

# **Nutritional issues in the peri transplant period**

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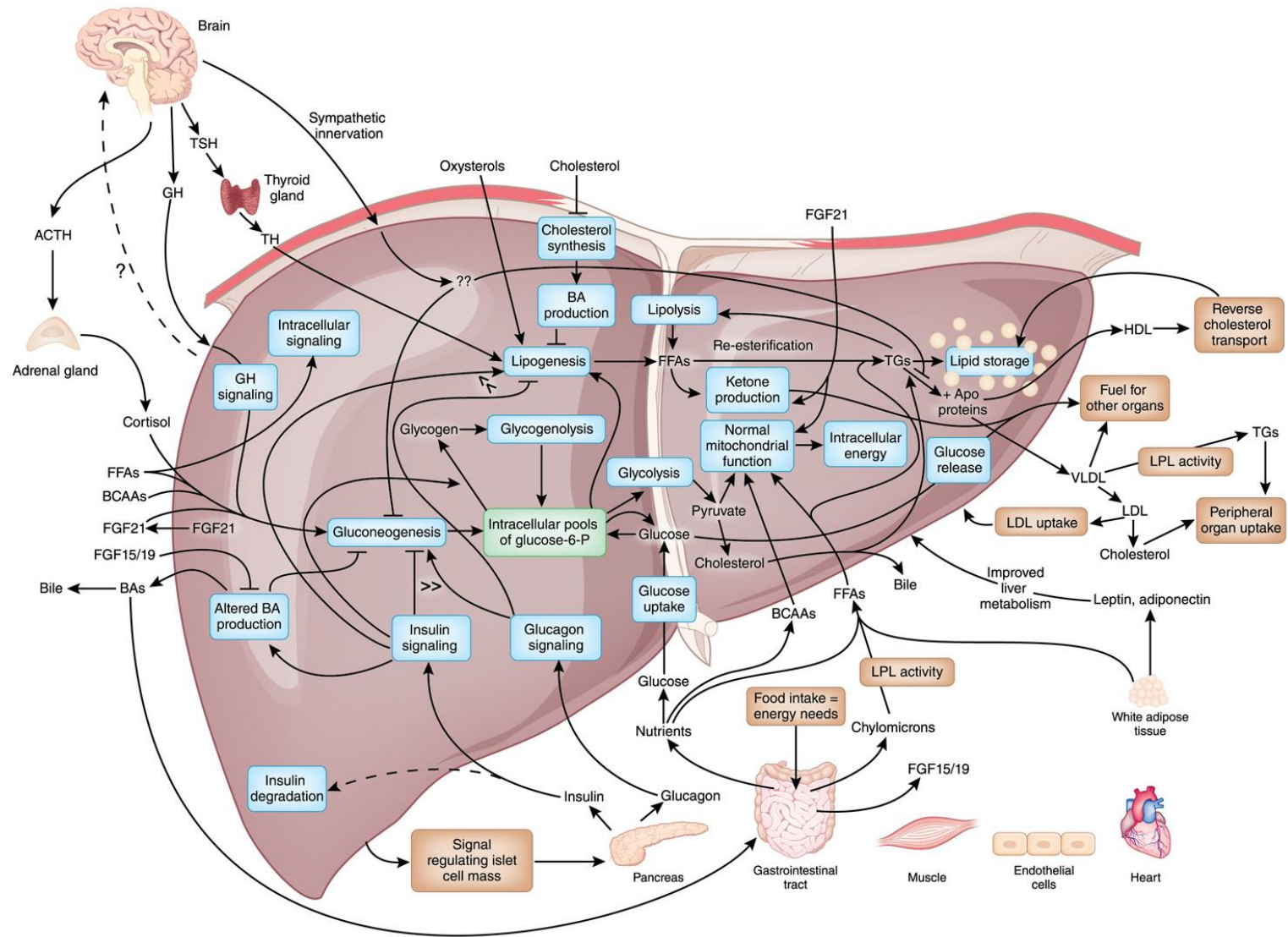
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# **Nutritional issues before transplant**



# Decreased dietary intake

**Anorexia**

**Altered taste**

**Unpalatable diet**

**Nausea / vomiting**

*Suchy 2014*



**Early satiety due to:**

**Ascites**

**Organomegaly**



# Impaired digestion and absorption

**Reduced luminal bile**

**SIBO**

*PCNA 2009*





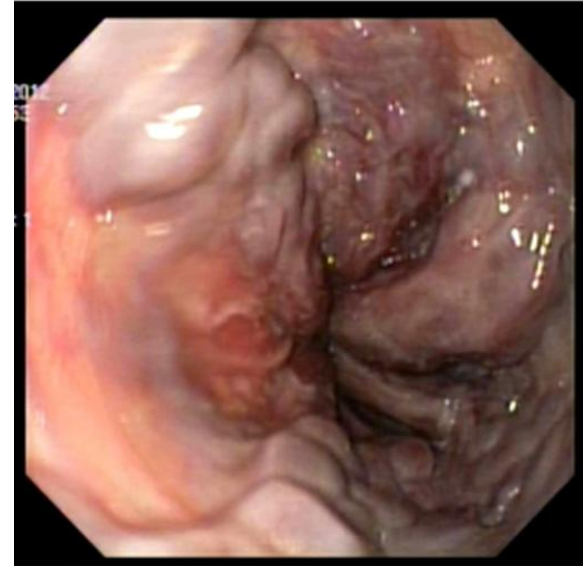




***Pancreatic insufficiency***



# Increased requirements



Suchy 2014



# Increased requirements

**Inflammation**

**Recovery from major insults  
(infection)**

**Increased work of breathing  
(abdominal distention)**

*Suchy 2014*



# Macronutrient disturbances

<b>Carbohydrates</b>	<b>Proteins - negative balance</b>	<b>Lipids - increased fat oxidation</b>
Low glycogen stores - Hypoglycemia	Gluconeogenesis	Lipolysis
Insulin resistance - post prandial hyperglycemia	Decreased synthesis	Malabsorption - fat soluble vitamin deficiency
	Increased catabolism	Associated pancreatic insufficiency
	Increased AAA/BCAA ratio	



# Micronutrients

Fat soluble vitamins	Water soluble vitamins	Trace elements
Vitamin A deficiency 69%	Associated malabsorption	Zn deficiency 40%
Vitamin D 25% low, 17% radiological rickets, 11% fractures		Fe 33%
Vitamin E 62-75%		Ca /Mg (vitamin D deficiency and fat binding in lumen)
Vitamin K 25%		Selenium deficiency (cardiomyopathy)
		Cu / Mn excess (basal ganglia deposition)

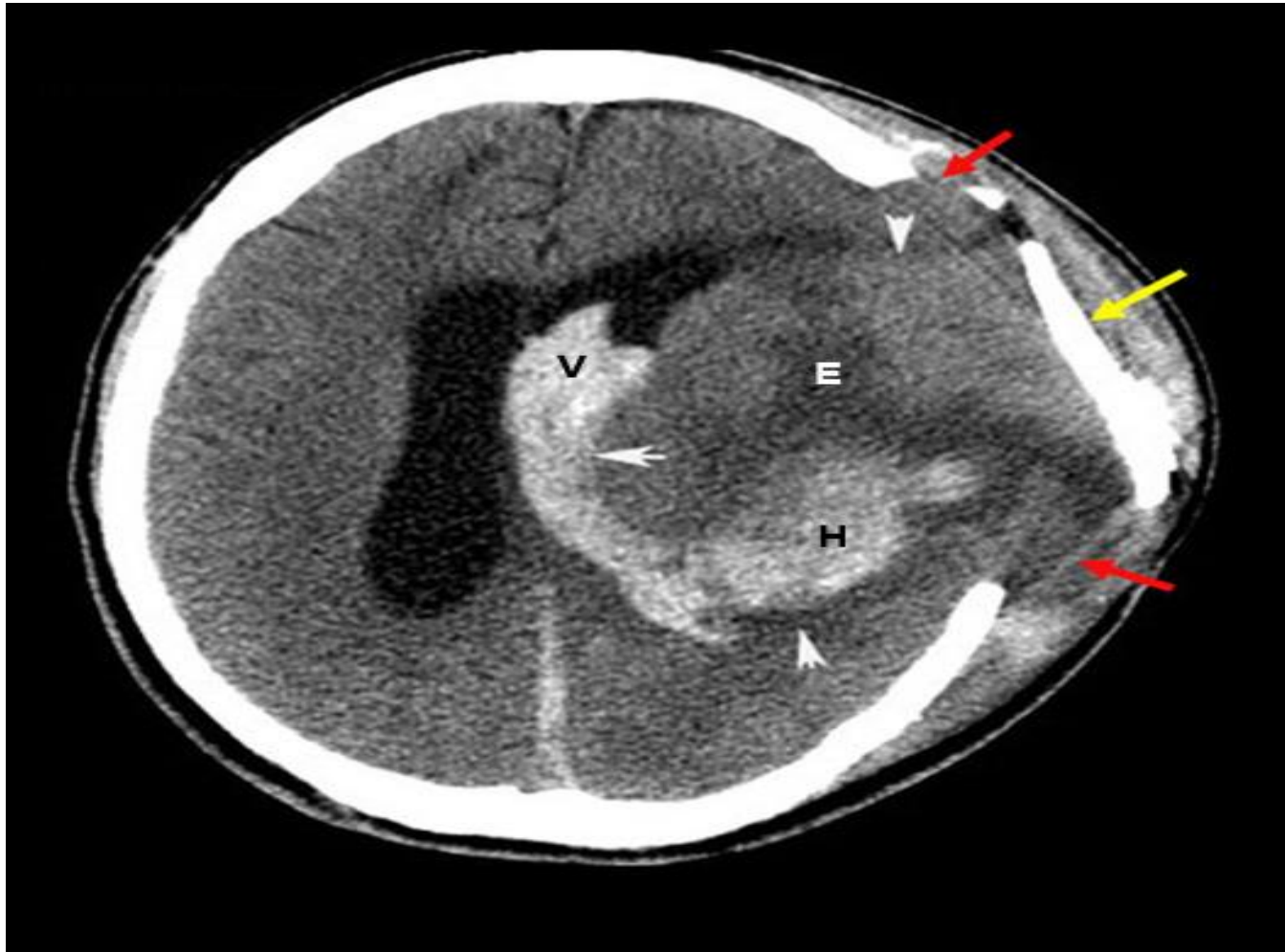












# Assessment of malnutrition in CLD

*AAP Nutrition 2014*



# History

**Feeding (amount/restriction)**

**Diarrhea, vomiting (loss of calories)**

**Pale stools, pruritus (cholestasis/fat malabsorption)**

**Bleeding, bruises (vitamin k)**

**Night blindness**

**Bone fractures**



# Anthropometry

**Weight for height and weight for age - deceptive**

**Height for age decreased - chronic malnutrition**

**MUAC is more sensitive than weight/height**



# Physical examination

<b>Edema</b>	<b>Protein deficiency</b>
Cachexia	Protein + Fat deficiency
Rickets	Vit D deficiency
Bruising	Vit K
Alopecia	PEM, EFA, Zn
Pallor	Fe, B12, Folic acid
Glossitis	B complex
Poor dentition	Vit D
Skin dryness ,peeling	EFA, Zn, Niacin
Depressed or absent reflexes	Vit E



# Nutritional management

**Calorie 130-150% of ideal body weight**

**Carbohydrate up to 20gm/kg/day - sugar monitoring during fasting, illness or reduced intake**

**Protein 2 - 4gm/kg/day unless in encephalopathy**

**Fat up to 8gm/kg/day, 30-40% of total fat as MCT**

*AAP 2014  
PCNA 2009*







## **Ascites**

**Salt and fluid restriction**

## **Encephalopathy**

**Protein restriction to 1g/kg/day**

**BCAA**



# Supplementation

Vitamin /mineral	Route	Dose
A	Oral	5000-25000IU/day
D	Oral	400-1200IU/day
E	oral	50-400IU/day or 15-25IU/kg/day of TPGS
K	Oral/Parenteral	2.5 mg twice weekly/2.5mg monthly
Water soluble	Oral	2 times RDA
Calcium	Oral	50-100 mg/kg/day
Phosphorus	Oral	25-50mg/kg/day
Zinc	Oral	1mg/kg/day
Iron	Oral	5-6mg/kg/day

*Indian pediatrics 2014*



# Outcomes of pre transplant malnutrition

**Increased operative blood loss, transfusion**

**Long ICU stay**

**Infection**

**Higher mortality**

**Post transplant nutritional lag**



# Pre transplant malnutrition outcome

Pikul et al	Prolonged ventilator support Increased tracheostomy incidence More days of ICU stay
Stephenson et al	Increased blood product requirement More days of hospital stay
Merli et al	More days of ICU / hospital stay Increased infection incidence
Figueiredo et al	More days in ICU Increased infection incidence



# Post op catabolic state - 1<sup>st</sup> 2 weeks

**Pre operative malnutrition**

**Stress of surgery**

**Immunosuppression**

**Organ dysfunction**

**Sepsis**

**Optimizing nutrition during this period is critical for wound healing and hepatocyte recovery**

*Surg today 2015*

*Kaido, Mori et al nutrition 2012*



# Post operative feeding

**Within 48hrs of uncomplicated surgery, once ileus settles**

**Continuous nasogastric feeding**

**Polymeric feeds, semi-elemental feeds if intolerance**

**Oral feeding after enteral feeds are tolerated**

*Hepatobiliary surg nutr 2015*



**Lower incidence of infections (29.4 % of EN group vs 63.2 of control)**

**Bile duct complication 5.9% vs 31.6 in control group**

*Medicine nov 2015*



# Enteral Nutrition

**Stimulates bile/portal flow**

**Prevents mucosal atrophy**

**Preserves intestinal structure and function**

*Transplant proc 2014*





# Specific nutrients post transplant

Decrease infection post transplant	Improve synthetic function	Shorten post transplant catabolic state	Shorten post transplant hospital stay
Lactic acid synbiotic	Glutamine	BCAA	BCAA Omega 3 FA
Whey hydrolyzed peptide			
Omega 3 FA			
Arginine			
BCAA			



# It takes a village to raise a child





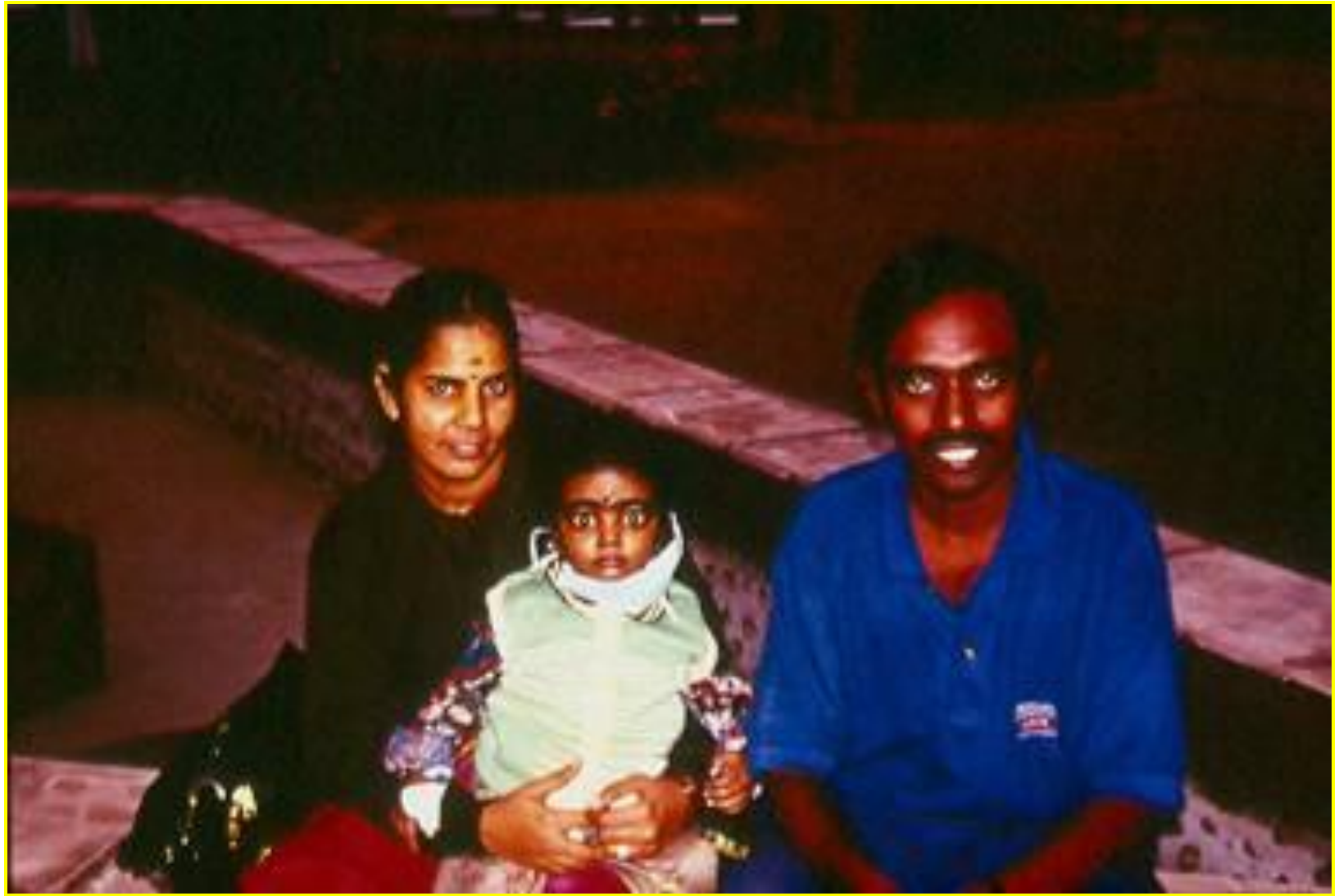
**Perforations**

**Ventilation**

**TPN**

**100 days in hospital**







## India's First Successful Pediatric Liver Transplant

**V. Poonacha**  
**A. Sibal**  
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*Manuscript received: March 28, 2000;*  
*Initial review completed: April 7, 2000;*  
*Revision accepted: August 22, 2000*

Liver transplantation is an accepted therapy for end stage liver failure in the developed world(1). Till recently the option of liver transplantation was not available to the developing world due to the prohibitive costs, lack of expertise and sophisticated infrastructure(2,3). We report the first successful pediatric liver transplant in India in a child with extrahepatic biliary atresia (EHBA).









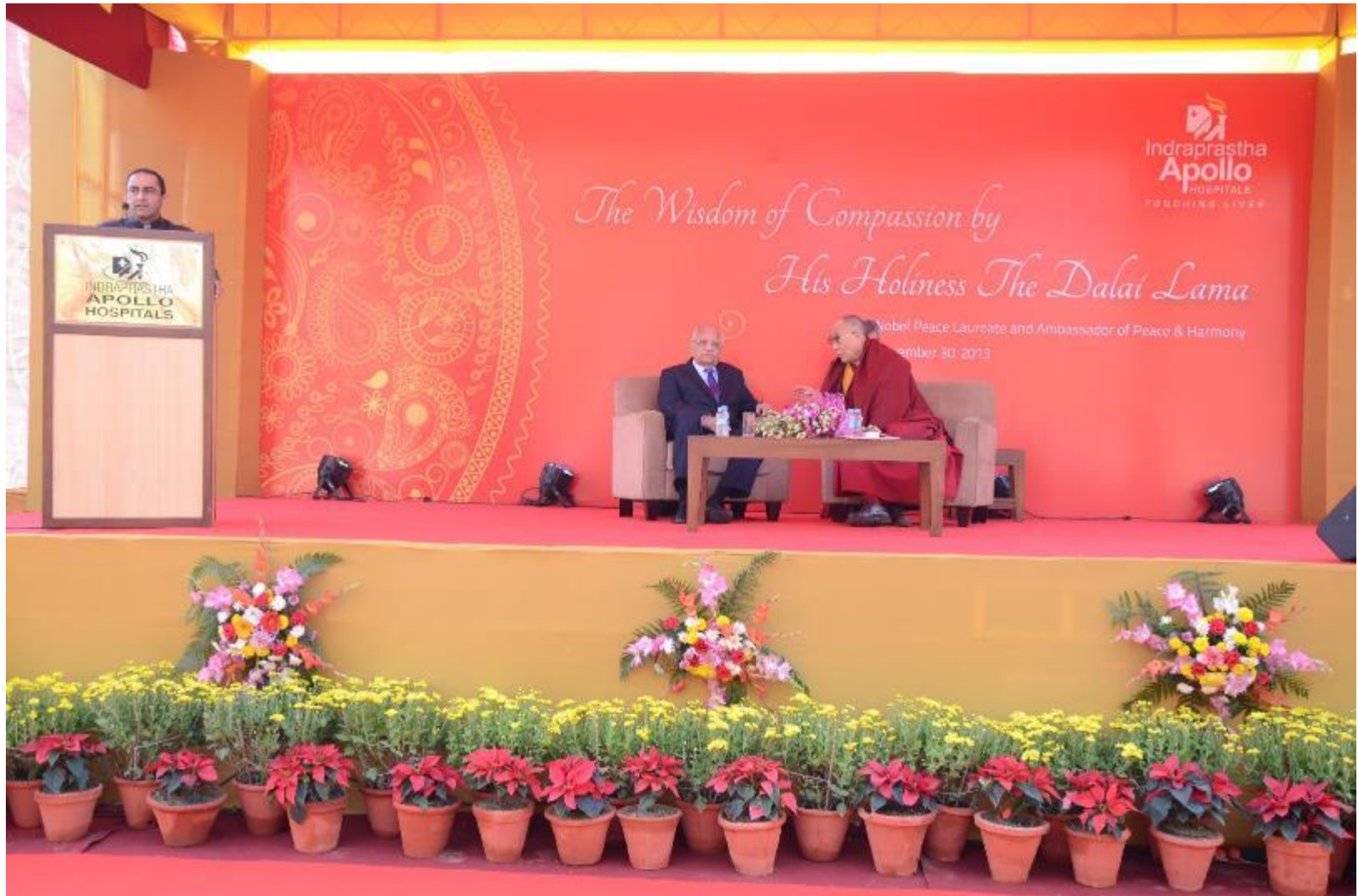












# Indian Pediatrics

## **Fifteen Years of Liver Transplantation in India**

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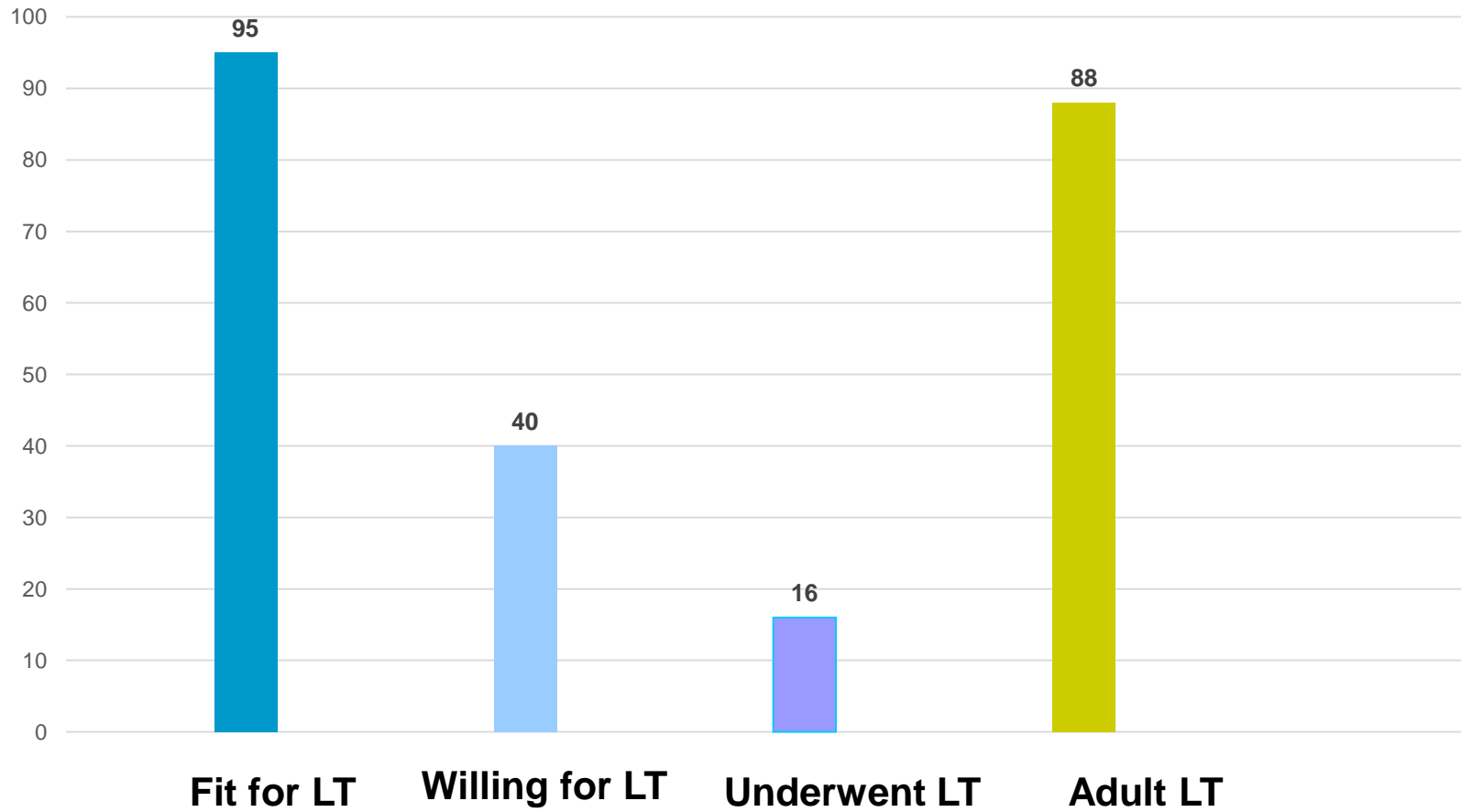
VOLUME 50—NOVEMBER 15, 2013





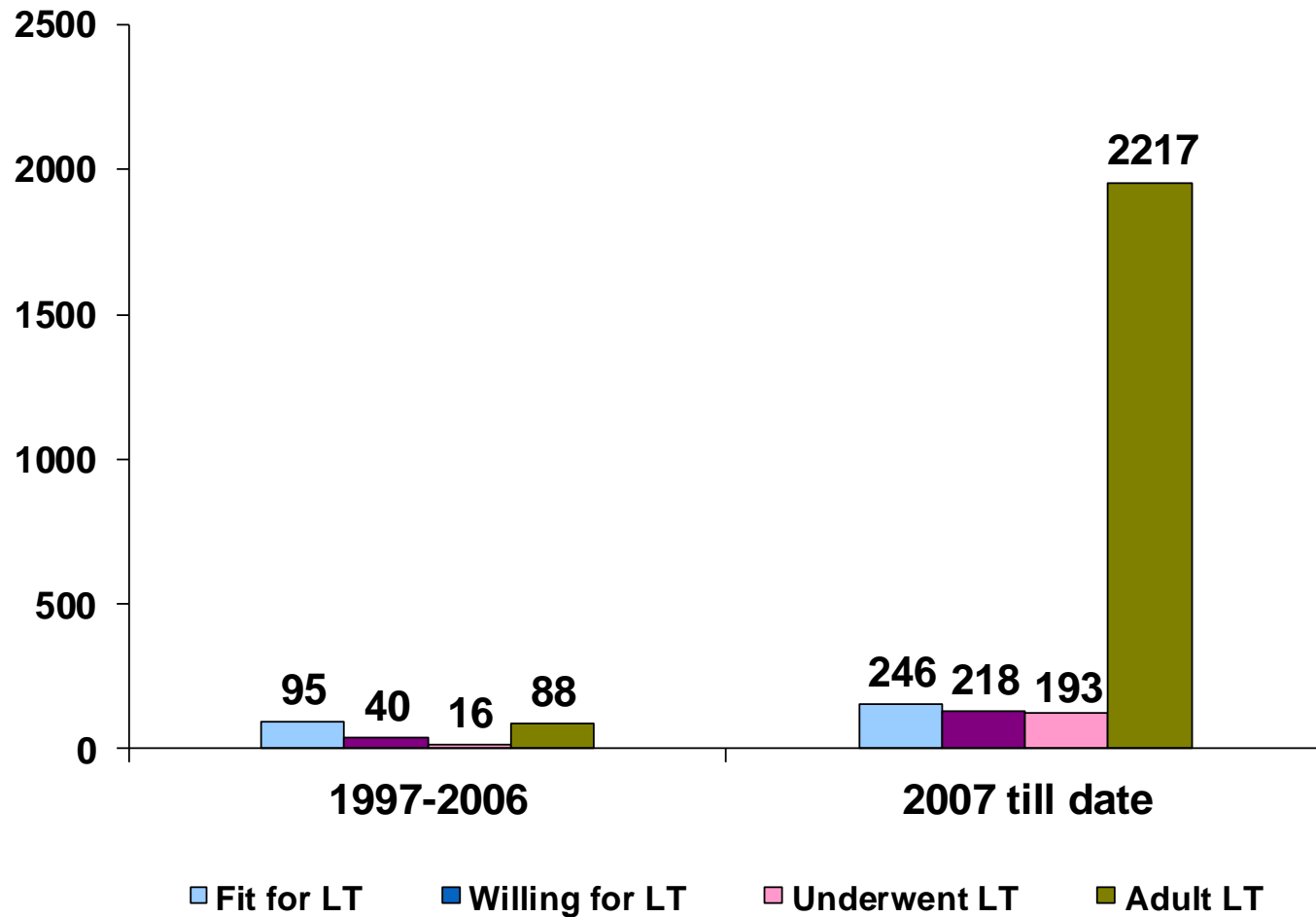


## 1997 - 2006





# The watershed



# What has contributed to success?

**Pre-operative nutrition/management**

**Better surgical expertise**

**Improvements in intensive care**

**Standardized post transplant care**



# LT experience

## 2514, pediatric 209

BA	79
Metabolic liver diseases	45
Cryptogenic	34
ALF	19
BCS	08
NNH	06
AIH	03
Hep B	03
Hyper oxaluria	02*
Poisoning	02
Hepatoblastoma	02
PVT	01**
Hep C	01
HCC	01
Chronic rejection	01
* combined LK	
** re transplant	



# Busiest solid organ transplant centre in the world

Year	2012	2015
Kidney	849	1217
Liver	351	410
Total	1200	1627





500

भारत  
INDIA

भारत में यकृत प्रत्यारोपण  
LIVER TRANSPLANTATION IN INDIA 2014







**“Alone we can do so little; together we can do so much”**

***Helen Keller***



**“Let food be thy medicine and medicine be thy food” ~Hippocrates**

