	0
46	0	none	5.1	0	0
47	1	none	5.8	0	0
48	0	marijuana, ecstasy, amphetamine	5.3	0	0
49	0	amphetamines	not done	0	0
50	0	none	not done	0	0
51	0	marijuana, ecstasy, amphetamine	5.8	0	0
52	0	none	not done	0	0
53	0	meth, benzo, marijuana	4.8	0	0

TABLE 12

Donor	Cardiac Arrest	Respir Arrest	Total Downtime	CPR Duration	MAP range
1	1	1	8	8	64.3-136
2	0	0	0	0	69.7-107.7
3	1	1	32	32	69.3-119.7
4	0	0	0	0	72.3-123
5	1	0	unk	0	57.7-96
6	0	1	21	21	66.3-125
7	0	0	0	0	85.3-110.7
8	0	0	0	0	73.3-148.3
9	0	0	0	0	63.7-135.7
10	0	0	0	0	77.3-140.7
11	0	0	0	0	55.3-109
12	0	0	0	0	69-105
13	0	0	0	0	68-126.3
14	0	0	0	0	69.7-167.7
15	0	0	0	0	87.3-141
16	0	0	0	0	49.3-115.7
17	0	0	0	0	73-149
18	0	0	0	0	74.3-139.3
19	0	0	0	0	68-129.7
20	0	0	0	0	60-118.3
21	0	0	0	0	62-92.7
22	1	1	unk	unk	69.3-143
23	0	0	0	0	66.7-86
24	1	1	13	13	71-195
25	0	0	0	0	60.3-133
26	0	0	0	0	89-123.7
27	0	0	0	0	50.7-133
28	0	0	0	0	66.7-108.7
29	0	0	0	0	57.3-116
30	0	0	0	0	60.3-129.3

TABLE 12-continued

Donor	Cardiac Arrest	Respir Arrest	Total Downtime	CPR Duration	MAP range
31	1	1	15	15	76.7-104.3
32	0	0	0	0	85.3-126.3
33	0	0	0	0	60.3-104
34	1	1	9	9	68.3-123.7
35	0	0	0	0	74-127.3
36	0	0	0	0	69.7-116.7
37	1	1	11	11	71.3-119.3
38	0	0	0	0	81.7-131.7
39	0	0	0	0	57.7-124.7
40	0	0	0	0	60-104
41	1	1	8	8	44.7-93.7
42	0	0	0	0	61-129.7
43	0	0	0	0	66.7-137.7
44	0	0	0	0	89.3-139.3
45	0	0	0	0	69.3-130
46	1	1	15	15	59.7-88.3
47	0	0	0	0	70-128.3
48	0	0	0	0	74.7-134.3
49	0	0	0	0	77.3-107.7
50	1	1	38	34	70-109.7
51	0	0	0	0	67-112.3
52	0	0	0	0	66-104
53	0	0	0	0	66-130

TABLE 13

Donor	MAP @ procurement	Na Peak	Na Proc	Cr Peak	Cr Proc	TBili Peak
1	78.7	167	146	0.7	0.5	1.3
2	113.3	173	146	3.9	3.7	1.7
3	106.3	157	151	1.08	0.74	1.2
4	84	162	155	1.1	0.9	1.0
5	71	165	131	1.4	2.9	1.7
6	104	151	149	0.9	0.9	1.5
7	80.7	140	134	8.3	6.4	1.1
8	93	160	149	2.7	2.5	4.9
9	115.7	191	154	2.7	2.7	1.6
10	114.3	169	150	1.6	1.4	1.7
11	55.3	154	151	0.8	0.7	0.7
12	86.3	152	144	6.7	3.9	0.9
13	102.3	155	149	1.79	1.0	1.8
14	91	160	130	1.1	0.5	2.9
15	94	188	147	2.71	1.61	1.3
16	111.7	152	151	1.1	0.9	2.2
17	106.7	152	150	1.3	0.6	1.1
18	105.7	148	148	3.5	2.7	3.2
19	122	158	145	1.1	0.8	0.4
20	101.7	160	157	2.17	1.09	2.6
21	78.7	147	154	6.67	5.59	0.7
22	96	175	151	2.4	1.5	1.8
23	71.7	137	136	0.85	0.52	1.1
24	88	159	150	1.1	1.1	0.7
25	65.3	179	164	2.0	2.0	2.4
26	81.7	151	136	2.6	0.6	0.7
27	97.3	159	149	2.2	2.0	0.6
28	75	148	148	2.4	1.3	0.8
29	95.7	169	145	1.4	0.8	0.9
30	71	164	157	1.49	1.07	1.8
31	91.7	167	157	1.3	1.1	0.5
32	105.7	156	153	2.7	2.7	3.6
33	83.7	167	136	1.0	1.0	1.2
34	100.7	150	146	2.4	2.1	1.0
35	70.7	166	140	1.1	1.0	0.7
36	112	161	144	0.8	0.5	1.8
37	101	150	141	5.2	5.2	1.5
38	93	149	139	0.7	0.76	2.1
39	91.7	171	146	0.99	0.99	0.8
40	85	173	138	2.48	2.16	0.6
41	85.3	156	136	4.2	3.6	0.9
42	84	174	154	1.2	0.7	4.4

TABLE 13-continued

Donor	MAP @ procurement	Na Peak	Na Proc	Cr Peak	Cr Proc	TBili Peak
43	90	169	138	1.4	0.9	0.8
44	90	151	145	1.4	1.4	0.9
45	116.3	165	141	2.8	2.0	1.3
46	72	153	153	1.38	1.38	0.5
47	102.7	168	139	0.7	0.6	0.6
48	84	159	145	1.7	1.0	1.5
49	111.7	160	153	1.6	1.4	0.8
50	99	149	142	4.4	4.1	1.3
51	76.3	146	144	9.0	8.4	2.4
52	81.7	172	157	3.9	3.9	2.4
53	130.7	156	151	2.14	1.94	3.0

TABLE 14

Donor	TBili Proc	AST Peak	AST Proc	ALT Peak	ALT Proc
1	1.0	77	32	59	42
2	1.1	45	28	21	21
3	1.0	1185	268	1293	106
4	0.9	109	49	194	87
5	1.7	54	482	29	103
6	0.6	55	20	61	33
7	0.6	31	31	15	11
8	3.7	111	54	49	40
9	1.6	74	74	126	50
10	1.7	216	41	209	107
11	0.3	28	21	40	40
12	0.4	370	130	197	131
13	1.3	273	170	78	76
14	1.6	128	34	100	53
15	0.9	43	35	38	40
16	1.2	59	29	14	15
17	0.6	44	18	33	59
18	1.5	77	24	32	14
19	1.1	244	19	165	36
20	0.9	60	94	150	26
21	0.4	31	23	24	15
22	1.1	619	22	973	169
23	1.6	137	42	72	59
24	0.4	41	39	37	37
25	0.8	49	49	38	38
26	0.9	38	24	34	23
27	0.5	40	44	24	24
28	0.8	720	727	200	227
29	0.5	70	23	30	30
30	1.1	127	25	235	80
31	0.4	87	26	74	21
32	3.2	37	28	27	11
33	1.1	36	35	37	37
34	0.2	163	163	158	158
35	0.6	33	12	15	11
36	0.9	82	37	49	27
37	0.7	1677	69	531	26
38	0.9	35	24	30	21
39	0.8	59	48	55	50
40	0.4	82	27	47	38
41	0.9	33	22	51	27
42	4.0	52	17	22	13
43	0.6	52	25	33	30
44	0.6	48	22	28	16
45	0.5	24	17	28	16
46	0.4	243	13	113	32
47	0.6	59	31	40	20
48	1.4	491	267	138	81
49	0.4	51	18	32	28
50	1.1	468	63	488	81
51	1.4	194	29	168	81
52	2.4	88	88	73	49
53	3.0	333	183	78	74

TABLE 15

Donor	INR Peak	INR Proc	pH @ Adm	pH @ Proc	pCO_2 @ Adm	pCO_2 @ Proc
1	12.7	1.14	7.47	7.47	29	33
2	1.96	1.45	7.45	7.49	34.8	33.8
3	1.62	1.62	7.25	7.45	31	38
4	1.1	1.0	7.38	7.39	34.8	35.1
5	2.0	1.4	7.19	7.27	53	37.2
6	1.2	1.2	7.42	7.35	30	41
7	1.6	1.6	7.48	7.39	40	29
8	2.1	1.5	7.55	7.42	25	34
9	11.7	1.0	7.58	7.34	29.1	29.4
10	1.8	1.5	7.35	7.38	48	44.9
11	1.22	1.07	7.46	7.39	32.4	30
12	1.7	1.3	7.24	7.44	47.3	41.1
13	1.42	1.1	7.41	7.47	37	38
14	1.1	1.1	7.37	7.43	36	37
15	1.5	1.3	7.44	7.4	39	32
16	15	1.3	7.31	7.51	49	35
17	1.17	1.09	7.4	7.46	37.7	126
18	1.6	1.1	7.35	7.44	40.2	39.5
19	1.26	1.26	7.43	7.45	19.3	40.3
20	8.73	1.45	7.34	7.46	33	34
21	1.79	1.79	7.41	7.26	44	39
22	1.65	1.51	7.15	7.37	96.7	41.5
23	1.01	1.2	7.2	7.35	48.2	34
24	1.03	0.99	7.07	7.35	31	41
25	1.9	1.8	7.35	7.4	39	31
26	1.37	1.1	7.4	7.47	36.2	37.4
27	1.1	1.0	7.52	7.46	30.7	32
28	1.3	1.2	7.34	7.43	29.1	33.9
29	1.7	1.5	7.29	7.42	36.7	30
30	1.9	1.2	7.09	7.4	77	38
31	1.1	1.1	6.99	7.38	95.7	48
32	1.7	1.4	7.53	7.42	30.4	25.3
33	1.5	1.1	7.44	7.39	26	30
34	1.0	1.2	7.44	7.45	32	35
35	1.4	1.1	7.38	7.34	43	32
36	1.2	1.1	7.44	7.48	56	36
37	1.3	1.3	6.95	7.34	57	44
38	1.04	0.99	7.38	7.46	34	39
39	1.67	1.5	7.51	7.42	23.9	35.6
40	1.58	1.47	7.34	7.35	36.9	39
41	1.4	1.4	7.46	7.39	27.6	35.3
42	1.42	1.16	7.30	7.34	35.2	66
43	1.5	1.8	7.4	7.6	31.9	24
44	1.6	1.4	7.39	7.35	29	33
45	1.2	1.2	7.23	7.36	61	49
46	1.55	1.55	7.25	7.44	33	28
47	1.3	1.3	7.34	7.54	36.8	26.6
48	1.27	1.18	7.24	7.43	42	40.2
49	1.2	1.1	7.41	7.37	39	50
50	1.16	1.1	7.21	7.9	32.3	32.3
51	1.77	1.07	7.26	7.36	45	42.5
52	1.4	1.4	7.28	7.47	31	26
53	1.35	1.1	7.18	7.34	58	53

TABLE 16

Donor	pO2 @ Adm	pO2 @ Proc	HCO3 @ Adm	HCO3 @ Proc	pO2 < 60	Liver Abnormal on Imaging
1	151	525	22.8	25	0	0
2	228	194	23.5	25.3	0	na
3	603	542	13	26	0	1
4	195	175	20.8	21.2	0	0
5	362	90.5	19.4	16.5	0	1
6	140	135	19	22	0	0
7	269	99	30	17.6	0	na
8	68	141	21.9	22.1	0	1
9	49	92.5	26.7	21	1	0
10	178	334	27	26.8	0	0
11	478	107	32.4	18	0	0
12	199	64	19.5	28	0	na
13	101	240	23.5	27.7	0	0
14	448	121	20.1	24	0	1
15	389	588	26.5	19.8	0	0
16	485	430	21.6	28.1	0	0
17	163	126	22.8	31.4	0	na
18	421	496	21.5	26.3	0	na
19	297	345	12.8	27.7	0	0
20	321	174	18	25	0	0
21	120	204	28	17.5	0	0
22	83.7	98.9	32	24.2	0	na
23	124	95.2	18.7	18.5	0	na
24	168	120	22	22.6	0	0
25	370	461	21.5	19.2	0	0
26	116	161	22.2	26.6	0	0
27	97.9	501	24.4	22	0	0
28	195	147	15.4	22.2	0	0
29	167	398	17.8	21.4	0	0
30	47	119	23	23.5	1	1
31	437	98.3	23.4	28	0	1
32	110	156	25.5	16	0	na
33	443	124	17	17.8	0	na
34	172	89	21.3	24.2	0	na
35	107	147	24.9	16.9	0	0
36	84.9	136	38.8	26.8	0	na
37	205	158	12.5	24.3	0	0
38	418	183	20.1	27.7	0	na
39	309	170	18.3	22.4	0	na
40	78	151	19.9	21.2	0	na
41	371	143	19.4	20.7	0	0
42	48.7	95	17.2	35	1	0
43	249	553	19	23	0	0
44	183	110	17.7	18.2	0	na
45	174	130	25.5	27.7	0	0
46	540	166	15.9	21.9	0	0
47	135	132	19.3	23.6	0	na
48	78.8	120	17.6	26.3	0	0
49	105	141	24.9	29.1	0	na
50	309	121	12.7	24.9	0	na
51	35	191	20.4	23.5	1	0
52	548	119	14.1	18.1	0	0
53	355	118	20	28	0	na

What is claimed is:

1. A method for determining whether liver tissue will be acceptable for transplantation, the method comprising:

(a) measuring indocyanine green plasma disappearance rates (ICG-PDR) in a brain-dead donor prior to organ procurement; and

(b) designating liver tissue in the donor as acceptable for transplantation if the ICG-PDR is greater than about 18%.

2. The method of claim **1**, further comprising designating the liver tissue as acceptable for transplantation if the ICG-PCR is greater than about 24%.

3. The method of claim **1**, wherein ICG-PDR is measured non-invasively.

4. The method of claim **3**, wherein ICG-PDR is measured using a PULSON LiMON liver function monitor.

5. A method of determining whether liver tissue will be acceptable for transplantation, the method comprising:

(a) measuring indocyanine green plasma disappearance rates (ICG-PDR) in a brain-dead donor prior to organ procurement;

(b) comparing measured ICG-PDR to a threshold; and

(c) designating liver tissue in the donor as acceptable for transplantation if the ICG-PDR exceeds the threshold.

6. The method of claim **5**, wherein the threshold is about 18%.

7. The method of claim **5**, wherein the threshold is about 24%.

8. The method of claim **5**, wherein ICG-PDR is measured non-invasively.

9. The method of claim **8**, wherein ICG-PDR is measured using a PULSON LiMON liver function monitor.

* * * * *

专利名称(译)	尸体供体肝移植物利用的快速，可重复，非侵入性预测因子		
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摘要(译)

提出了一种在采购之前对脑死亡供体中的肝功能进行快速，非侵入性评估的方法。通过测量吲哚菁绿血浆消失率（ICG-PDR），可以在器官采集之前在局部供体服务区域的脑死亡供体中测量肝功能的定量评估。该方法可以使用使用非侵入性手指探针的装置来执行，以使用脉冲密度测定法来获得ICG-PDR。