

## Introduction

- Fatty pancreas (FP) is a frequent, incidental finding on Endoscopic Ultrasound (EUS) of diffuse increased echogenicity
- 45 % of patients with FP have exocrine pancreatic insufficiency (EPI), and FP is an independent risk factor for DM<sup>1-3</sup>
- EUS may be more sensitive for diagnosis of chronic pancreatitis (CP) than CT or MRI using Rosemont Criteria\*

## Objectives

Short-term rate of progression from EUS-diagnosed fatty pancreas to the following conditions:

- CP
- DM
- EPI
- Pancreatic parenchymal changes without progression to CP

## Methods

### Retrospective Cohort

Patients with EUS findings of diffuse echogenicity

Follow-up EUS/CT/MRI >2 years after index EUS

### Exclusion:

- Follow-up imaging <2 years after index
- History of chronic pancreatitis
- Pancreatic malignancy
- Prior pancreatic surgery
- Known autoimmune pancreatitis

\*Progressive parenchymal changes include: hyperechoic foci, lithiasis in main pancreatic duct, honeycomb pattern, cysts, ductal dilation, ductal irregularities, fibrous tracts, lobularity - Rosemont criteria utilizes these with standardized scoring system

\*\* Of the nineteen patients without history of alcohol use at the time on index EUS, three patients reported remote history of ethanol consumption.

\*\*\* All five patients successfully quit tobacco consumption by the time of the follow up imaging modality.

Table 1: Baseline Characteristics

Age (Mean ± SD) years	51.21 ± 12.34
Gender (female)	64% (n=25)
Race (White)	97%
Ethnicity (Non-Hispanic Latino)	74.4%
History of alcohol use	51.3% (n=20)**
<i>Tobacco use</i>	
Current smoker	12.8% (n=5)***
Former smoker	28.2% (n=11)
Baseline weight (Kg)	80.17±17.75
Baseline BMI (kg/m <sup>2</sup> )	29.59 ± 6.45
Fatty liver	46.15% (n=18)
Diabetes mellitus	15.38% (n=6)
Exocrine pancreatic insufficiency	33.33% (n=13)

Table 2: Baseline Parenchymal Changes

<i>Location of Fatty Infiltration</i>	
Diffuse	92.3% (n=36)
Body and tail	7.7% (n=3)
Hyperechoic strands	38.5% (n=15)
Visible side branches	15.4% (n=6)
Dilated pancreatic duct	10.3% (n=4)
Lobularity	5.1% (n=2)
Atrophy	5.1% (n=2)
Cyst	2.6% (n=1)
Irregular duct wall	2.6% (n=1)
Hyperechoic duct wall	0%

Figure 1: Association between weight and parenchymal changes

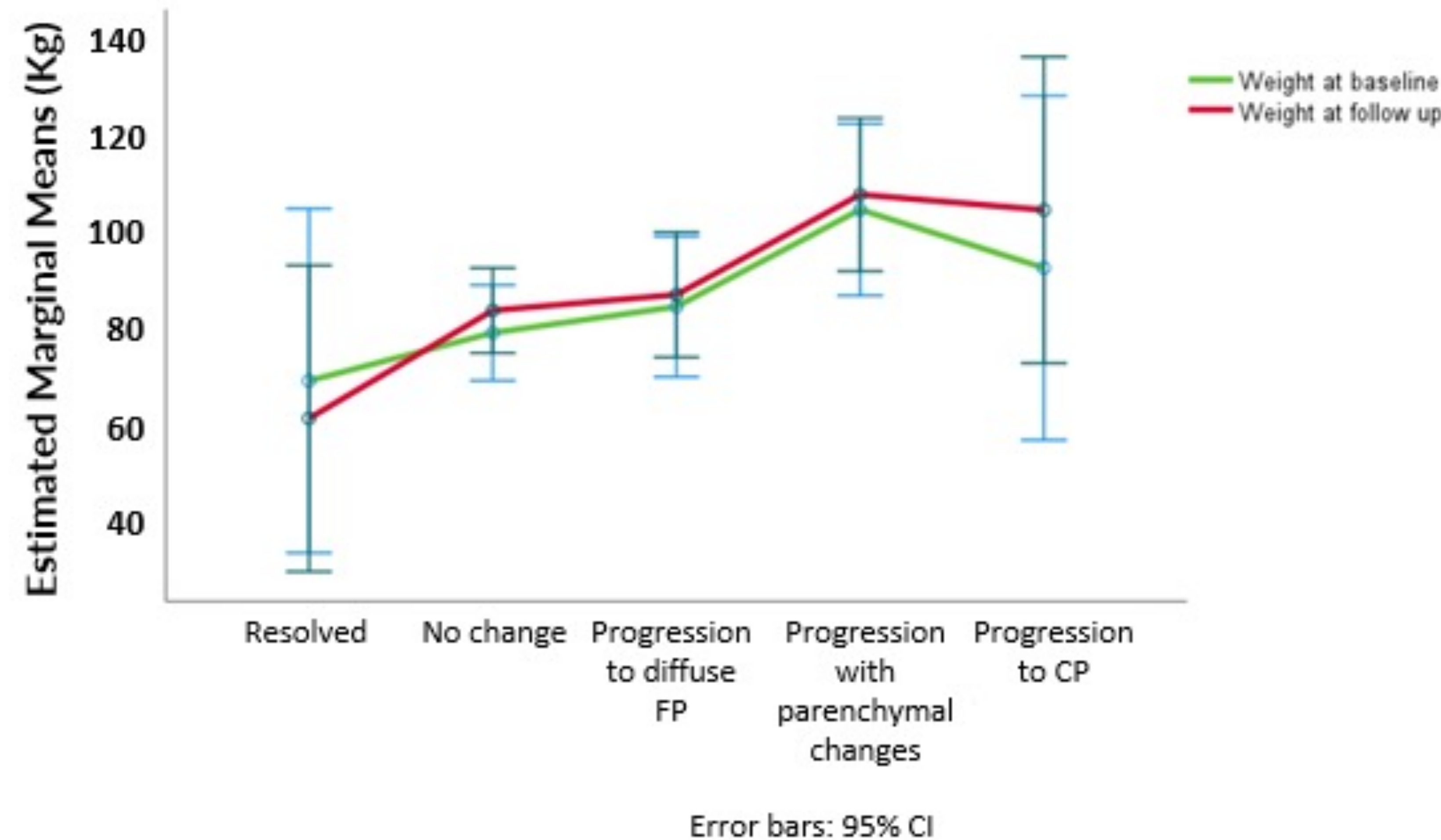


Table 3: Between group analysis of patients with and without progressive parenchymal changes

	Progressive changes present (n=11)	Without progressive changes (n=14)	P-value
Age at baseline (mean)	44.7 ± 13.68	54.67 ± 10.6	0.99
Gender (female)	72.7% (n=8)	64.3% (n=9)	1.00
Tobacco use:			0.42
Never smoker	63.6% (n=7)	57.1% (n=8)	
Former smoker	36.4% (n=4)	28.6% (n=4)	
Current smoker	0%	14.3% (n=2)	
Diagnosis of EPI at baseline	74.4% (n=5 of 7 with any results)	74.4% (n=5 of 7 with any results)	
Baseline weight (Kg)			0.032
Initial	92.6 ± 5.2	78.43 ± 4.6	
Follow-up	96.2 ± 6.09	82.17 ± 4.4	
Diabetes			
Diagnosis at baseline	36.4% (n=4)	0	0.026
Diagnosis at follow-up	45.5% (n=5)	0	0.009
Fatty Liver			
Initial	72.7% (n=8)	28.6% (n=4)	0.047
Follow-up	72.7% (n=8)	21.4% (n=3)	0.015

## Limitations

- known interobserver disagreement with EUS, single-center study with a short follow up period

## Discussion

- FP is a dynamic process with the possibility of progression or regression over time.
- Annual incidence of CP in the US of 4-5 per 100,000. No studies have established connections between FP and CP<sup>4-8</sup>
- No large studies have been performed EUS monitoring of FP
- Multiple studies have confirmed that EUS is able to detect CP at an earlier stage than cross-sectional imaging<sup>9-11</sup>
- FP is a potential precursor for chronic pancreatitis and further parenchymal changes
- Weight gain may be an independent contributor to the development of further parenchymal changes in patients with FP (Table 1)
- Further large, prospective studies will help to show independent associations between DM, Fatty liver, weight, and progression to CP

## Results

- In short-term follow-up of patients with fatty pancreas using endoscopic ultrasound, **44%** of patients had **progressive parenchymal changes**, including **16%** who progressed to **chronic pancreatitis**
  - 52% (n=13) of patients had stable FP findings
  - 4% (n=1) of patients had resolution of FP
  - 4% (n=1) of patients had progression of focal FP to diffuse FP.
- Out of all 39 patients:**
  - 5.1% (n=2) had resolution of fatty liver
  - 2.5% (n=1) developed DM
- In multivariate analysis, progressive parenchymal changes on EUS were associated with an increase in weight over time, independent of the effects of gender, alcohol, or tobacco (p-value = 0.04).

References with links to papers

