Evaluation of continuous-glucose monitoring for the diagnosis of Cystic Fibrosis Related Diabetes (CFRD): A prospective and longitudinal study

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INTRODUCTION

Continuous-glucose monitoring (CGM) is becoming a useful tool to evaluate glucose profiles in real-life conditions and to detect glucose abnormalities undetected by OGTT in CF patients.

AIMS

- Evaluation of OGTT and CGM results longitudinally.
- Evaluation of BMI z-score and %FEV1 changes in relation to OGTT and CGM results.
- Analysis of 6 proposed criteria to classify glucose abnormalities by CGM results.
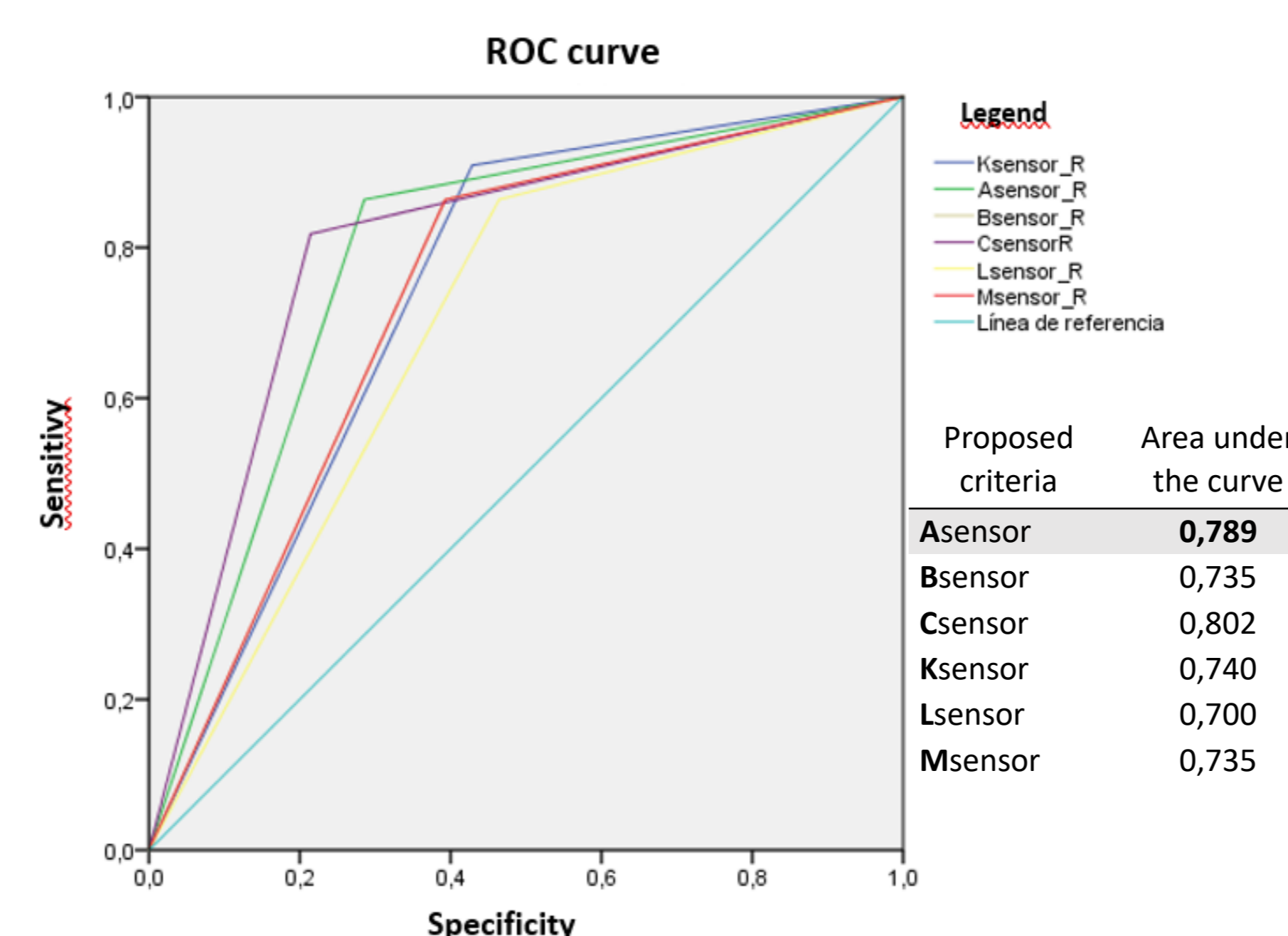
PATIENTS & METHOD

Prospective longitudinal and cross-sectional study. Patients with **genetically-confirmed CF >10 years old**, visited between November 2012 and November 2019. **Fifty patients** (28 female), age: 13.79 ± 2.43 years.

Patients receiving insulin, lung transplant; or treatment with corticosteroids, GH and/or immunosuppressants or having disease exacerbation in the previous four weeks were excluded.

OGTT and GCM performed yearly. BMI and %FEV1 assessed at the time of testing (±2 months) and at the previous year (±2 months).

OGTT classifies patients into normal glucose tolerance (NGT), abnormal glucose tolerance (AGT) or CFRD. After OGTT, CGM (IproTM2) was carried out for 6 days with regular exercise and diet.

Comparison, by ROC curve, of sensitivity and specificity of the proposed criteria to classify glucose abnormalities by CGM results.

RESULTS

Cross-sectional study: 26% homozygous and 50% heterozygous for F508del mutation. 80% pancreatic insufficiency.

- **OGTT**: 28 patients (56%) NGT, 19 (38%) AGT and 3 (6%) CFRD.
- **CGM**: One patient (2%) with NGT and 11 (22%) with AGT on OGTT had glucose peaks >200mg/dl.

Chosen criteria to classify glucose abnormalities by CGM
(Specificity: 71.43%, Sensitivity: 86.36%)

	Fasting glucose	Post-prandial glucose
Abnormal glucose tolerance (**AGT**)	<126 mg/dl	140-199 mg/dl **>4.5%** of monitoring time, or one peak of glucose ≥200mg/dL
Cystic Fibrosis Related Diabetes (**CFRD**)	>126 mg/dl	≥2 peaks of glucose ≥200mg/dL (on different days)

ROC curve

Proposed criteria	Area under the curve
Asensor	0,789
Bsensor	0,735
Csensor	0,802
Ksensor	0,740
Lsensor	0,700
Msensor	0,735

Prospective study: in 21 patients at least 2 pairs of tests (CGM and OGTT) were performed (second test age: 15.33 ±2.38 years) and in 12 of them (third test age: 16.01 ±1.71 years) 3 pairs of tests.

BMI and %FEV1 according to CGM results.

2nd CGM	Difference in BMI z-score* in 3rd test (median)	p-value
NTG	0.13	**0.024**
AGT / CFRD	-0.30	

3rd CGM	%FEV1 in 3rd test (median)	
NTG	106	**0.024**
AGT / CFRD	94	

NGT n=8; AGT/CFRD n=4.
*Difference of BMI z-score compared to the previos year.

CONCLUSIONS

➤ CGM is a useful method to evaluate glucose abnormalities in CF patients.

➤ Criteria to diagnose glucose abnormalities using CGM are proposed.

➤ CGM is more sensitive than OGTT in detecting glucose abnormalities that are related with lung function variations and predicting future nutritional changes (decreased BMI).

CONTACT INFORMATION

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