

# Liver Transplantation for Hepatocellular Carcinoma Outperform Other Populations in the New Hepatitis C Era

Robert Burk BS<sup>1</sup>, Angel Alsina MD<sup>2</sup>, Alexia Athienitis PhD<sup>3</sup>, John Trendowski BS<sup>4</sup>, Alejandro Delgado BS<sup>4</sup>, Jacentha Buggs MD<sup>2</sup>, Brenna Evans RN<sup>5</sup>, Edson Franco MD<sup>2</sup>, Christopher Albers MD<sup>6</sup>, Nyingi Kemmer MD<sup>6</sup>

<sup>1</sup>University of South Florida Morsani College of Medicine, <sup>2</sup>Transplant Surgery, Tampa General Medical Group, <sup>3</sup>Information Systems, Muma College of Business, University of South Florida, <sup>4</sup>Clinical Research, Tampa General Medical Group, <sup>5</sup>Hepatology, Tampa General Medical Group; Tampa, FL



#### INTRODUCTION

Long term results of HCC liver transplants (LTx) in the recent era of direct-acting antivirals (DAA) against hepatitis C (HCV) are not available.

- We aimed to examine the access, treatments and cure rates with DAA's utilized in HCC LTx with HCV.
- Secondarily, we aimed to determine the long term impact of the Liver Cancer Program and DAA therapies on survival of HCC LTx.

## **METHODS**

A retrospective analysis of 4 eras of transplantation for HCC/HCV LTx at a single center:

Dec 1996- July 2015: 1,368 patients

- **t** Era 1 ('97-2001)
- **Era 2 (2002-06)**
- **Era 3 (2007-10)**
- **t** Era 4 (2011-15)

In 2011, utilization of first generation DAA's began, as well as a fully revamped liver cancer program.

By 2012, second generation DAA's were used. All eras were examined for patients that died prior to reaching DAA's (Era 4). Era 1 to 4 had 2, 20, 47 and 67 HCC/HCV patients, respectively.

All DAA treatments in this study were post liver Tx. Kaplan Meier methodology, Log rank and Chi-square was utilized

Table 1. Evolution of HCV Treatments and DAA's

Drug	Approval
Interferon	1991
Pegylated Interferon	2001
Telaprevir / Boceprovir	2011
Sofosbovir / Simeprivir	2013
Daclatasvir, Elbasvir, Ledipasvir, Ombitasvir, Velpatasvir, Dasabuvir	2014-2016

### **RESULTS**

# 136 HCC/HCV liver TX and 233 HCC liver TX

Table 2. Available to be treated

Era	Yes	No	Total
Era 1	0	2	2
Era 2	10	10	20
Era 3	41	6	47
Era 4*	67		67

More patients Era 3 (41/47=87%) vs. Era 1 and 2 (10/22=45%) were able to reach the DAA era ( p=0.0002).

**Table 3. Treated Patients with DAA's** 

Era	Yes	No	Total
Era 1	0	0	0
Era 2	2	18	20
Era 3	8	39	47
Era 4	22	45	67

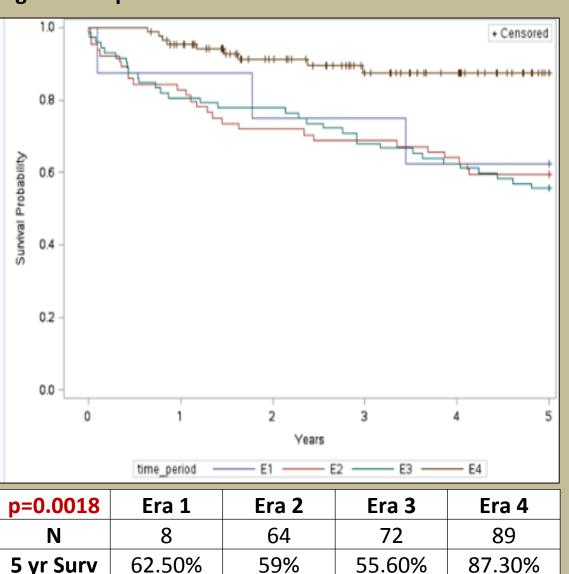
More patients in Era 4 (22/67=32.8%) were treated with DAA's than in Era 3 (8/47=17.7%) and in Era 2 (2/20=10%, **p= 0.04**). [Era 3 vs 4, p=0.059].

**Table 4. Patients Cured** 

Era	Yes	No
Era 1		
Era 2	2	18
Era 3	7	47
Era 4	22	67

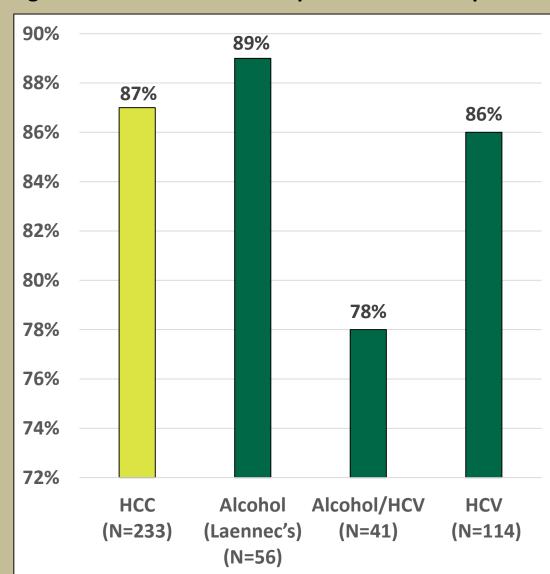
More patients were cured in Era 4 (22/67= 32.8%) vs. Era 3 (7/47=14.8%, p=0.03).

Figure 1. Impact on Overall Cohort of HCC Liver Tx



The 3-year	survival of	89 patients	in Era 4 was	87.3%
compared	to 68% for I	Era 3. Forty-	nine patien	ts have
already rea	ached that e	endpoint.		

Figure 2. 3 Year Survival Compared to other Populations



Kaplan Meier 3 year survival rates of the HCC population compared with Alcohol (Laennec's), Alcohol/HCV, and HCV.

#### CONCLUSION

The superiority of Era 4 HCC liver Tx is impressive, with a 19% survival improvement. Decay after the first year was only 3.8% / year. This era coincides with the beginning of DAA's and the revamped liver cancer program, both significantly improving survival. Contributions from Hepatitis C therapies on overall survival of HCC LTx are unquestionable. One third of HCV infected HCC patients were treated and cured. All (100%) were cured since 2011. However, other factors in the liver cancer program also contributed: better bridge therapies, adjuvant therapies, patient selection, among others. Hepatocellular carcinoma liver Tx recipients are outperforming other liver Tx recipients, and are comparable to HCV alone.

1. Naugler W, Alsina A, et al. Building the Multidisciplinary Team for Management of Patients with Hepatocellular Carcinoma. *Clin Gastroenterol Hepatol*. 2015 May;13(5):827-35 2. Alsina A, Makris A, et al. Can sorafenib extends survival of recurrent hepatocellular carcinoma following liver transplantation? *American Surgeon* 2014;80(7):680-4.

<sup>\*</sup>Era 4 is the DAA era. All patients are available to be treated.