HEART TRANSPLANTATION

Pediatric Recipients

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Ramot, 2009

History

- First infant heart transplantation was performed in late 1960s (Kantrowitz et al., 1967)

Symposium on human heart transplantation

Transplantation of the heart in an infant and an adult☆

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Available online 9 March 2004.

Abstract

Experience with human heart transplantation is reported. A technically successful infant heart transplantation was performed on December 6, 1967. The child died $6\frac{1}{2}$ hours postoperatively in severe metabolic and respiratory acidosis.

Another heart transplantation was performed on January 5, 1968; the recipient was a 57-year old man. The donor heart was unable to support the circulation, and the patient died $10\frac{1}{2}$ hours postoperatively.

Problems in the selection of donors and of recipients, in the surgical technic, and in the postoperative management are discussed.

☆This work was supported by Grant HE-11173 from the U. S. Public Health Service.

1980s-1990s

- Cyclosporine based immuno-supression regimens stimulated an increased application of heart transplantation in pediatric patients with intractable heart failure.
- 1985 – Registry of the International Society for Heart and Lung Transplantation (ISHLT) recorded 41 pediatric heart transplantations.
- 1995 - 370 pediatric heart transplantations.

Consensus Indications for Pediatric Heart Transplantation

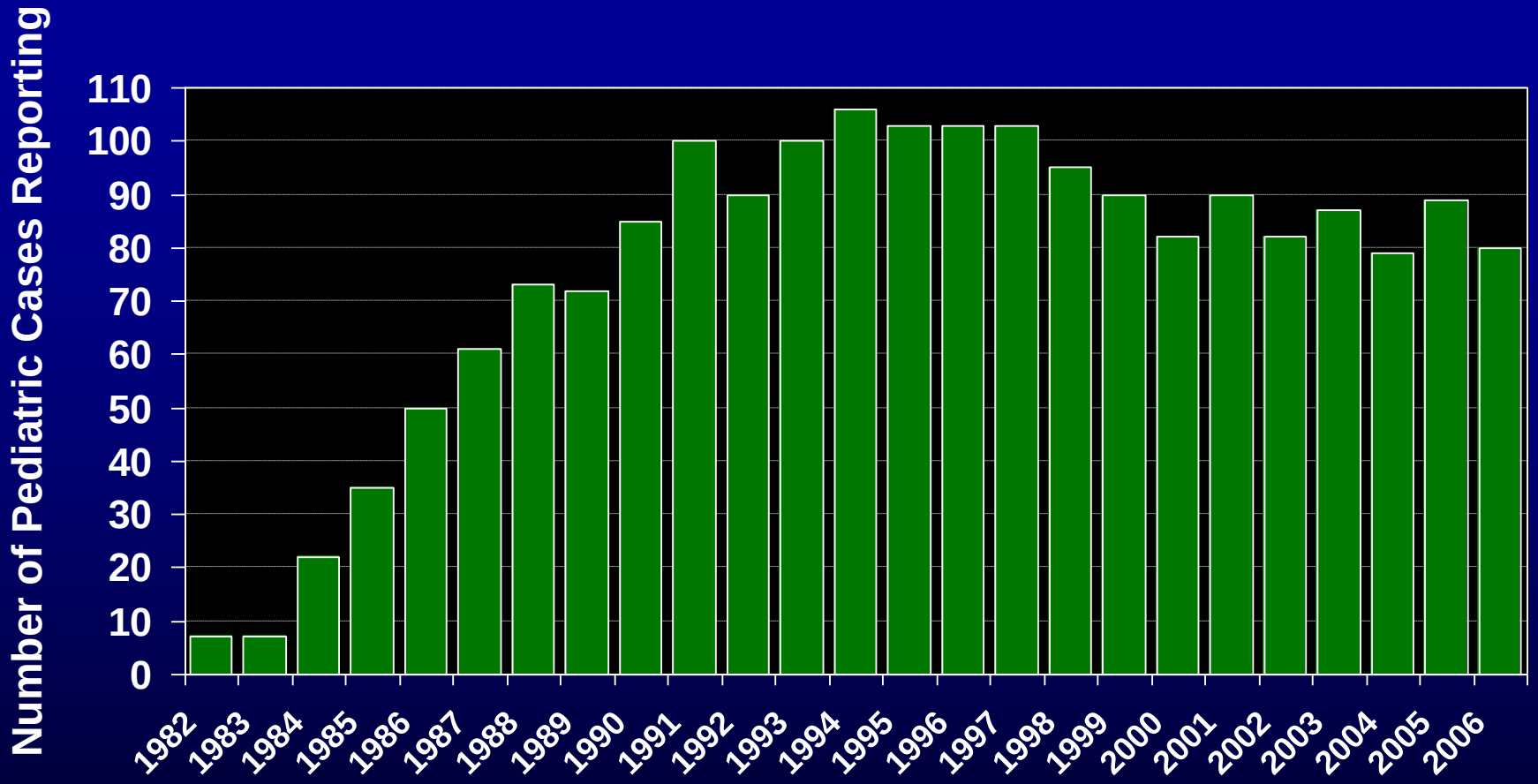
- Need for ongoing IV inotropic or mechanical circulatory support
- Complex congenital heart disease not amenable to conventional surgical repair or palliation or for which surgical procedure carried a higher risk of mortality than transplantation
- Progressive deterioration of ventricular function or functional status despite optimal medical care with digitalis, diuretics, and ACEi
- Malignant arrhythmia or survival of cardiac arrest unresponsive to medical treatment, catheter ablation, or an automatic implantable defibrillator
- Progressive pulmonary hypertension that could preclude cardiac transplantation at a later date
- Growth failure secondary to severe congestive heart failure unresponsive to conventional medical treatment
- Unacceptably poor quality of life

Circulation, 1995

Contemporary Era

- New medical therapies, such as the use of ß-blockers proven to improve survival with heart failure in adults, are being applied to pediatric heart failure
- Furthermore, heart transplantation has been increasingly utilized in adults with congenital heart disease and previous surgery as they develop progressive, end-stage disease
- ***Re-transplantations*** have formed an increasing percentage of pediatric heart transplantations

NUMBER OF CENTERS REPORTING PEDIATRIC HEART TRANSPLANTS



ISHLT

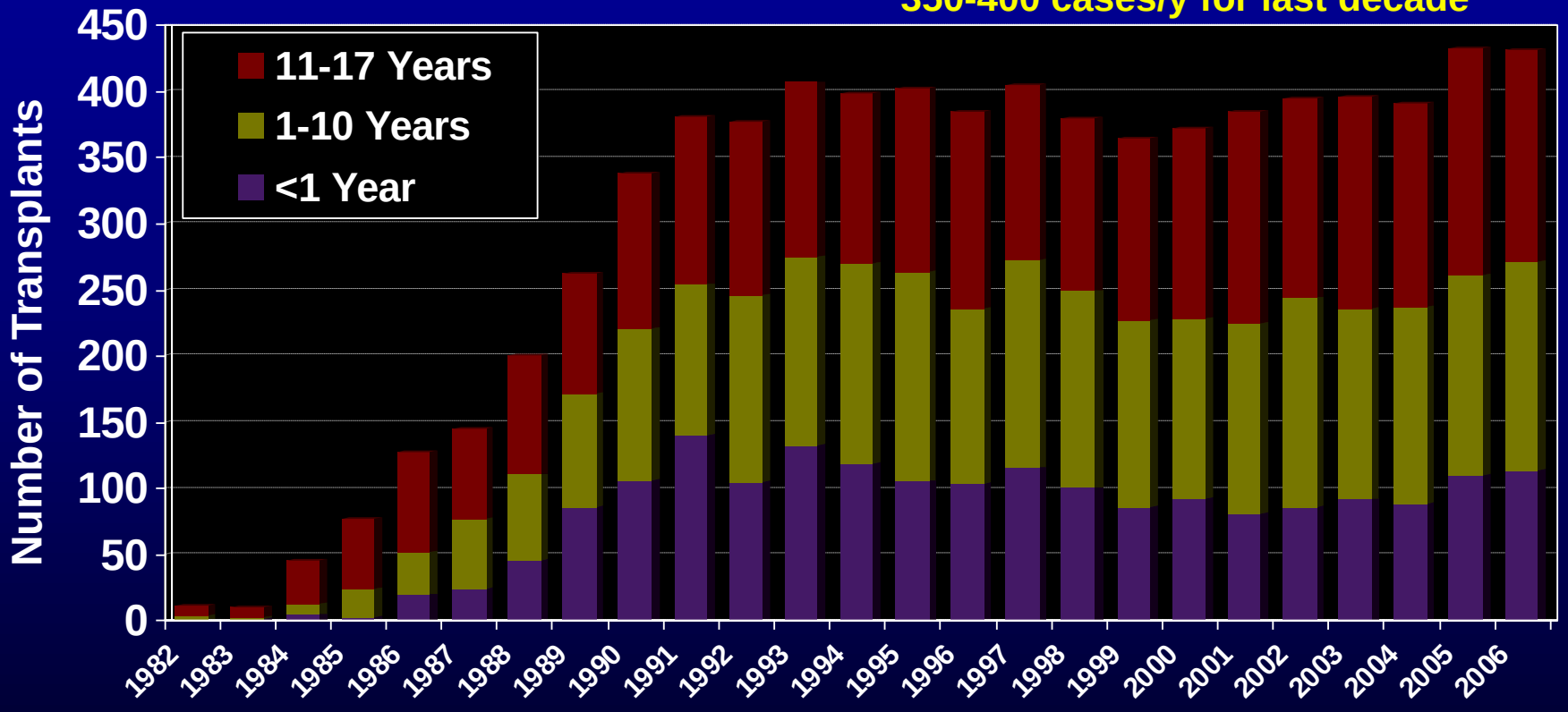
2008

J Heart Lung Transplant 2008;27: 937-983

AGE DISTRIBUTION OF PEDIATRIC HEART RECIPIENTS

By Year of Transplant

350-400 cases/y for last decade



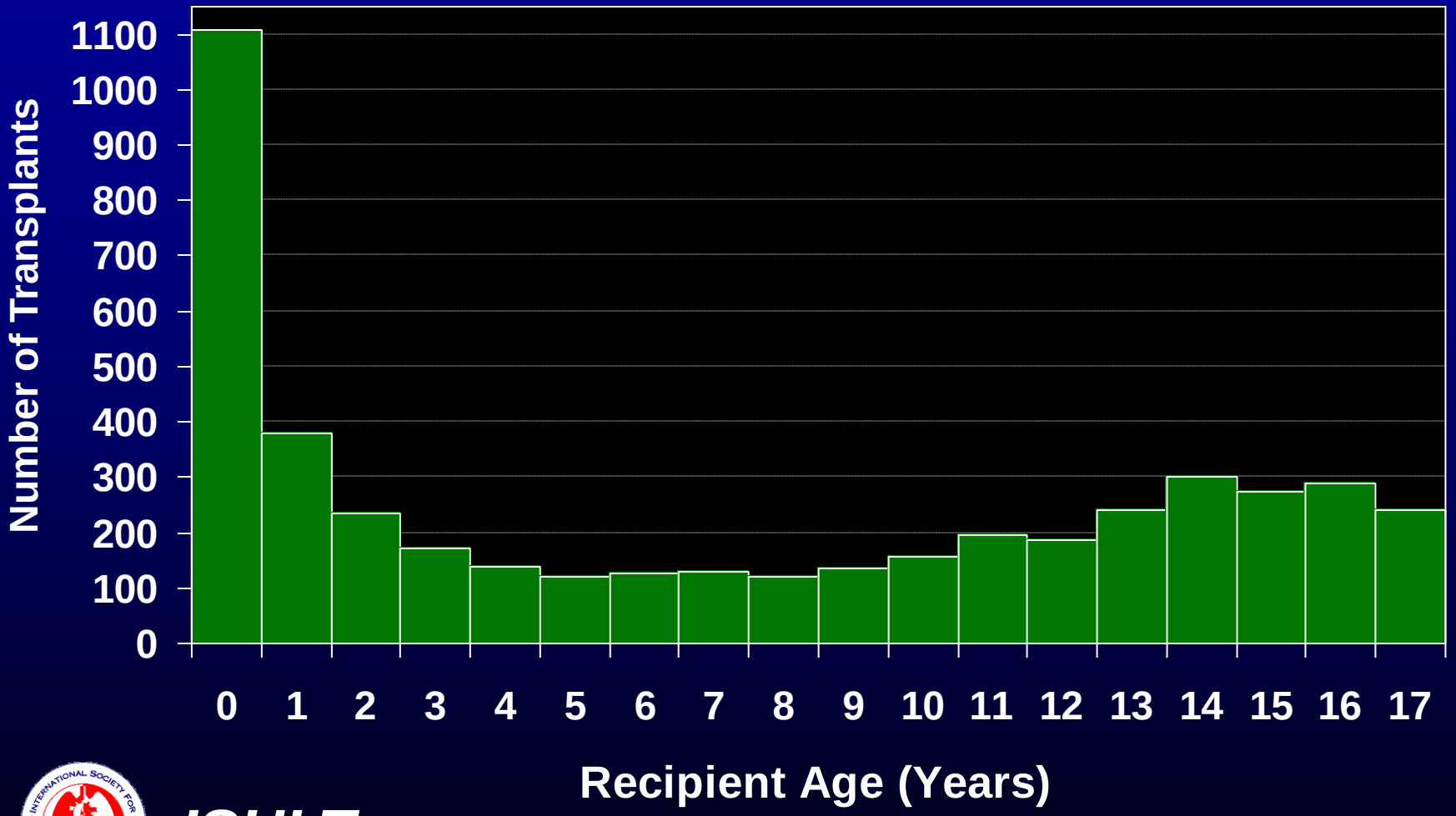
NOTE: This figure includes only the heart transplants that are reported to the ISHLT Transplant Registry. As such, this should not be construed as evidence that the number of hearts transplanted worldwide has increased and/or decreased in recent years.

ISHLT

2008

J Heart Lung Transplant 2008;27: 937-983

AGE DISTRIBUTION OF PEDIATRIC HEART RECIPIENTS (Transplants: January 1996 - June 2007)



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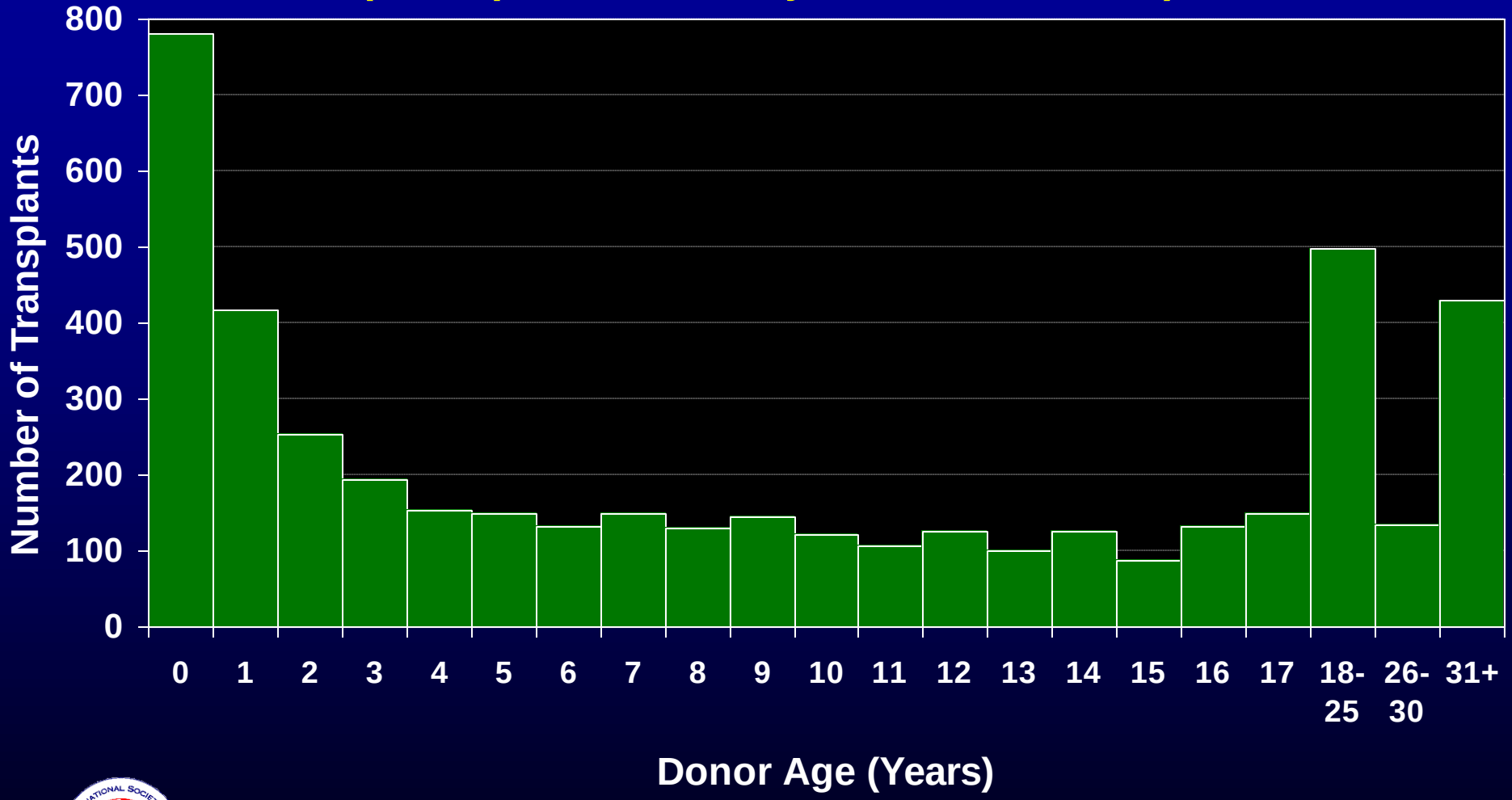
J Heart Lung Transplant 2008;27: 937-983

AGE DISTRIBUTION FOR DONORS OF PEDIATRIC HEART RECIPIENTS

(Transplants: January 1996 - June 2007)



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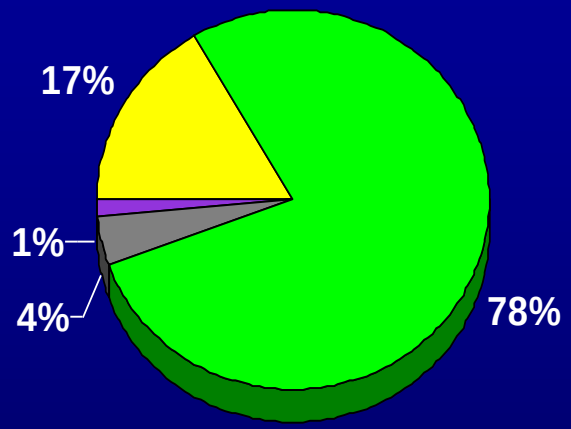
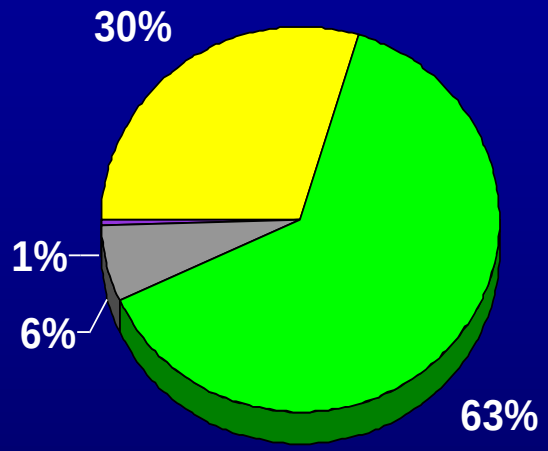
J Heart Lung Transplant 2008;27: 937-983

DIAGNOSIS IN PEDIATRIC HEART TRANSPLANT RECIPIENTS (Age: < 1 Year)

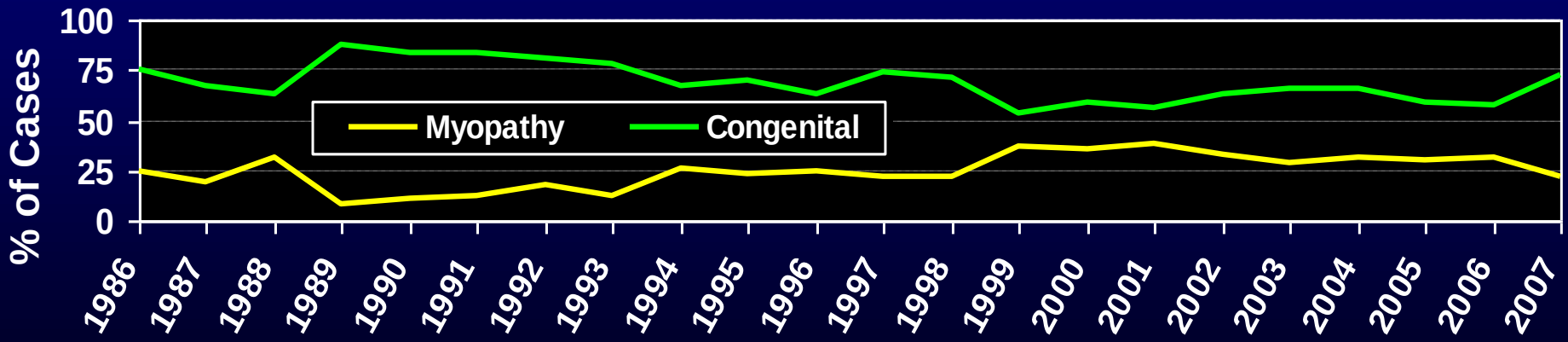


1988-1995

Myopathy
Congenital
Other
ReTX



1/1996-6/2007



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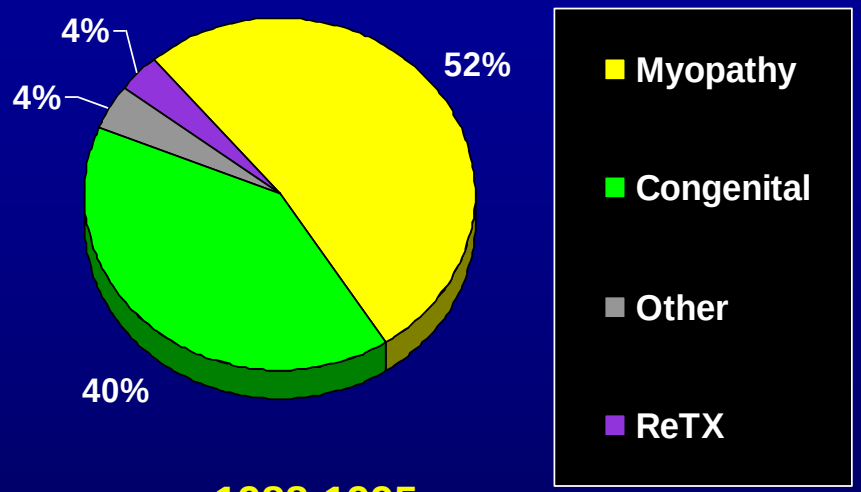
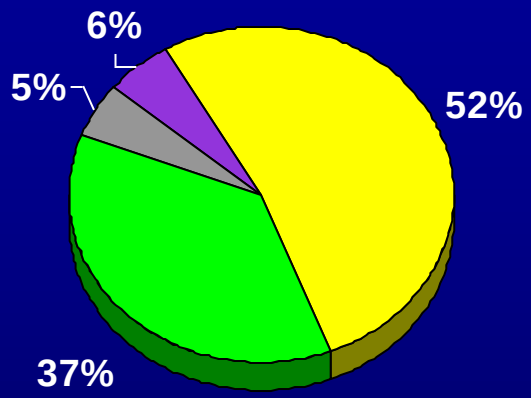
J Heart Lung Transplant 2008;27: 937-983

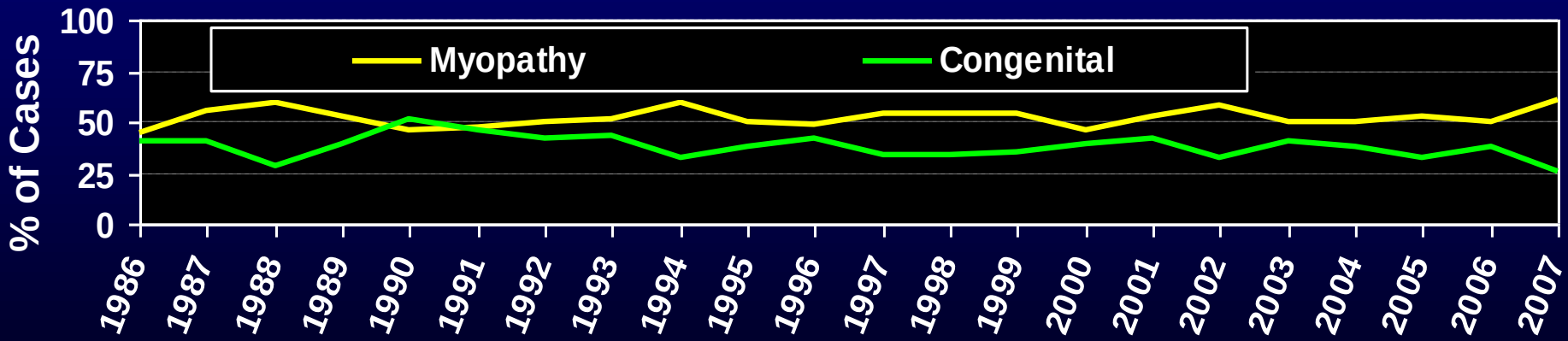
DIAGNOSIS IN PEDIATRIC HEART TRANSPLANT RECIPIENTS (Age: 1-10 Years)



1988-1995



1/1996-6/2007



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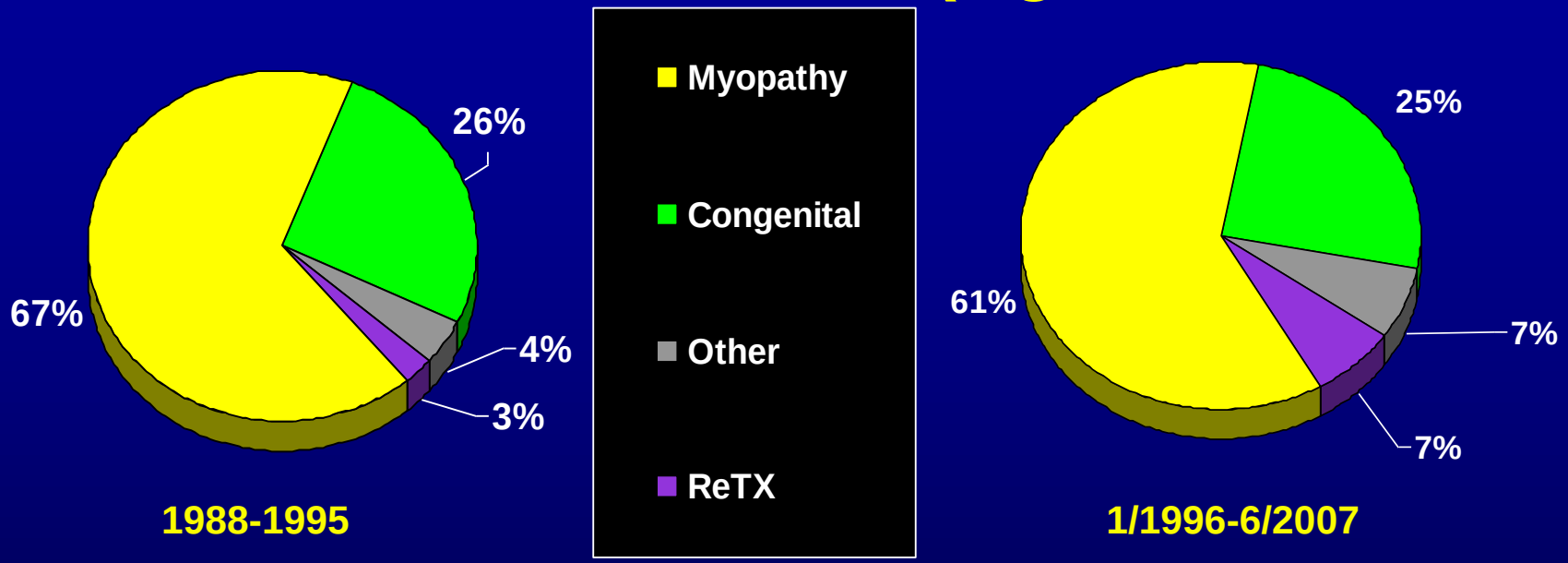
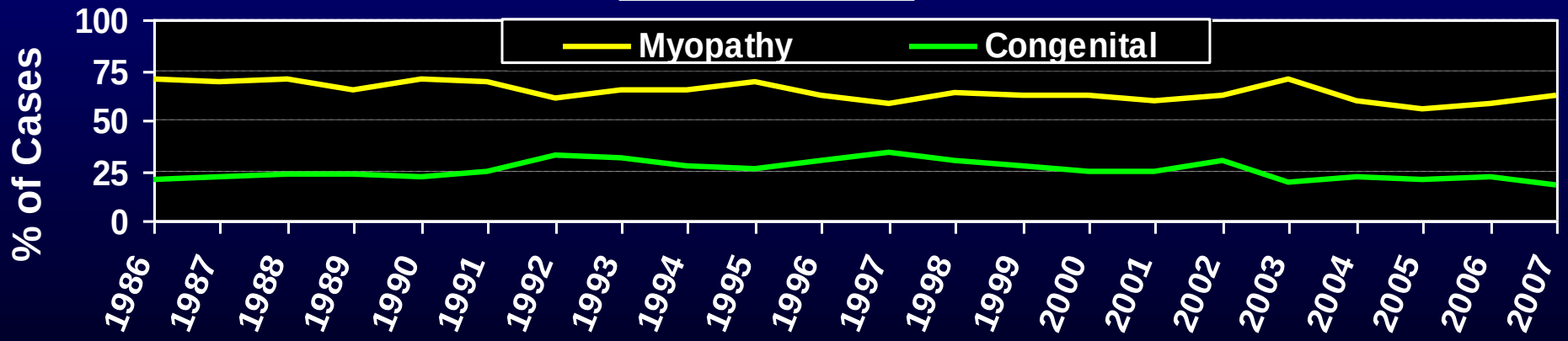
DIAGNOSIS IN PEDIATRIC HEART TRANSPLANT RECIPIENTS (Age: 11-17 Years)





ISHLT

2008

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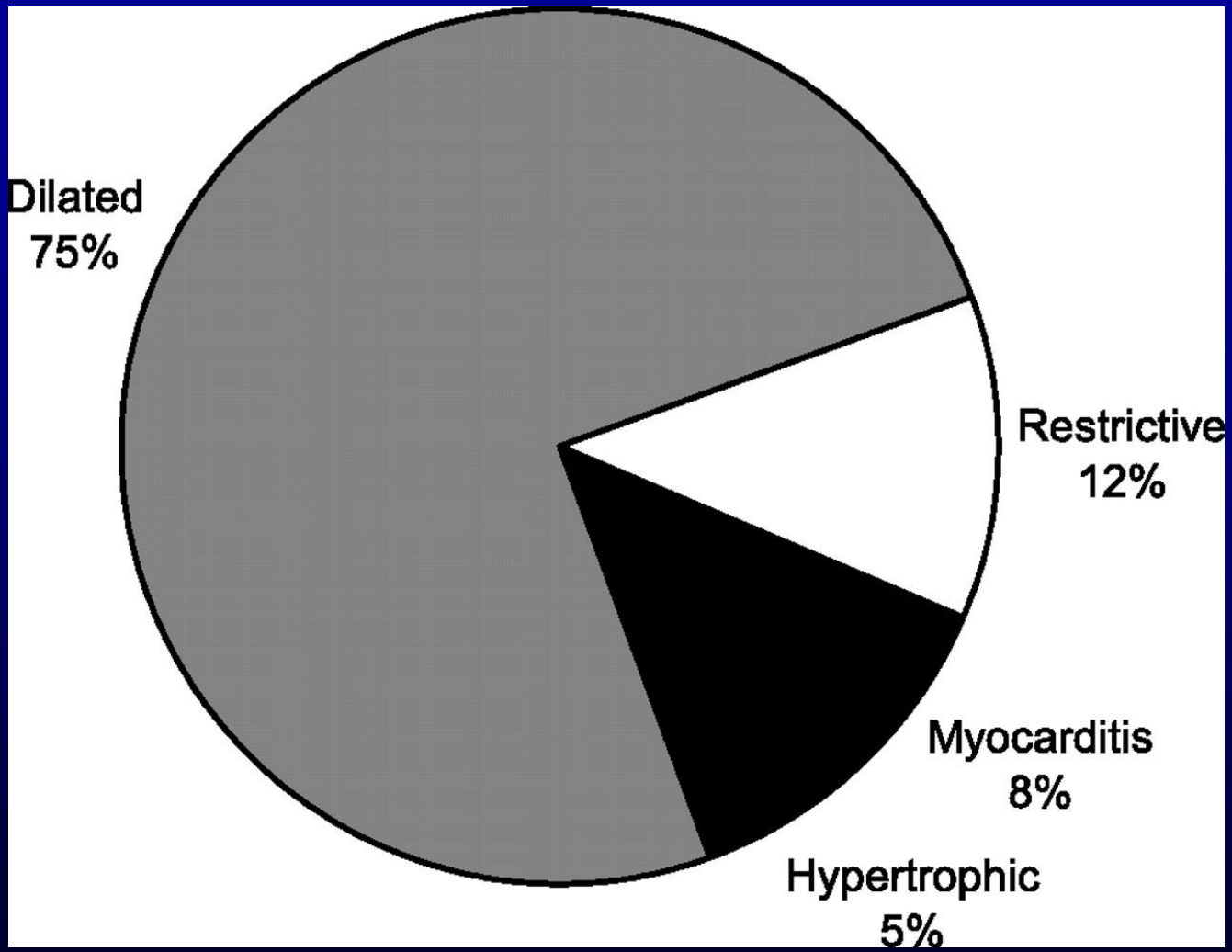
Distribution of cardiomyopathy subtypes within PHTSG recipients transplanted with a diagnosis of cardiomyopathy



Canter, C. E. et al. Circulation 2007;115:658-676

Circulation

Dilated Cardiomyopathy

- Severity of dysfunction has been found to be predictive of outcome in some studies but not in others.
- Similarly, the presence of arrhythmia has and has not been associated with a greater risk of death.
- The shape of the ventricle is important prognostically, with a more spherical shape associated with a poorer outcome

Matitiau et al., Circulation 1994

Dilated Cardiomyopathy

- Younger age at presentation has been reported to be associated with a better outcome[1] and with a worse outcome[2] or to bear no relation to outcome[3].
- Symptoms appear to provide poor prognostic capability because even asymptomatic patients with incidental discovery of dilated cardiomyopathy can have a poor prognosis[2].

[1] **Burch, 1994**
[2] **Redfield, 1994**
[3] **Kimball, 1991**

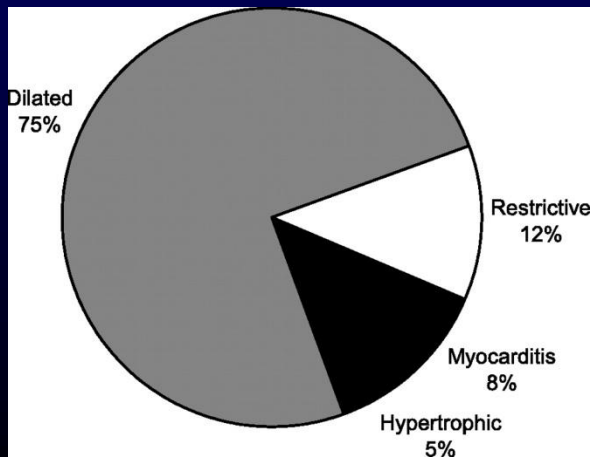
Dilated Cardiomyopathy

- Diagnosis of myocarditis may be a positive prognostic factor in pediatric dilated cardiomyopathy and that a need for inotropic and/or mechanical circulatory support in pediatric patients with myocarditis does not necessarily indicate a poor prognosis (50-80% of resolution within 2 years of presentation[1]

[1]English, 2004

Hypertrophic Cardiomyopathy

- Heterogeneous group
- Relatively infrequent cause of pediatric heart transplantation
- Approximately one fourth of the cases in the American and Australian registries are composed of malformation syndromes such as Noonan's syndrome and Beckwith-Wiedemann syndrome.



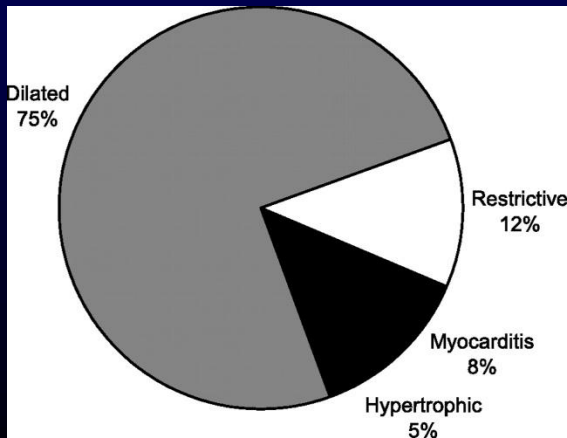
Hypertrophic Cardiomyopathy

- Risk factors for death or transplantation
  - Age at presentation of 1 year,
  - Lower presenting echocardiography shortening fraction
  - Higher presenting echocardiographic left ventricular posterior wall thickness

Lipshultz, 2004
Nugent, 2005

Restrictive Cardiomyopathy

- Least common type of cardiomyopathy
- Less amenable for medical or surgiacl treatment
- Thus is more likely to lead to consideration for heart transplantation than other types of cardiomyopathies.



Congenital Heart Disease

Heart Transplantation as a Primary Therapy for Congenital Heart Disease

- Hypoplastic left heart syndrome
- Pulmonary atresia with intact septum and right ventricle–dependent coronary circulation
- Complex heterotaxy syndromes in which a functional single ventricle can be associated with anomalous pulmonary venous return and severe atrioventricular or semilunar valve disease.

Heart Transplantation as a Primary Therapy for Congenital Heart Disease

- Within the past 10 years, survival with staged, palliative surgery for hypoplastic left heart syndrome has continued to improve.

Heart Transplantation as a Primary Therapy for Congenital Heart Disease

TABLE 1. No. of Donors and Heart Waiting List Additions <1 Year of Age, 1995 to 2005*

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Donors	70	53	59	57	53	63	62	65	63	67	53
Waiting list additions	186	156	190	180	137	142	180	191	133	171	118

Data from the Organ Procurement and Transplant Network Database as of January 15, 2006.[62]

*The data in this table were supported in part by Health Resources and Services Administration contract No. 231-00-0115.

- Decreased use of heart transplantation as primary therapy for hypoplastic left heart syndrome and an increased proportion of infant heart transplantations performed for cardiomyopathies.

Heart Transplantation as Therapy in Previously Repaired or Palliated Congenital Heart Disease

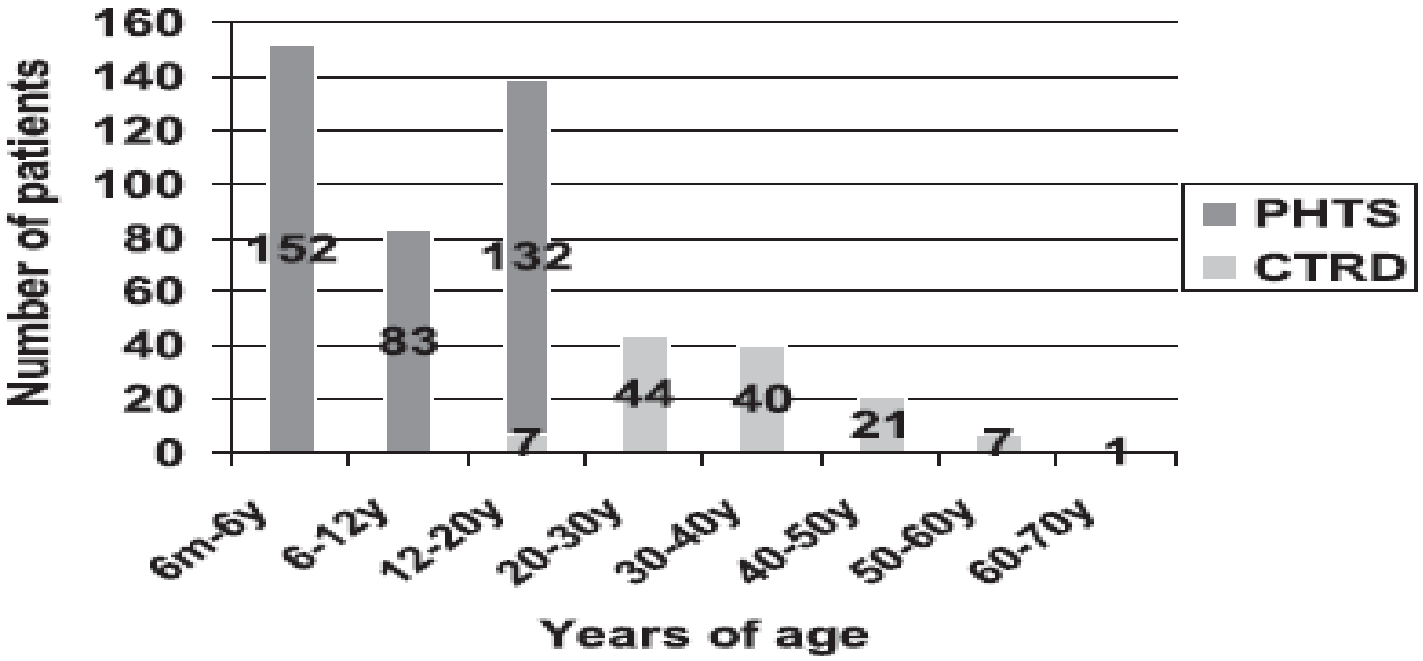


Figure 2. Number of patients transplanted because of congenital heart disease within the PHTSG database and the Cardiac Transplant Research Database (CTRD).[66] Data represent the 367 (40%) of 923 heart transplant recipients with congenital heart disease in the PHTSG from 1993 to 2002 and the 121 (1.6%) of 7345 heart transplant recipients with congenital heart disease in the Cardiac Transplant Research Database from 1990 to 2002. Reprinted from Lamour et al,[66] with permission of the publisher. Copyright © 2005, the American College of Cardiology Foundation.

Heart Transplantation as Therapy in Previously Repaired or Palliated Congenital Heart Disease

- Congenital heart disease is a risk factor for increased mortality in both pediatric and adult heart transplantation, primarily owing to increased risks in the perioperative period.
- However, in those patients who survive past the perioperative period, the survival for children and adults transplanted for congenital heart disease is as good as or better than survival in other diagnostic groups.

המערכת לאיתור התורמים והפניתם למקבל הנכון

- המרכז הלאומי להשתלות אחראי על איתור תורמי לב אפשריים באמצעות רשת של מתאמי השתלות המפוזרים כמעט בכל בתי החולים בארץ.
- כל הממתינים להשתלת לב בארץ, כ 120 חולים, מבוגרים וצעירים כאחד, רשומים ברשימה ממוחשבת ומסודרת במרכז הלאומי להשתלות.
- עם קבלת מידותיו של תורם איברים פוטנציאלי למרכז הלאומי להשתלות, מתואם לתורם מקבל המתאים על סמך סוג הדם, משקל, גובה וותק על רשימת הממתינים להשתלת לב.
- משך ההמתנה להשתלת לב בארץ נע סביב 180 יום !?.

תהליך הערכת תורם הלב הפוטנציאלי

- תהליך הערכת התורם כולל שני שלבים:
  - יש לשלול הוריות נגד לקבלת תרומת הלב כגון הפרעה בתפקוד השתל, מום לב מולד בתורם, נוכחות מחלות מדבקות או ממאירויות בתורם (למעט גידולים ראשוניים של מערכת העצבים המרכזית).
  - בשלב השני מותאם לתורם ההולם ממתין להשתלה התואם לו.

התאמה לפי סוג הדם (O,B,A,AB)

- השלב הראשון בהתאמת הממתין להשתלה לתרומת האיבר נקבעת על פי סוג הדם.
- למרות זאת, בשנים האחרונות בוצעו בהצלחה השתלות לב מוצלחות מתינוקות ללא התאמה בסוג הדם.
- פעולה זו בוצעה לאור הטיטר הנמוך של הנוגדנים אנטי A ואנטי B בסרום של תינוקות מתחת לגיל שנה ובהתייחס לכך שתינוקות לא מפתחים נוגדנים כנגד קבוצות הדם.
- גישה זו תסייע בשימוש בתרומות איברים שלא נמצא להם מקבל מתאים לכאורה ובכך להוריד את תמותת התינוקות ברשימת הממתינים להשתלה.

TABLE 4. Heart Failure Staging in Pediatric Heart Disease

Stage	Interpretation	Clinical Examples
A	At risk for developing heart failure	Congenital heart defects
		Family history of cardiomyopathy
		Anthracycline exposure
B	Abnormal cardiac structure and/or function	Univentricular hearts
	No symptoms of heart failure	Asymptomatic cardiomyopathy
		Repaired congenital heart disease
C	Abnormal cardiac structure and/or function	Repaired and unrepaired congenital heart defects
	Past or present symptoms of heart failure	Cardiomyopathies
D	Abnormal cardiac structure and/or function	Same as stage C
	Continuous infusion of intravenous inotropes or prostaglandin E_1 to maintain patency of a ductus arteriosus	
	Mechanical ventilatory and/or mechanical circulatory support	

Reprinted from Rosenthal et al,[105] with permission of the publisher.

Recommendations for Pediatric Heart Transplantation

- Stage D heart failure associated with systemic ventricular dysfunction in pediatric patients with cardiomyopathies or previous repaired or palliated congenital heart disease (Level of Evidence B).
- Stage C heart failure in pediatric heart disease associated with severe limitation of exercise and activity. If measurable, such patients would have a peak maximum oxygen consumption50% predicted for age and sex (Level of Evidence C).
- Stage C heart failure associated with systemic ventricular dysfunction in pediatric patients with cardiomyopathies or previously repaired or palliated congenital heart disease whenheart failure is associated with significant growth failure attributable to the heart disease (Level of Evidence B).

Circulation, 2007

Recommendations for Pediatric Heart Transplantation

- Stage C heart failure in pediatric heart disease with associated near sudden death and/or life-threatening arrhythmias untreatable with medications or an implantable defibrillator(Level of Evidence C).
- Stage C heart failure in pediatric restrictive cardiomyopathy disease associated with reactive pulmonary hypertension (Level of Evidence C).
- In the presence of other indications for heart transplantation, heart transplantation is feasible in patients with pediatric heart disease and an elevated pulmonary vascular resistance index 6 Woods units/m2 and/or a transpulmonary pressure gradient 15 mm Hg if administration of inotropic support or pulmonary vasodilators can decrease pulmonary vascular resistance to 6 Woods units/m2 or the transpulmonary gradient to 15 mm Hg (Level of Evidence B).

Circulation, 2007

Cardiac Retransplantation in Pediatric Patients

- ***Class I***
  - Retransplantation is indicated in children with abnormal ventricular function and at least moderate graft vasculopathy (Level of Evidence B).
- ***Class IIA***
  - Retransplantation is indicated in children with normal ventricular function and at least moderate graft vasculopathy (Level of Evidence B).
- ***Class III***
  - Retransplantation should not be performed during an episode of ongoing acute allograft rejection, even in the presence of graft vasculopathy (Level of Evidence B).
  - Retransplantation is not efficacious when performed during the first 6 months after primary transplantation (Level of Evidence B).

Circulation, 2007

Adults With Previously Repaired Congenital Heart Disease

- ***Class I***
  - Severe systemic ventricular dysfunction after repair of congenital heart disease in adults when accompanied by persistent or recurrent stage D heart failure symptoms despite optimal medical therapy (Level of Evidence B).
  - Recurrent symptomatic ventricular arrhythmias refractory to all therapeutic modalities (Level of Evidence B).
  - In the presence of other indications for heart transplantation, heart transplantation is feasible in adult patients with congenital heart disease and an elevated pulmonary vascular resistance index 6 Woods units/m2 and/or a transpulmonary pressure gradient 15 mm Hg if administration of inotropic support and/or pulmonary vasodilators can decrease pulmonary vascular resistance to 6 Woods units/m2 or the transpulmonary gradient to 15 mm Hg (Level of Evidence B).

Circulation, 2007

Adults With Previously Repaired Congenital Heart Disease

- ***Class IIA***
  - Heart transplantation is indicated as therapy for stage C heart failure in adults with previously repaired or palliated congenital heart disease associated with severe limitation of exercise and activity. Such patients would have peak maximum oxygen consumption of 15 mL · kg1 · min1 or 50% predicted for age and sex (Level of Evidence C).
  - Several anatomic and physiological conditions likely worsen the natural history of previously repaired or palliated congenital heart disease in adults (especially compared with ischemic or dilated cardiomyopathy) and enhance the advisability of cardiac transplantation, including (1) pulmonary hypertension and a potential risk of developing fixed, irreversible elevation of pulmonary vascular resistance that could preclude orthotopic heart transplantation in the future; (2) severe aortic or systemic A-V valve insufficiency that is not considered amenable to surgical correction; (3) severe arterial oxygen desaturation (cyanosis) that is not considered amenable to surgical correction; and (4) persistent protein-losing enteropathy despite optimal medical-surgical therapy (Level of Evidence C).

Circulation, 2007

Heart Transplantation Technique

- Orthotopic
- Heterotopic
- Biatrial
- Bicaval

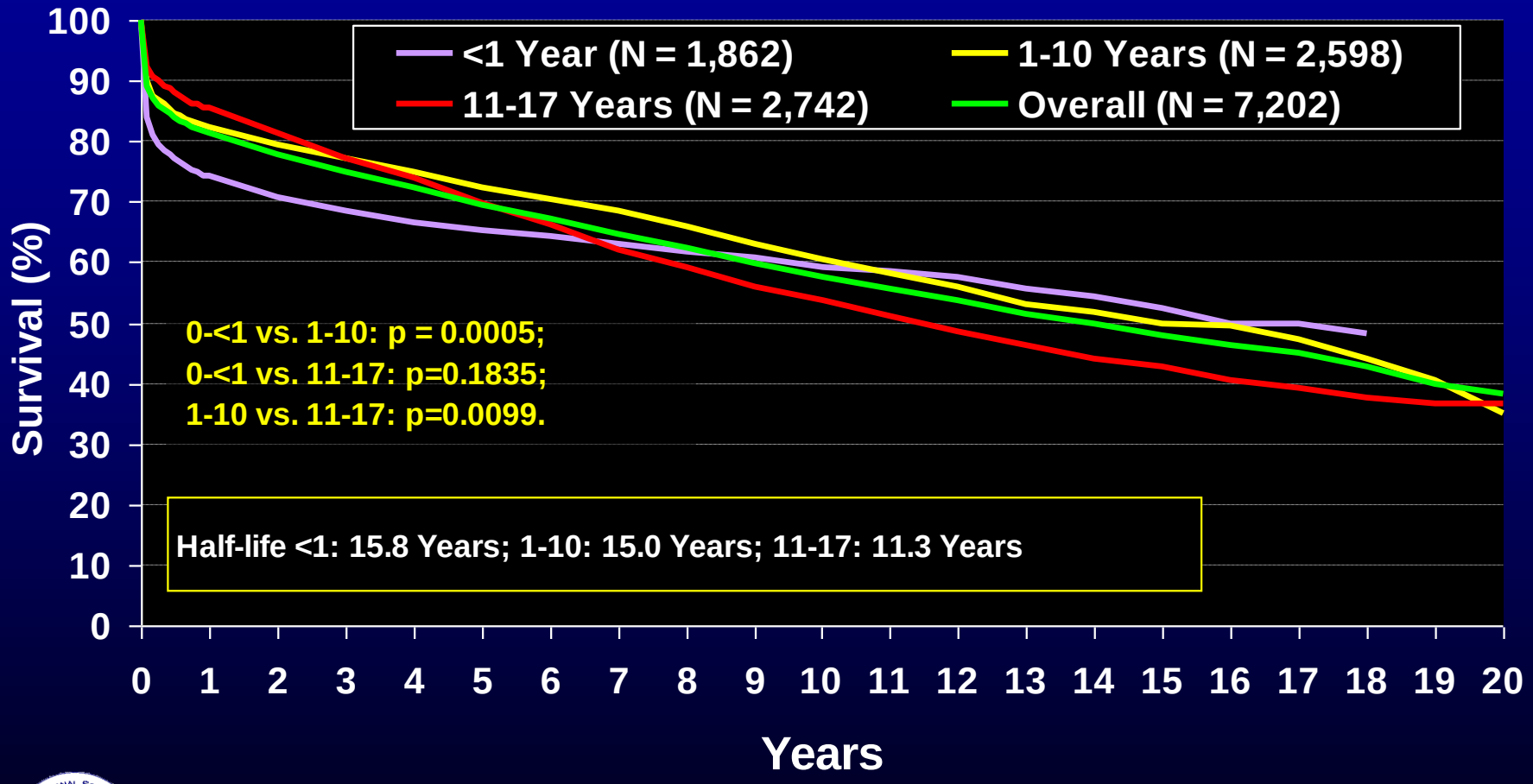
שינויים טכניים בניתוח השתלת הלב

- בהשתלת לב בילדים מקובל להנציל מהתורם את כלי הדם באורך המירבי שניתן להוצאה.
- שיירים וסקולריים אלה ישמשו כגשר על פני חוסרים בלב המקבל שנובעים ממומי לב מסויימים (קשת אאורטה היפופלסטית או Interrupted aortic arch).
- דקטרוקרדיה
  - שימוש בקטה פריקרד נתרם להגנה על עצב הפרניק משמאל כך שהלב הנתרם יוכל להתפשט לחזה השמאלי)
- situs inversus totalis
  - בעתיות בהמצאותם של שני הורידים הגדולים, וריד נבוב תחתון ועליון משמאל כך שדרשת רקמה ליצירת הארכה לורידים הגדולים להעברתם לימין) וכן במצבים של טרנספוזיציה של הכלים הגדולים.

- Heart transplantation is not feasible in the presence of severe hypoplasia of the central branch pulmonary arteries or pulmonary veins (Level of Evidence C).

PEDIATRIC HEART TRANSPLANTATION

Kaplan-Meier Survival (Transplants: 1/1982-6/2006)



ISHLT 2008

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)
Risk Factors for 1 Year Mortality

Continuous Factors (see figures)

Recipient Age (borderline)	Creatinine
Donor Age	Donor BSA (borderline)
Pediatric transplant volume	

N=3,395

ISHLT

2008

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)
Risk Factors For 1 Year Mortality

VARIABLE	*N*	*Relative Risk*	*P-value*	*95% Confidence Interval*
Congenital diagnosis, age > 0, on ECMO	56	4.80	<0.0001	2.94 -7.83
Congenital diagnosis, age = 0, on ECMO	63	4.74	<0.0001	2.99 -7.53
Congenital diagnosis, age > 0, no ECMO	735	2.32	<0.0001	1.76 -3.06
Retransplant	201	2.26	0.0001	1.52 -3.36
Congenital diagnosis, age=0, on PGE	209	1.93	0.0021	1.27 -2.93
Congenital diagnosis, age = 0, no PGE or ECMO	352	1.7	0.0039	1.19 -2.45
Year of Transplant: 1995-96 vs. 1999-2000	505	1.54	0.0057	1.13 -2.08
On ventilator	636	1.51	0.0008	1.19 -1.92
Female recipient	1488	1.23	0.0321	1.02 -1.48
Not ABO identical	759	0.77	0.0231	0.61 -0.96

N=3,395

ISHLT

2008

Reference diagnosis = cardiomyopathy

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2005)
Borderline Significant Risk Factors For 1 Year Mortality

VARIABLE	N	*Relative Risk*	*P-value*	*95% Confidence Interval*
VAD (diagnosis other than congenital)	217	1.44	0.0769	0.96 -2.14
Infection requiring IV drug therapy (with 2wk/TX)	511	1.23	0.0952	0.96 -1.56
Donor cause of death = anoxia	764	0.82	0.0893	0.66 -1.03

N=3,395

ISHLT

2008

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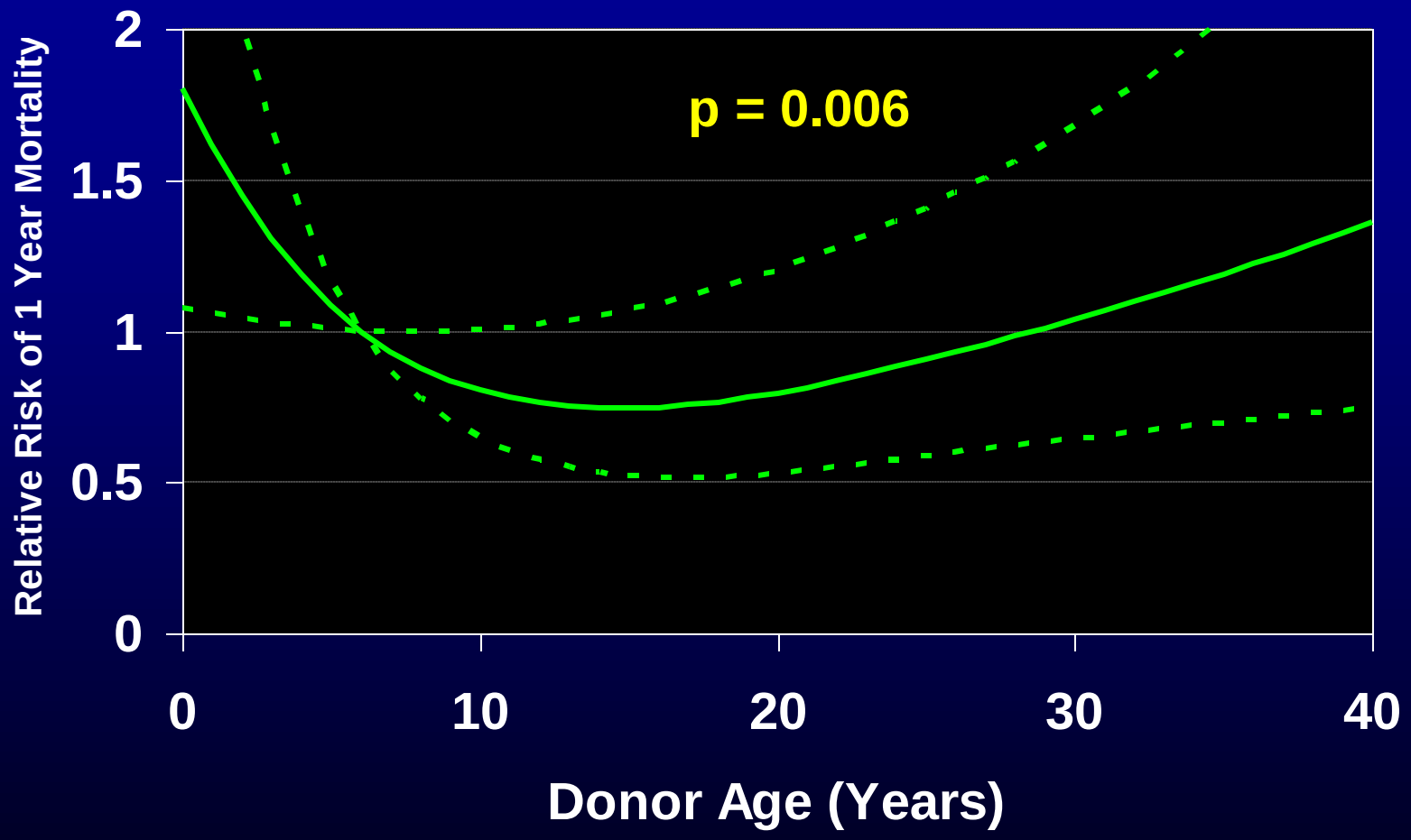
PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)

Risk Factors for 1 Year Mortality

Donor Age



ISHLT

2008

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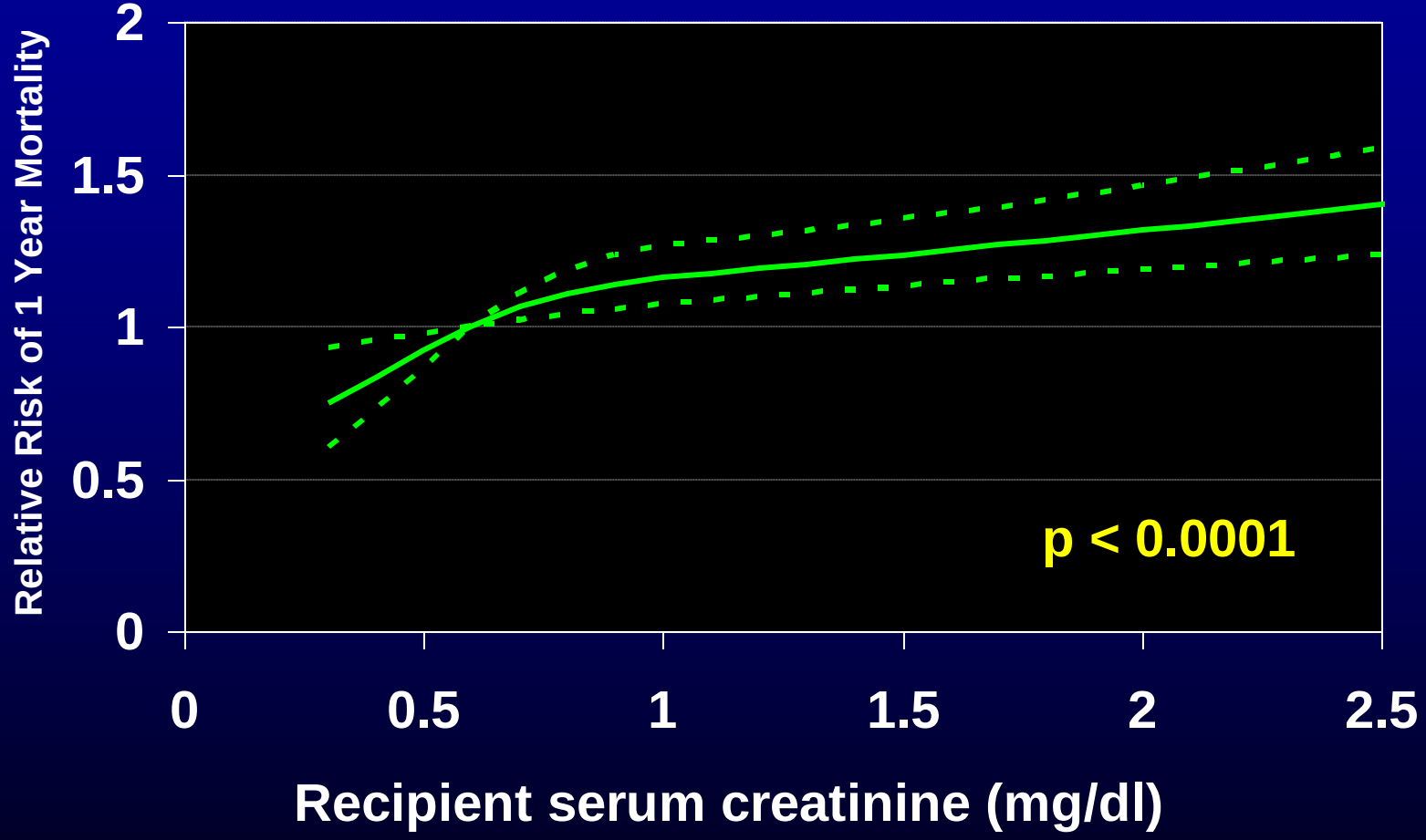
N=3,395

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)

Risk Factors for 1 Year Mortality

Pre-Transplant Creatinine



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2008

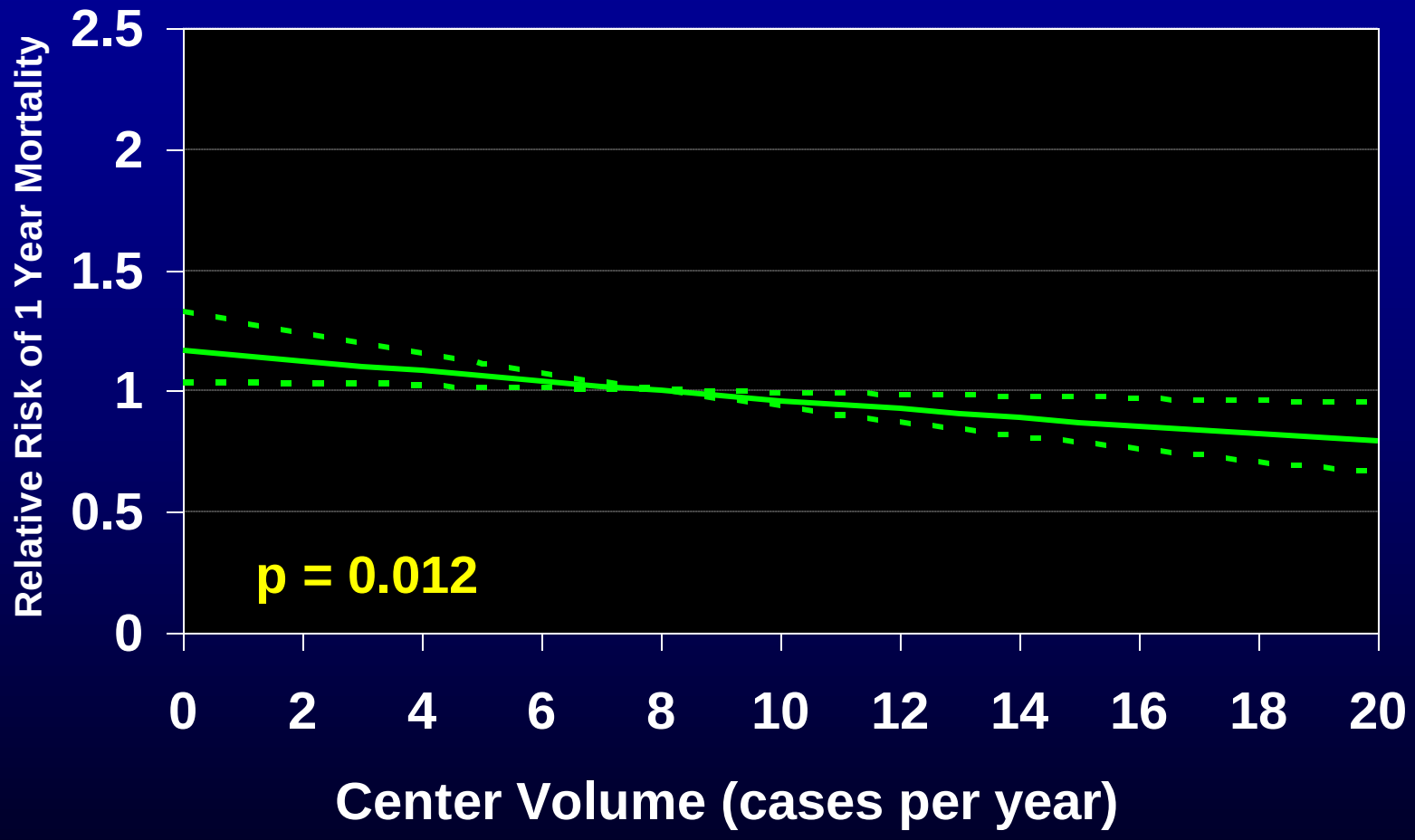
J Heart Lung Transplant 2008;27: 937-983

N=3,395

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)

Risk Factors for 1 Year Mortality

Center Volume for Pediatric Transplants



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2008

J Heart Lung Transplant 2008;27: 937-983

N=3,395

PEDIATRIC HEART TRANSPLANTS (1/1995-6/2006)

Factors Not Significant for 1 Year Mortality

Recipient Factors:

IV inotropes, sternotomy, history of malignancy, hospitalized, diabetes

Donor Factors:

Gender, clinical infection, history of diabetes

Transplant Factors:

CMV mismatch, ischemia time, HLA mismatch

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J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)
Risk Factors For 10 Year Mortality

VARIABLE	*N*	*Relative Risk*	*P-value*	*95% Confidence Interval*
Congenital diagnosis, ECMO	15	3.31	.0078	1.37 -7.99
Ventilator	107	1.60	.0339	1.04 -2.48
Female donor	299	1.56	.0141	1.09 -2.24

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N=697

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)
Risk Factors for 10 Year Mortality

Continuous Factors (see figures)

Creatinine

BSA ratio (borderline)

Pediatric transplant volume

Donor weight

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2008

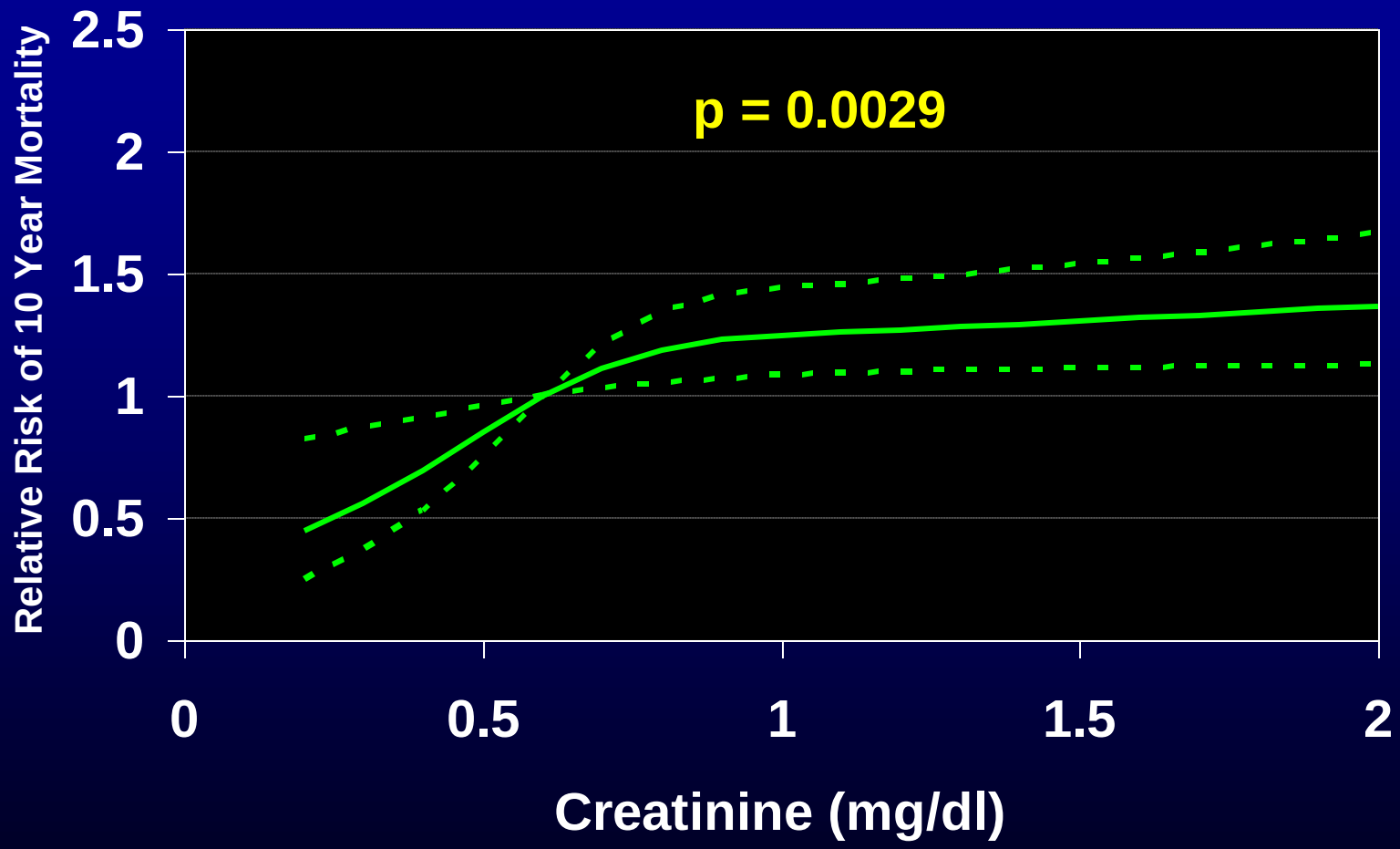
N=697

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)

Risk Factors for 10 Year Mortality

Pre-Transplant Creatinine



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2008

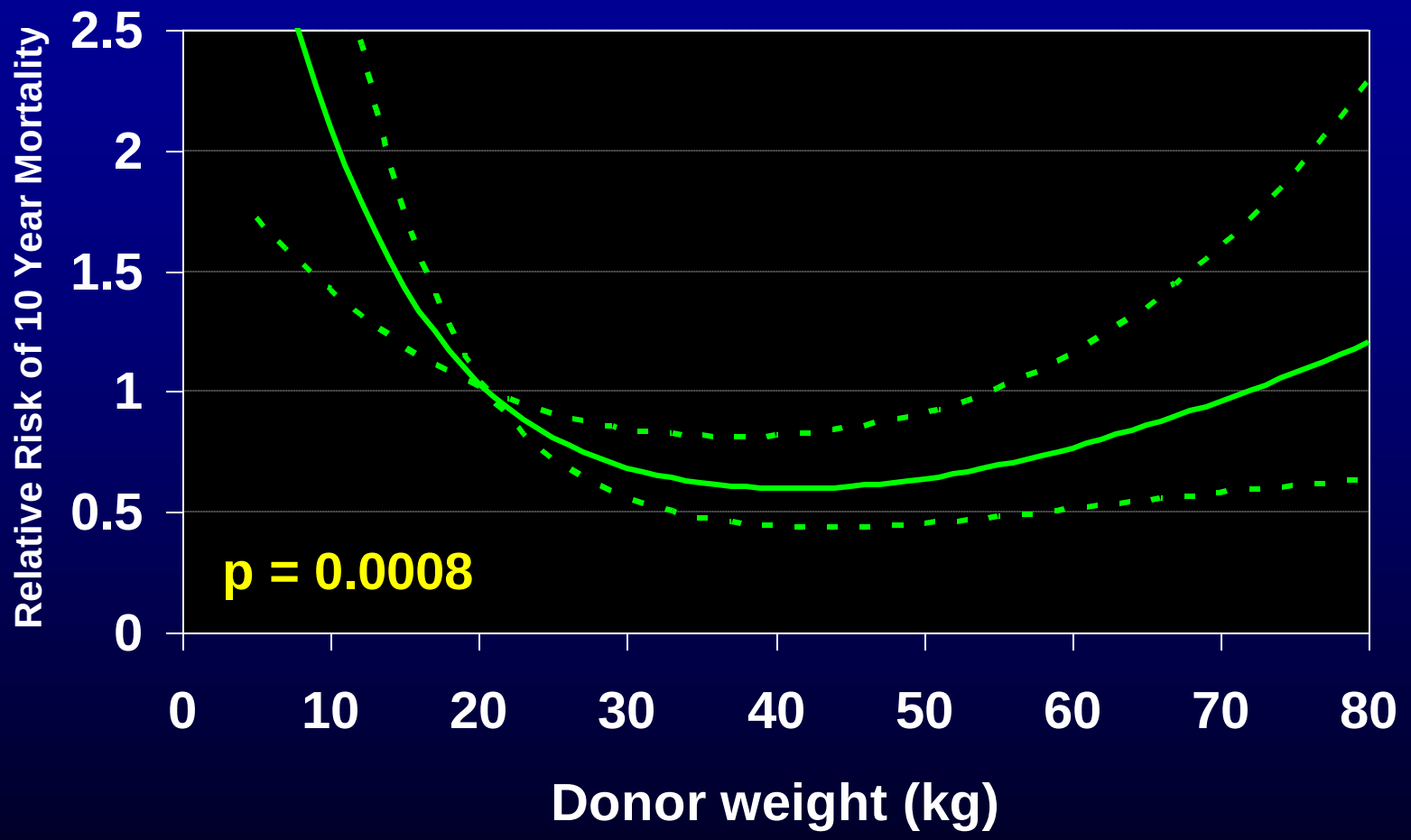
N=697

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)

Risk Factors for 10 Year Mortality

Donor Weight



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2008

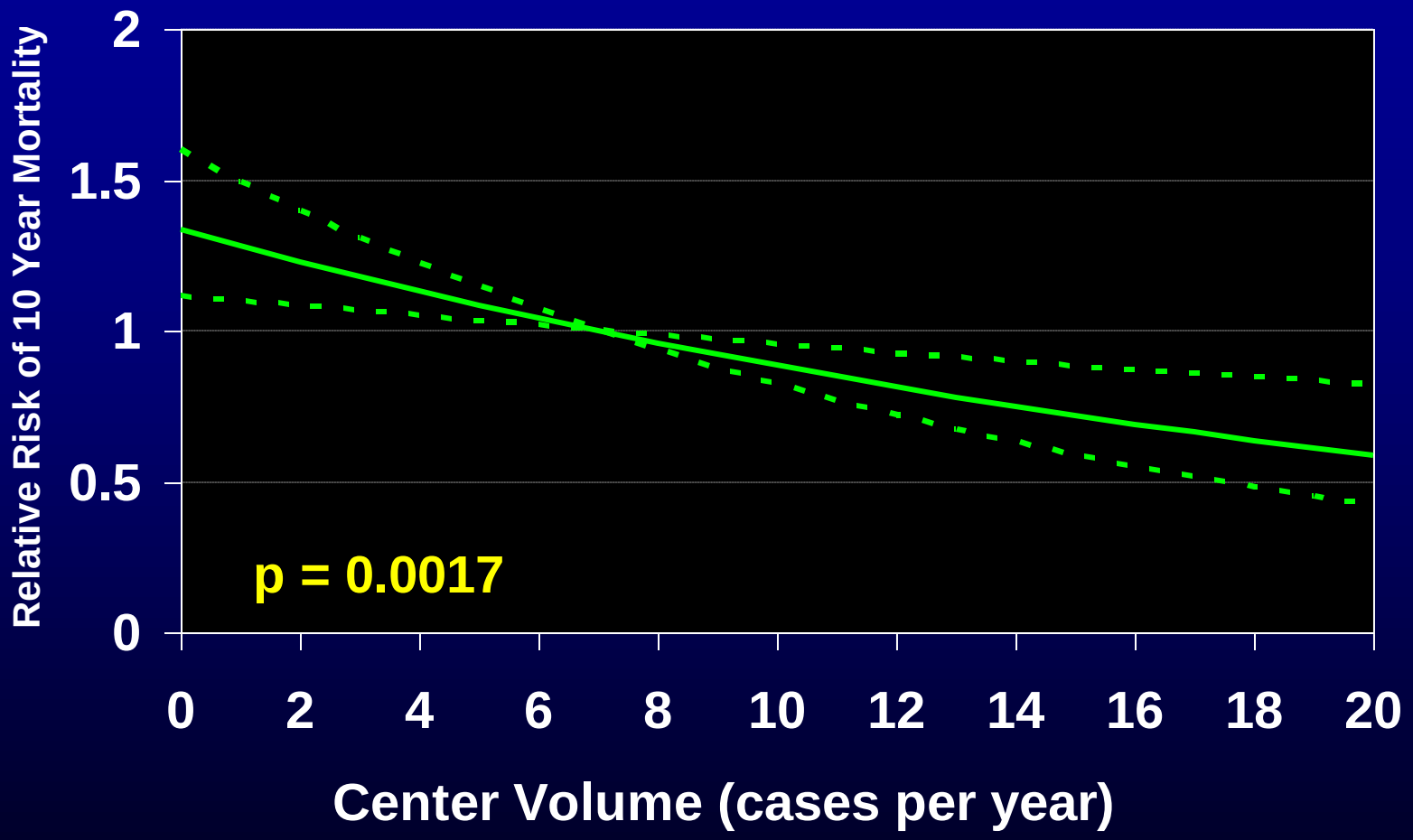
J Heart Lung Transplant 2008;27: 937-983

N=697

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)

Risk Factors for 10 Year Mortality

Center Volume for Pediatric Transplants



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2008

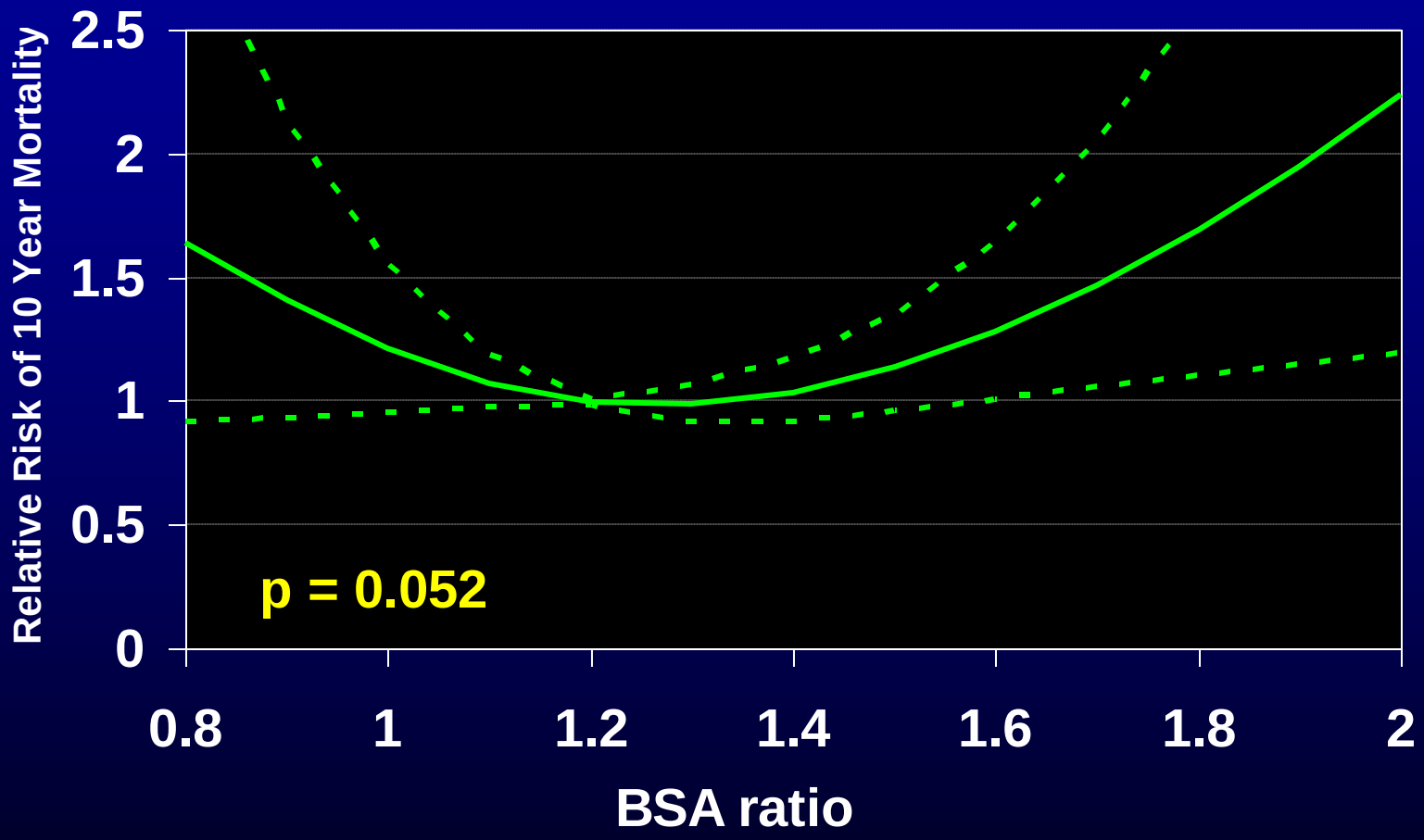
N=697

J Heart Lung Transplant 2008;27: 937-983

PEDIATRIC HEART TRANSPLANTS (1/1995-6/1997)

Risk Factors for 10 Year Mortality

BSA Ratio (Donor BSA/Recipient BSA)



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2008

N=697

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Retransplantation in Pediatric Heart Transplant Recipients

TABLE 3. Indications for Retransplantation in Pediatric Heart Transplant Recipients Within the UNOS/ISHLT Registry

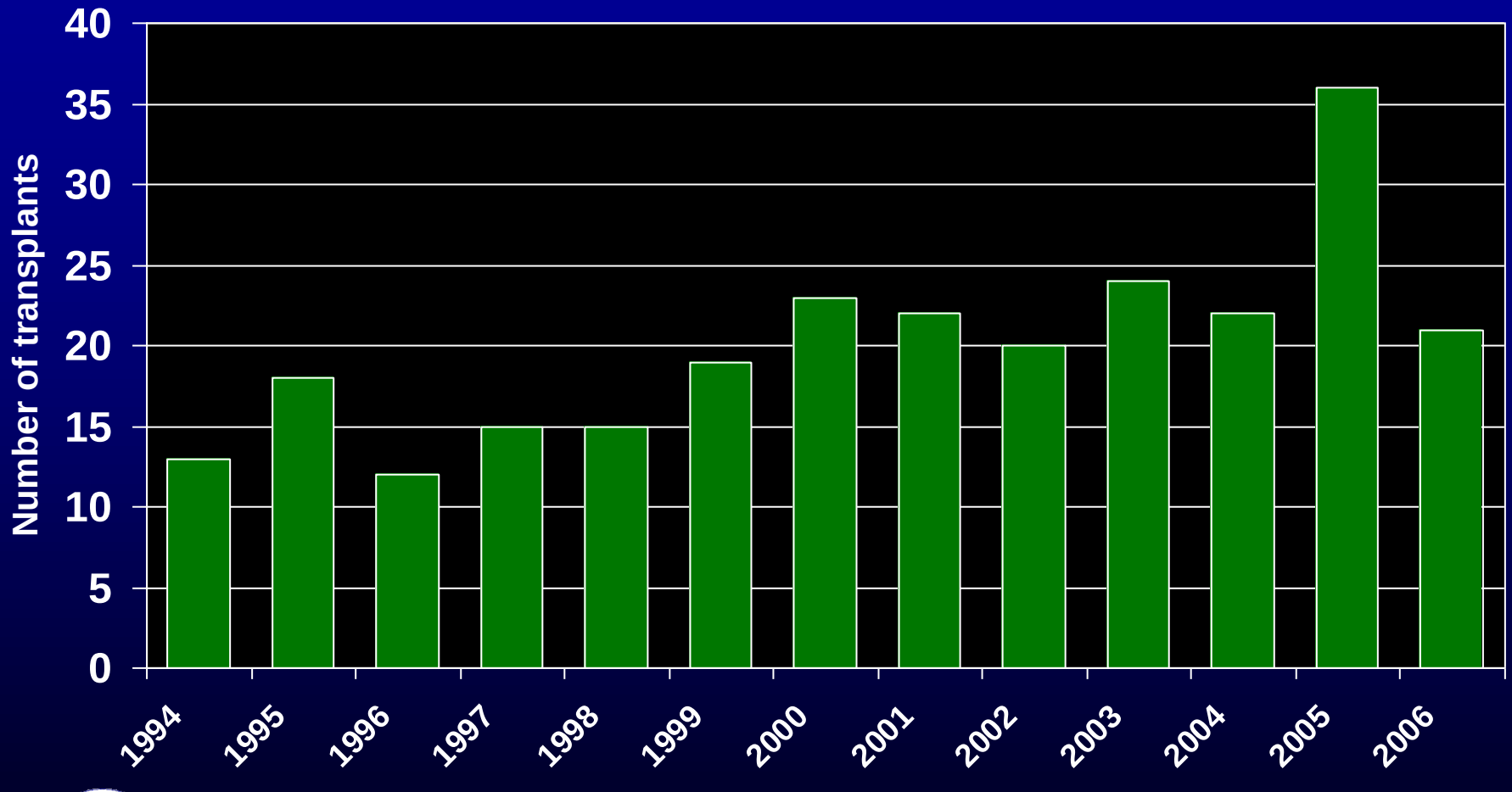
	n (N=219)	%
Primary failure	10	5
Hyperacute rejection	7	3
Acute rejection	19	9
Graft vasculopathy	111	51
Chronic rejection	16	7
Nonspecific graft failure	34	16
Other	22	10

Adapted from Mahle et al,[95] with permission of the publisher.

PEDIATRIC HEART RE-TRANSPLANTS

By Transplant Year

Retransplants: January 1994 – December 2006



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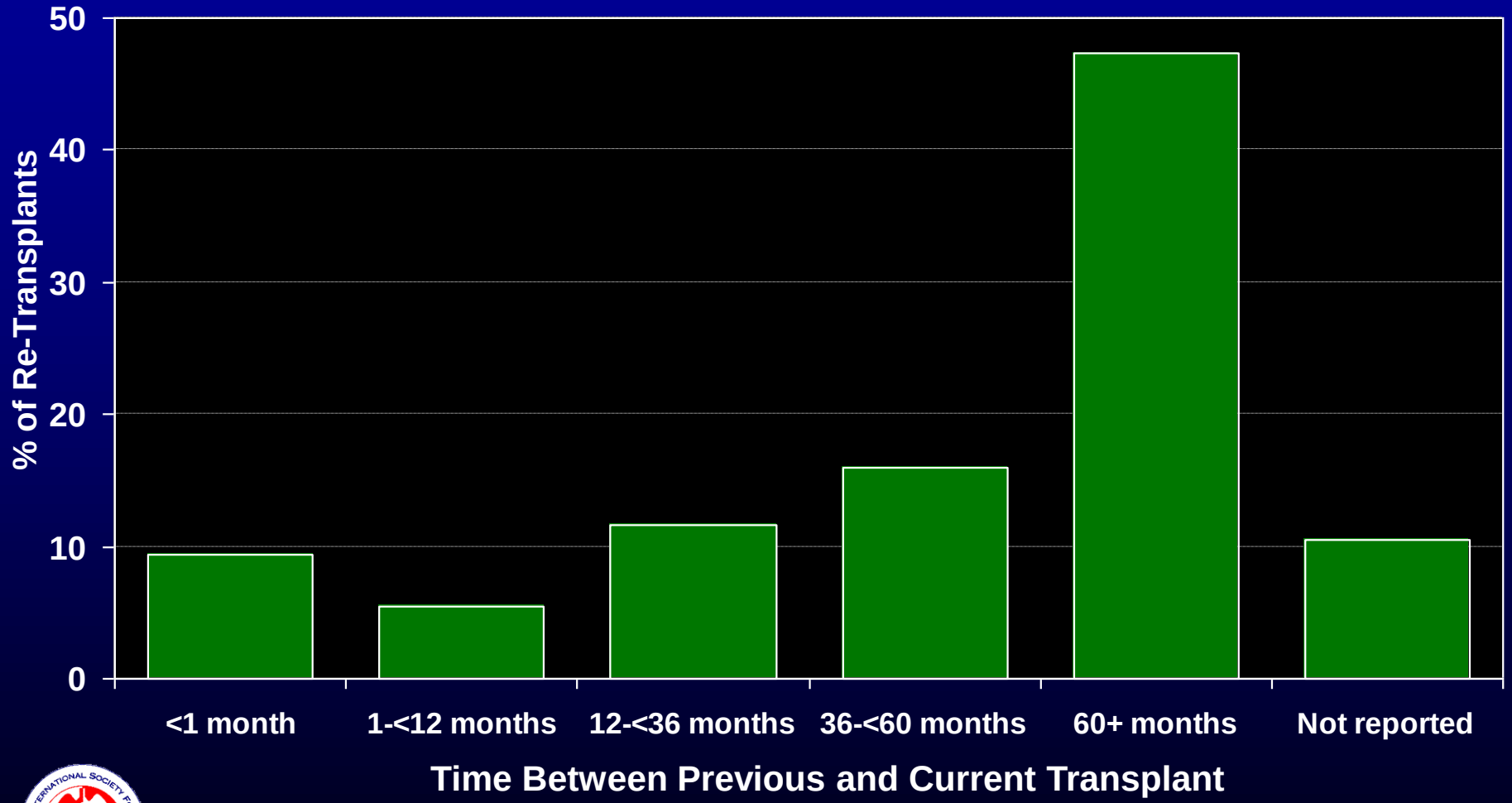
PEDIATRIC HEART RE-TRANSPLANTS

By Intertransplant Interval

Retransplants: January 1994 - June 2007



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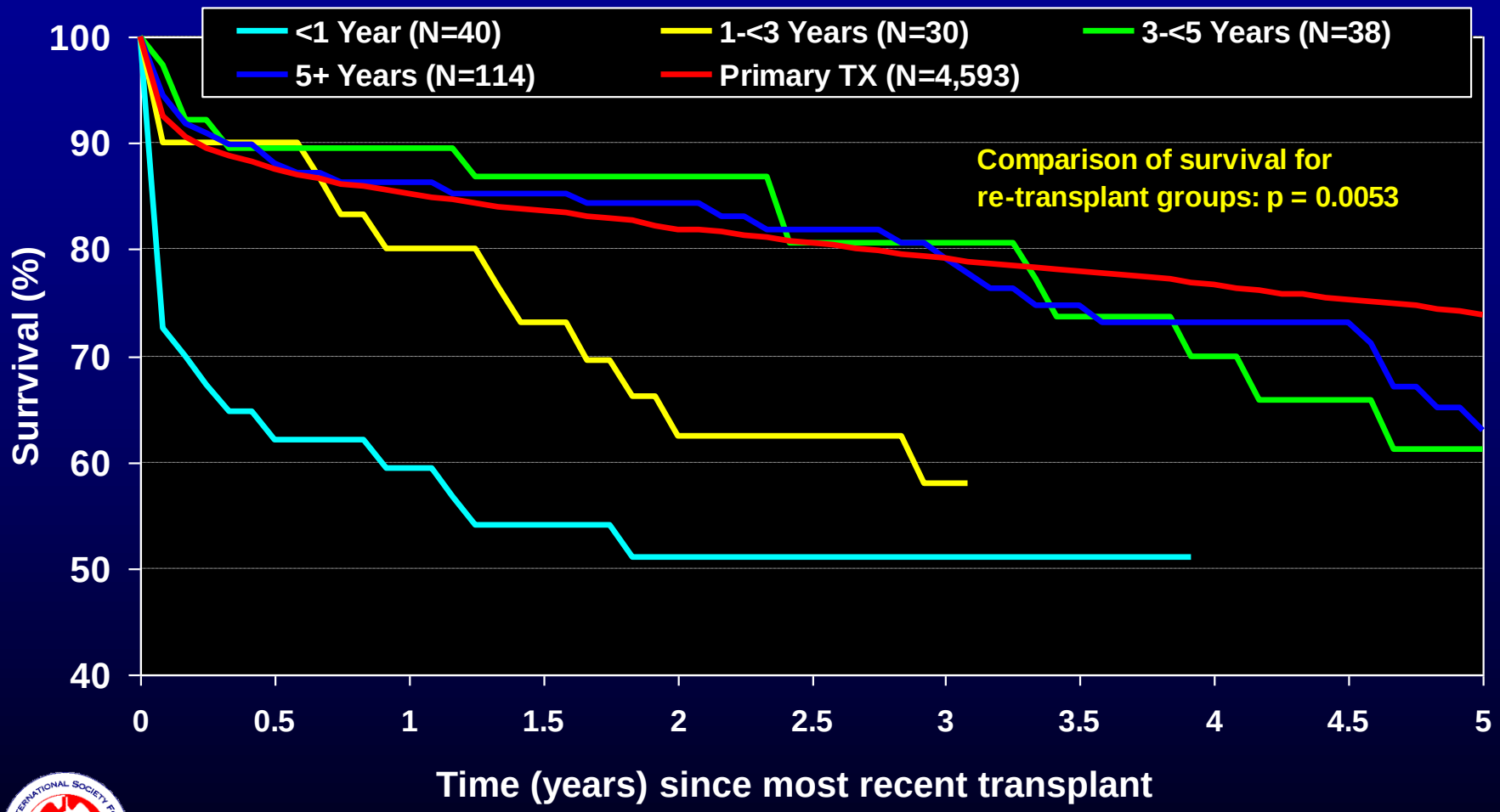
Retransplantation in Pediatric Heart Transplant Recipients

- Retransplantation was an independent risk factor for mortality after transplantation, with an odds ratio of 1.67.
- Risk factors for lower survival after retransplantation
  - an intertransplantation interval 180 days
  - the need for mechanical ventilation.
- After exclusion of patients with early graft failure, 1-year survival was similar after retransplantation compared with primary transplantation (86% versus 83%, respectively);
- However, by 5 years, survival was significantly worse in retransplantation than in primary transplant recipients.

ALMOND, 2006
CHIN, 2006

KAPLAN-MEIER SURVIVAL RATES FOR PEDIATRIC HEART RETRANSPLANTS STRATIFIED BY INTER-TRANSPLANT INTERVAL
Retransplants: January 1994 - June 2006



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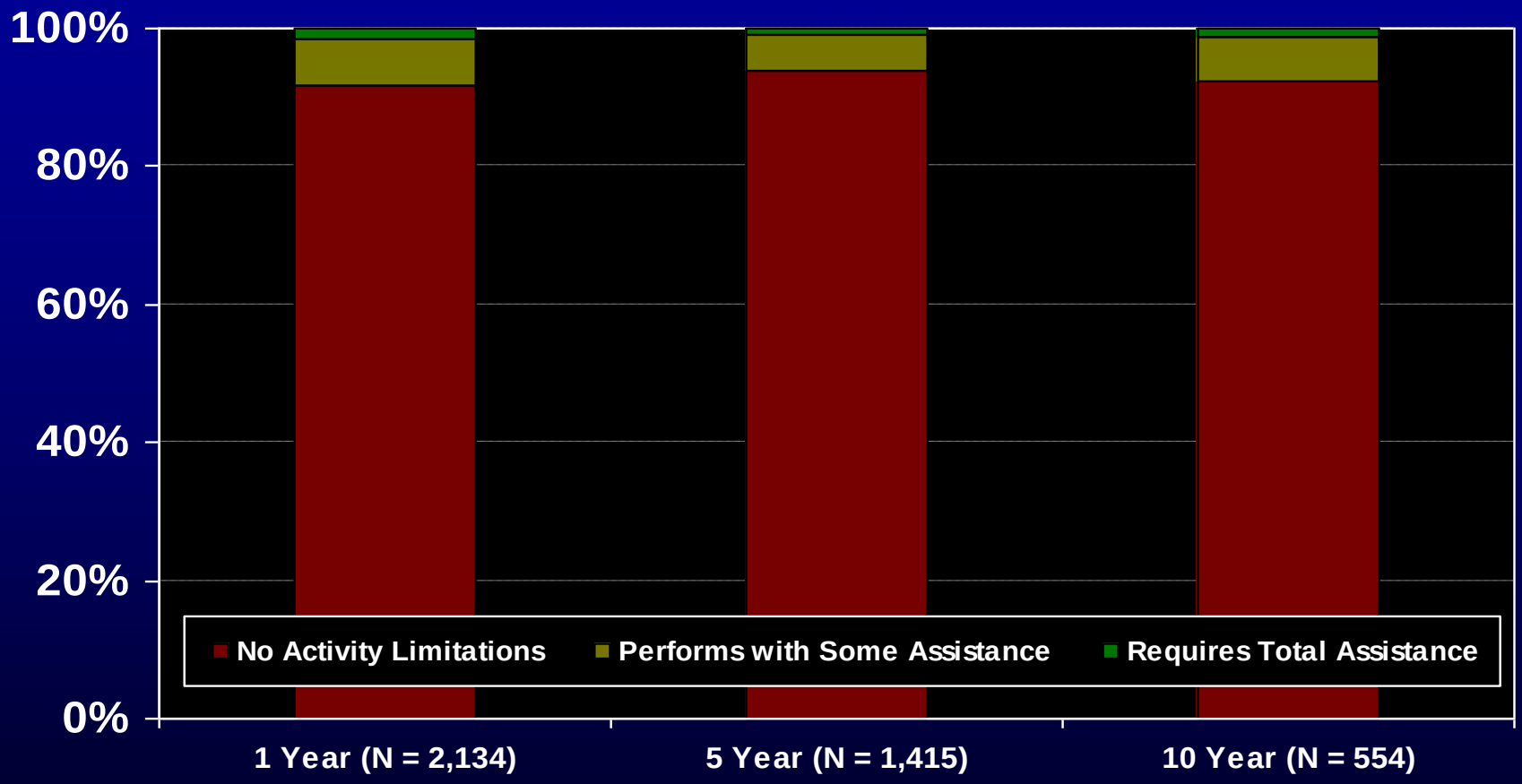
PEDIATRIC HEART RECIPIENTS

Functional Status of Surviving Recipients

(Follow-ups: April 1994 - June 2007)



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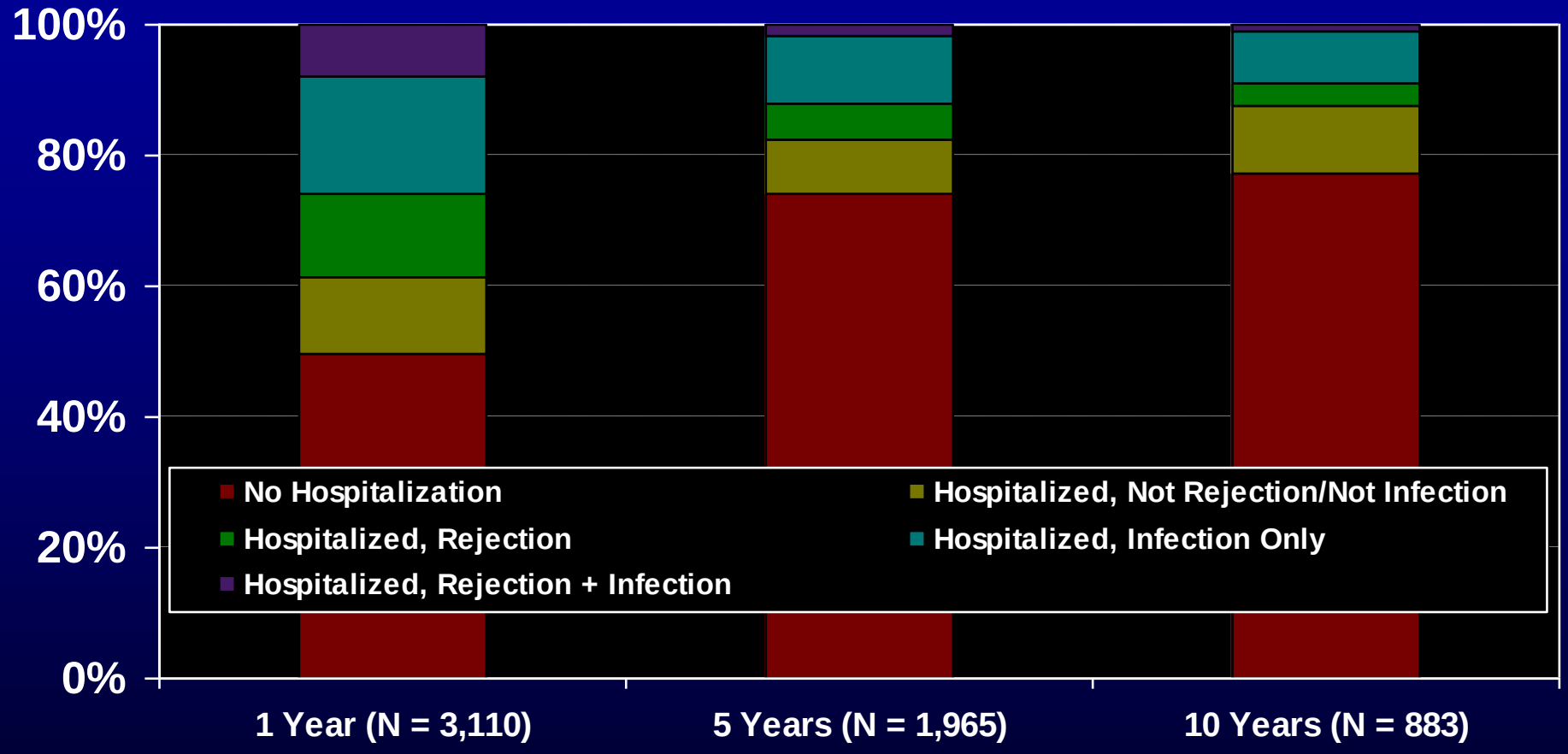
PEDIATRIC HEART RECIPIENTS

Rehospitalization Post-transplant of Surviving Recipients

(Follow-ups: April 1994 - June 2007)



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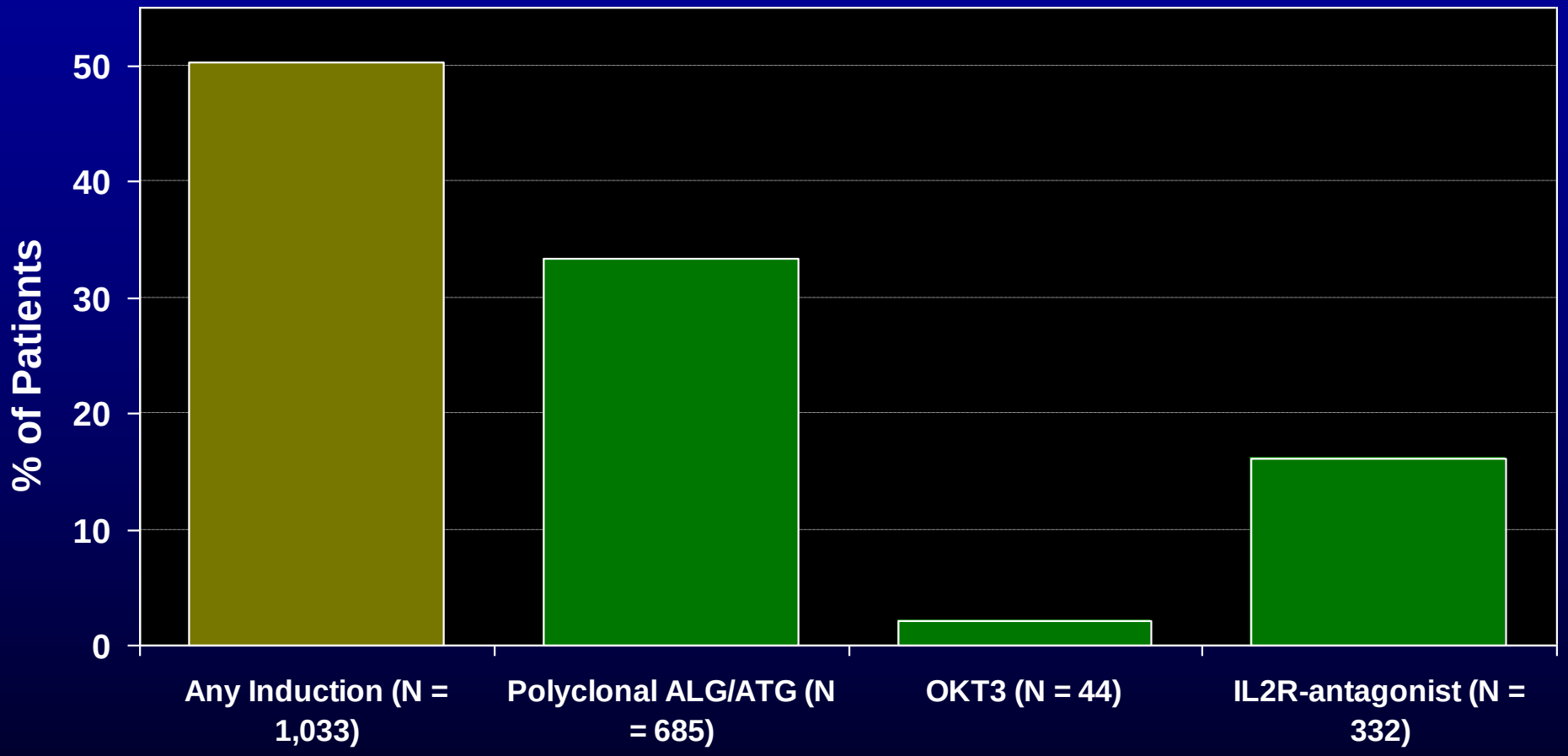
PEDIATRIC HEART RECIPIENTS

Induction Immunosuppression
(Transplants: January 2001 - June 2007)



ISHLT

2008

Analysis is limited to patients who were alive at the time of the follow-up

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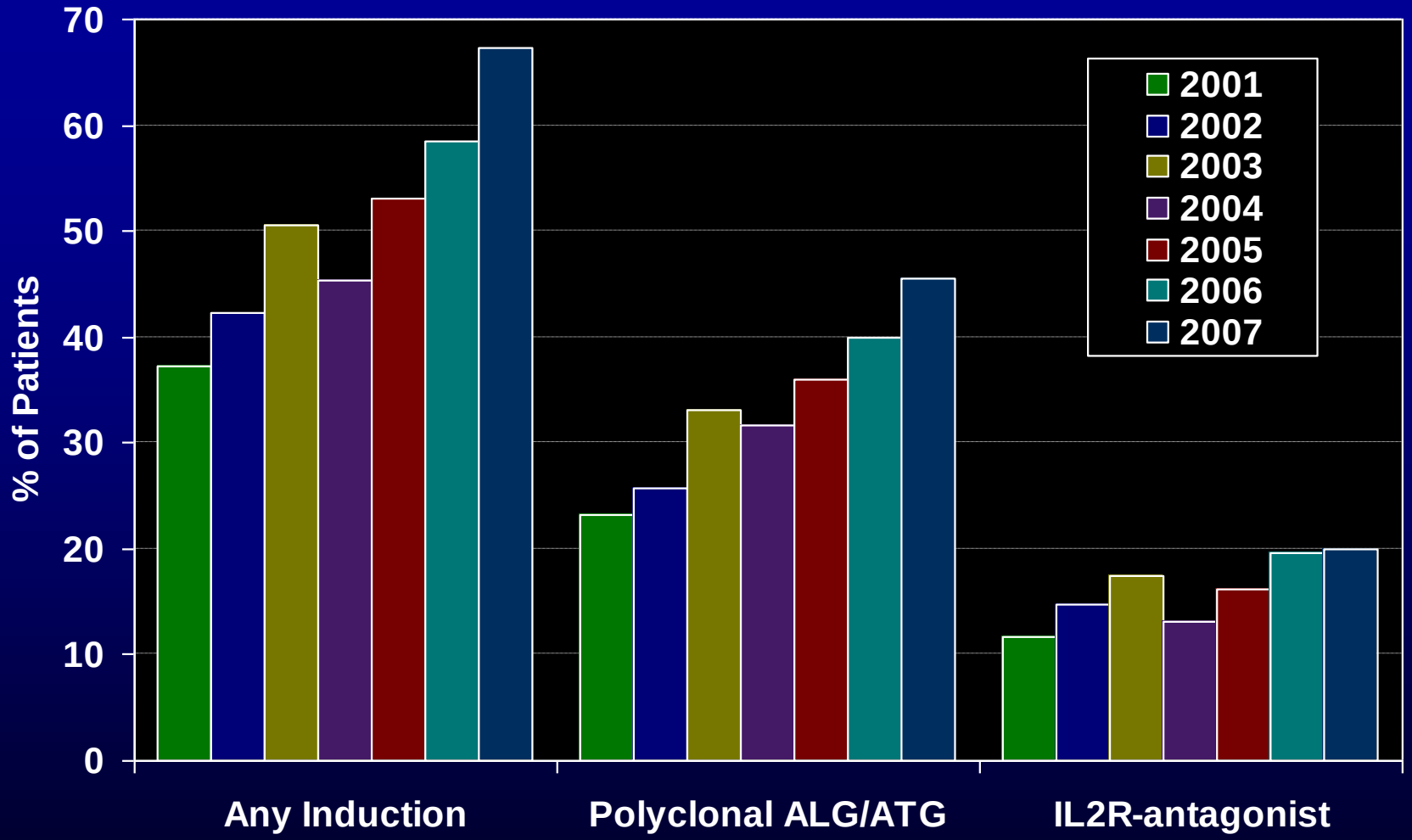
PEDIATRIC HEART RECIPIENTS

Induction Immunosuppression (Transplants: January 2001 - June 2007)



Test of increasing trend over time:
Any induction p < 0.0001
Polyclonal p < 0.0001
IL2 p = 0.0029
Analysis is limited to patients who were alive at the time of the follow-up

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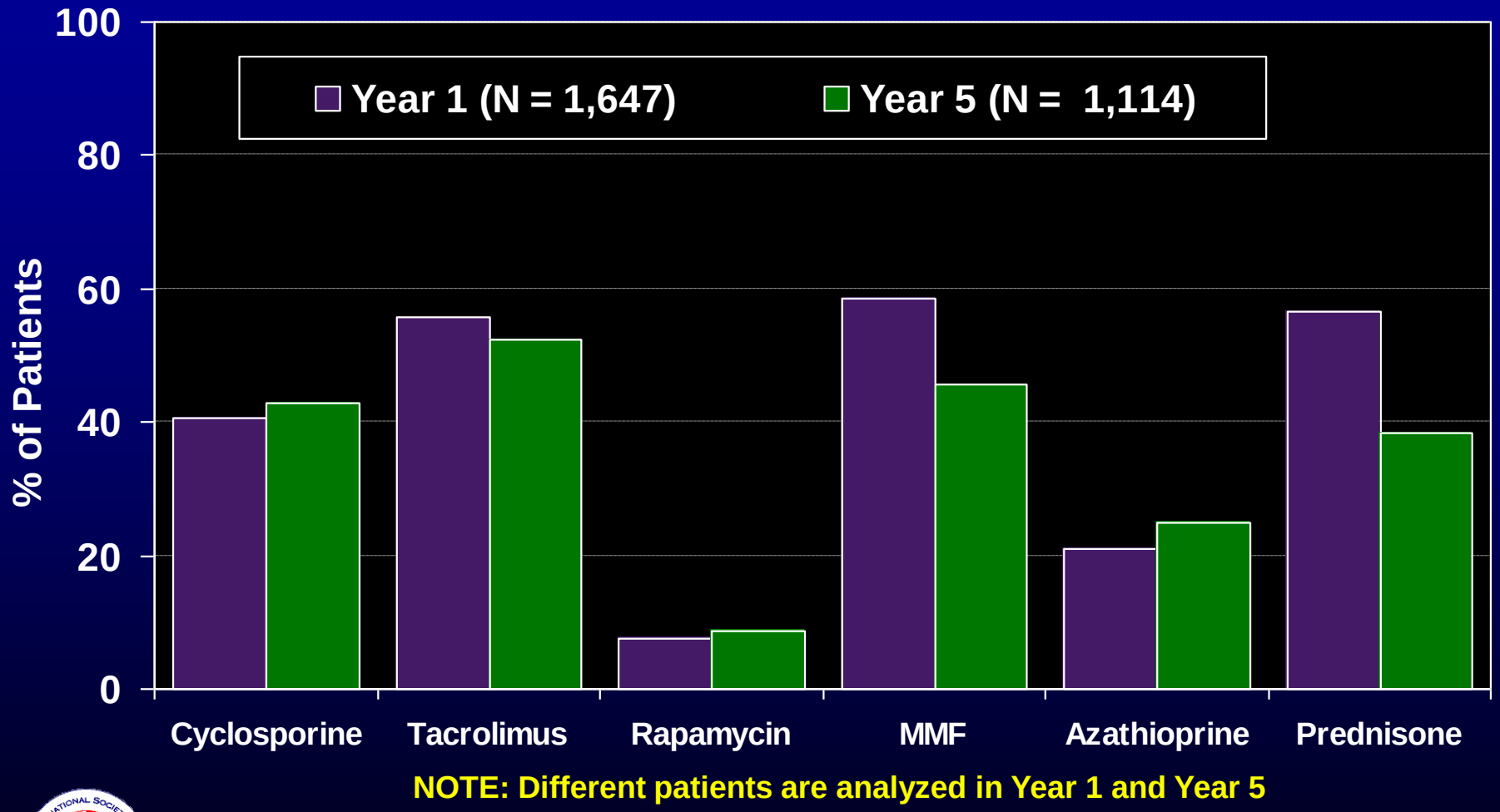
PEDIATRIC HEART RECIPIENTS

Maintenance Immunosuppression at Time of Follow-up (Follow-ups: January 2001 - June 2007)



NOTE: Different patients are analyzed in Year 1 and Year 5

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Analysis is limited to patients who were alive at the time of the follow-up

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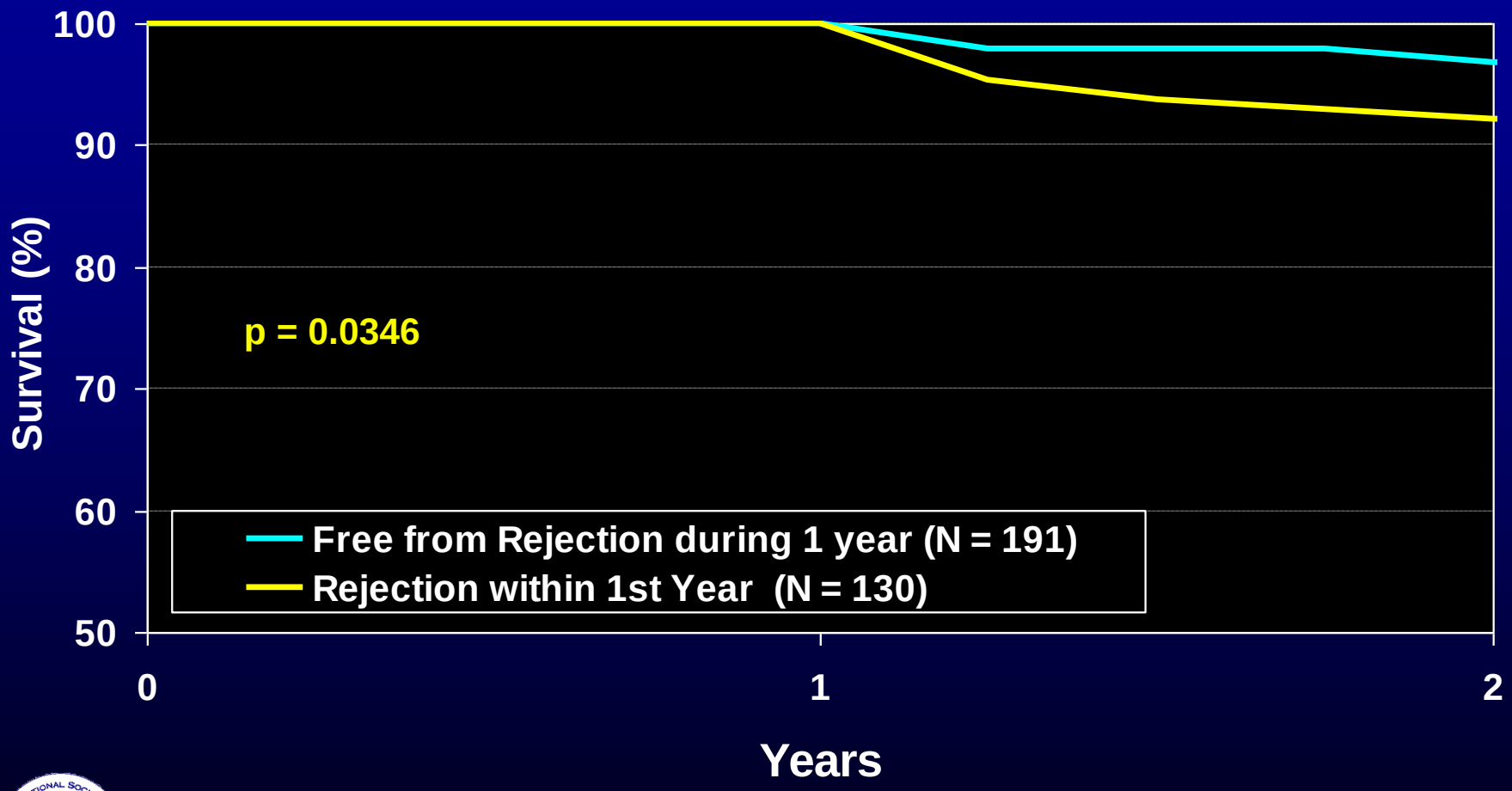
PEDIATRIC HEART TRANSPLANTATION

Kaplan-Meier Survival Based on Rejection within 1st Year

(1-Year Follow-ups: July 2004 - June 2006)



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FREEDOM FROM CORONARY ARTERY VASCULOPATHY

For Pediatric Heart Recipients (Follow-ups: April 1994 - June 2007)

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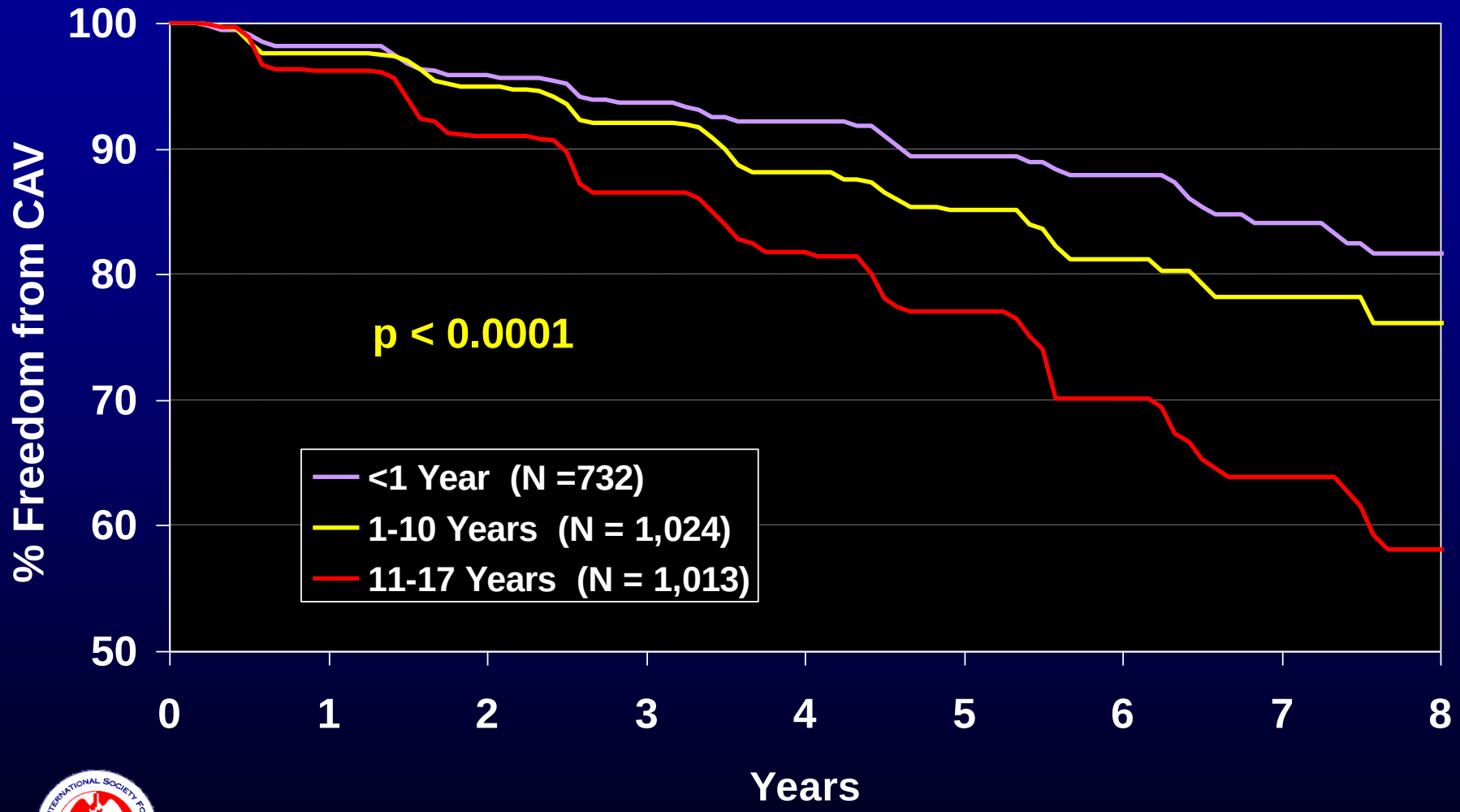
J Heart Lung Transplant 2008;27: 937-983

FREEDOM FROM CORONARY ARTERY VASCULOPATHY

For Pediatric Heart Recipients (Follow-ups: April 1994 - June 2007)

Stratified by Age Group



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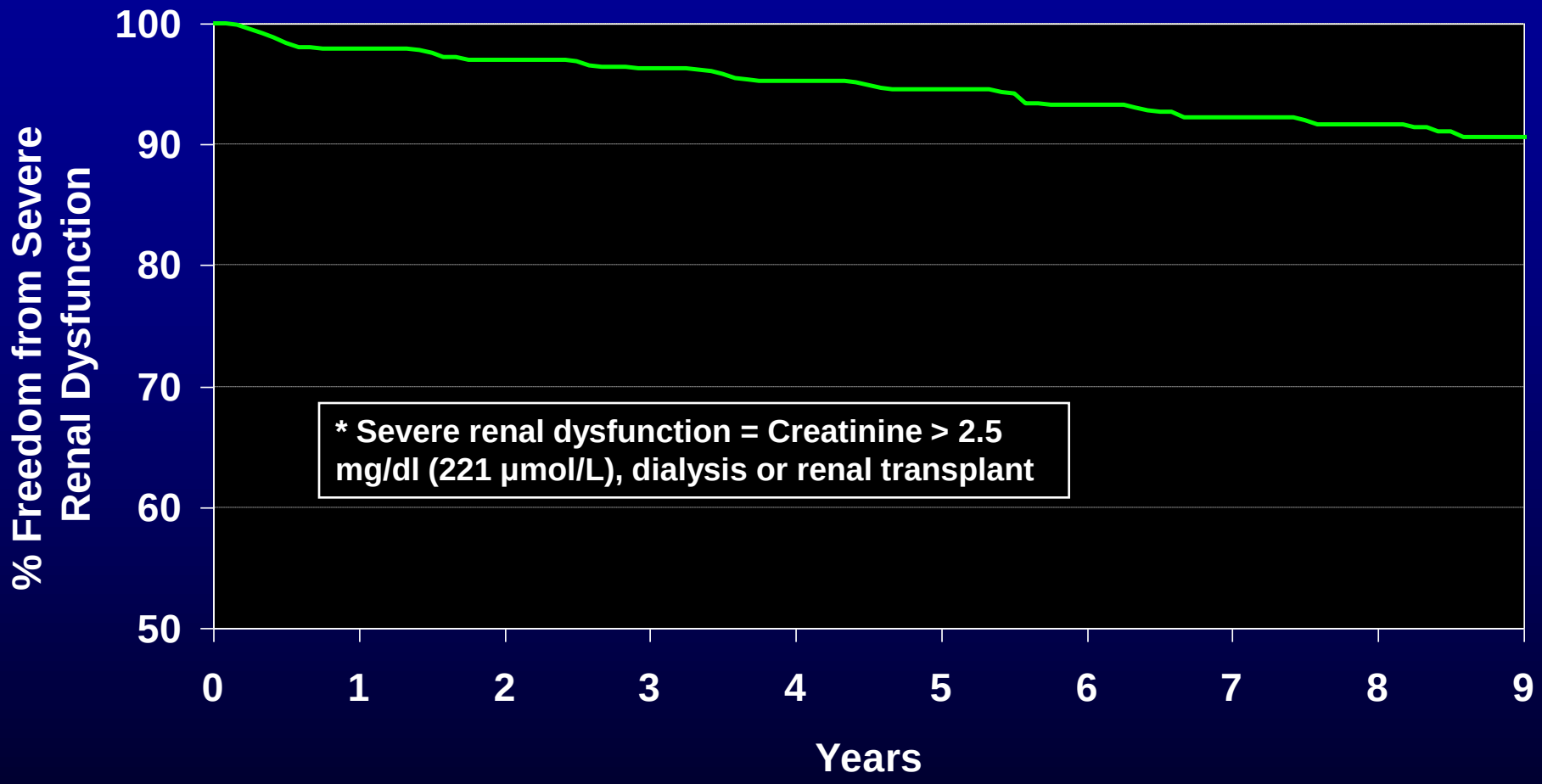
FREEDOM FROM SEVERE RENAL DYSFUNCTION*

For Pediatric Heart Recipients (Follow-ups: April 1994 - June 2007)



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MALIGNANCY POST-HEART TRANSPLANTATION FOR PEDIATRICS
Cumulative Prevalence in Survivors (Follow-ups: April 1994 - June 2007)

Malignancy/Type		1-Year Survivors	5-Year Survivors	10-Year Survivors
No Malignancy		3,065 (98.1%)	1,177 (95%)	253 (91.7%)
Malignancy (all types combined)		58 (1.9%)	62 (5%)	23 (8.3%)
Malignancy Type	*Lymph*	*54*	*57*	*22*
	Other	*3*	*6*	
	Skin		*1*	
	Type Not Reported	*1*		*1*

NOTE: Multiple types may be reported; sum of types may be greater than total number with malignancy.

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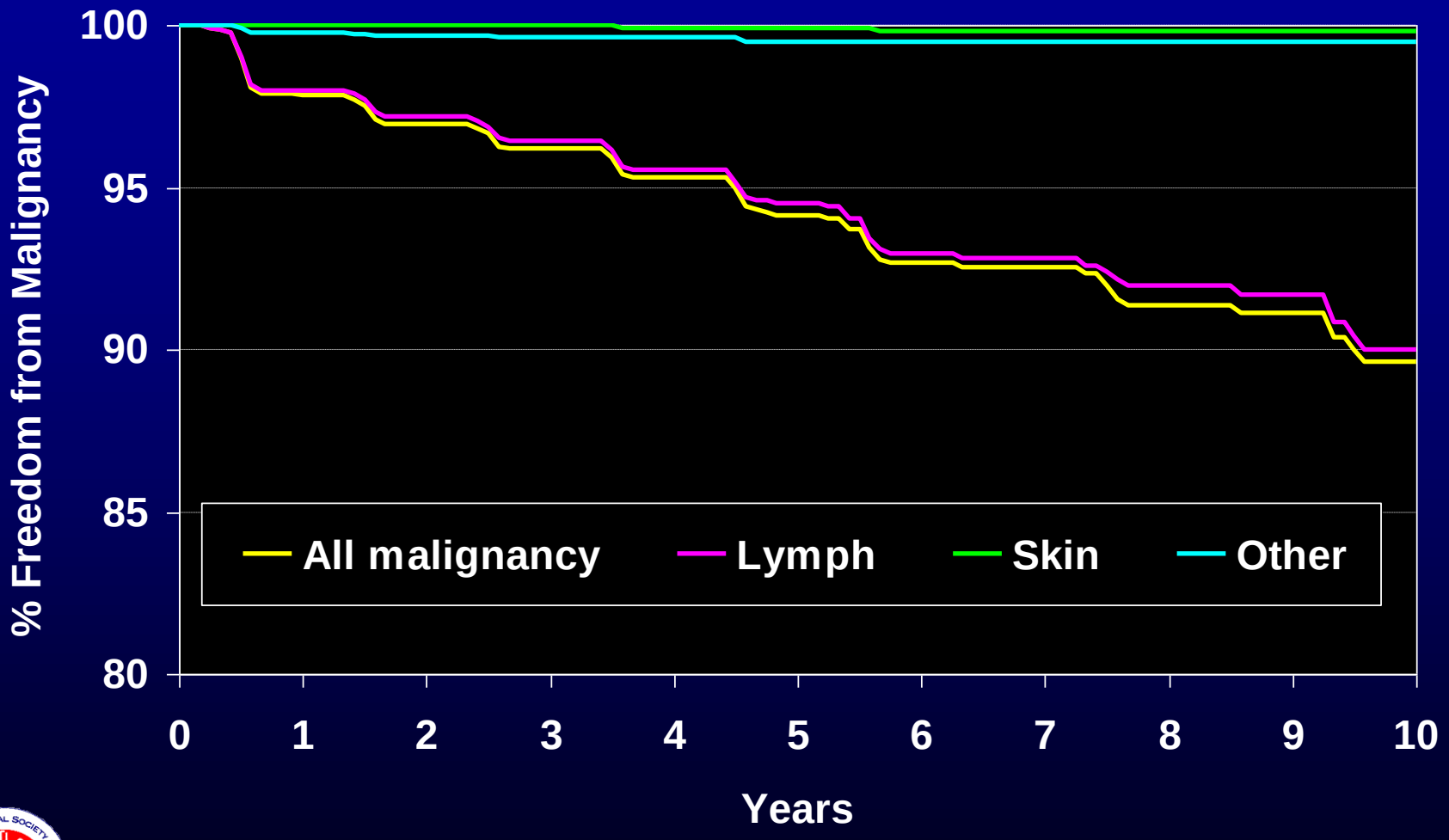
FREEDOM FROM MALIGNANCY

For Pediatric Heart Recipients (Follow-ups: April 1994 - June 2007)



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PEDIATRIC HEART TRANSPLANT RECIPIENTS:

Cause of Death (Deaths: January 1992 - June 2007)

CAUSE OF DEATH	0-30 Days (N = 444)	31 Days - 1 Year (N = 392)	>1 Year - 3 Years (N = 294)	>3 Years - 5 Years (N = 216)	>5 Years - 10 Years (N = 323)	>10 Years (N = 144)
CORONARY ARTERY VASCULOPATHY	5 (1.1%)	31 (7.9%)	59 (20.1%)	65 (30.1%)	92 (28.5%)	44 (30.6%)
ACUTE REJECTION	42 (9.5%)	94 (24.0%)	69 (23.5%)	29 (13.4%)	36 (11.1%)	8 (5.6%)
LYMPHOMA		10 (2.6%)	11 (3.7%)	5 (2.3%)	32 (9.9%)	9 (6.3%)
MALIGNANCY, OTHER		4 (1.0%)	2 (0.7%)	1 (0.5%)	4 (1.2%)	10 (6.9%)
CMV	1 (0.2%)	8 (2.0%)	1 (0.3%)			
INFECTION, NON-CMV	53 (11.9%)	64 (16.3%)	20 (6.8%)	8 (3.7%)	14 (4.3%)	10 (6.9%)
PRIMARY FAILURE	101 (22.7%)	21 (5.4%)	10 (3.4%)	15 (6.9%)	17 (5.3%)	4 (2.8%)
GRAFT FAILURE	95 (21.4%)	41 (10.5%)	53 (18.0%)	49 (22.7%)	68 (21.1%)	32 (22.2%)
TECHNICAL	24 (5.4%)	3 (0.8%)	2 (0.7%)	2 (0.9%)	4 (1.2%)	
OTHER	26 (5.9%)	30 (7.7%)	33 (11.2%)	25 (11.6%)	35 (10.8%)	12 (8.3%)
MULTIPLE ORGAN FAILURE	41 (9.2%)	47 (12.0%)	10 (3.4%)	6 (2.8%)	9 (2.8%)	7 (4.9%)
RENAL FAILURE	1 (0.2%)	3 (0.8%)		1 (0.5%)		2 (1.4%)
PULMONARY	29 (6.5%)	23 (5.9%)	15 (5.1%)	8 (3.7%)	6 (1.9%)	5 (3.5%)
CEREBROVASCULAR	26 (5.9%)	13 (3.3%)	9 (3.1%)	2 (0.9%)	6 (1.9%)	1 (0.7%)

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2008

J Heart Lung Transplant 2008;27: 937-983

השתלת לב ולב ראות בבית חולים שניידר 2000-2008

מידע באדיבותה של ד"ר נ. צוקר

השתלות לב ולב ראות בבית חולים שניידר מינואר 2000 עד 24.11.08								
ת.ז.	שם המושתל	סוג דם	שנת לידה	מין	תאריך רשום	איבר	תאריך השתלה	הערה
3819525	א-ח מ	O	1986	נ	06/04/2000	לב	11/07/2001	ex
32342690	ד ו	B	1998	ז	21/07/2001	לב-ריאות	22/07/2001	
30791285	ג ר	A	1992	נ	05/03/2003	לב	29/07/2003	דומינו
20088197	ז כ	A	1989	ז	12/06/2002	לב-ריאות	29/07/2003	
32232817	ס ר	B	2001	ז	30/10/2001	לב	27/09/2004	ex
31870427	א מ ר	A	1998	נ	01/09/2004	לב	06/06/2005	ex
213895493	ו ח	B	2003	ז	02/06/2005	לב-ריאות	25/06/2005	
31128339	ג ס	A	1993	נ	11/10/2004	לב	06/11/2005	
206261398	ז מ	O	1995	נ	12/08/2007	לב	12/08/2007	
33064577	ת ת	A	2007	נ	20/03/2008	לב	21/03/2008	
314667312	א י	O	1999	נ	09/09/2007	לב	21/04/2008	
21502333	ר א	O	2004	ז	26/05/2008	לב	04/06/2008	

12 מטופלים, 3 נפטרו, מטופלת הראשונה עברה retransplant כעבור 9 שנים לאחר ההשתלה ראשונה

סיכום

- במהלך 25 השנים האחרונות התקדמה השתלת הלב בילדים ממצב של טיפול ניסיוני לטיפול היעיל ביותר לילדים הסובלים מאי ספיקת לב סופנית עם יכולת לשפר משמעותית את איכות ותוחלת חייהם.
- תוצאות השתלות הלב בילדים ממשיכות להשתפר מתקופה לתקופה עם השגת הישרדות של למעלה מ 90% בשנה הראשונה שלאחר ההשתלה.
- יותר ויותר ילדים מושתלי לב שורדים לעשור השני והשלישי שלאחר ההשתלה.
- נדרש מחקר נוסף למציאת נוגדי דחייה עם פרופיל בטיחותי גבוה יותר, למציאת דרכים פחות פולשניות לאבחון דחייה ולמניעת CAV.