

# Comparison of diagnostic accuracy between the chemiluminescence and electrochemical methods for nasal nitric oxide measurements in PCD

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## Aims

Nasal Nitric Oxide (nNO) is an integral part of Primary Ciliary Dyskinesia (PCD) diagnostic work-up [1]. Few studies have investigated the diagnostic accuracy of the portable electrochemical NO analyzer (NIOX MINO) in comparison to the better validated stationary chemiluminescence analyzer (Ecomedics CLD88sp) [2]. In this study, we compared the diagnostic accuracy of the two methods in a prospective study from two PCD centers in Greece and Cyprus within the framework of the FP7 BESTCILIA.

## Methods

Patients, suspected for PCD, underwent diagnostic testing using a combination of tests including nNO, high speed video microscopy (HSVM) and transmission electron microscopy (TEM). We calculated sensitivity and specificity based on already reported optimal cut-offs [3,4] and constructed receiver operating characteristic curves (ROCs) for each of the two nNO methods (Figure 1 & 2).



Figures 1 & 2: Devices for measuring nNO: Ecomedics CLD88sp (Figure 1, left) and NIOX MINO (Figure 2, right)

## Results

Out of 221 suspect patients that underwent diagnostic testing within a 3-year period, 54 were confirmed as PCD patients with TEM and/or HSVM. PCD patients had lower nNO compared to non-PCD both with CLD88sp (median 18.2 vs 156.8 nL/min) and NIOX MINO (median 9.9 vs 86.5 nL/min) (Figure 3). Diagnostic accuracy of the two methods is displayed in Table 1. In ROC analysis, the area under the curve (AUROC) was slightly higher for CLD88sp compared to NIOX MINO (AUROC 0.97 vs 0.93) (Figure 4). For the CLD88sp analyzer, a nNO cut-off of 96 nL/min had the best combination of sensitivity and specificity (Se= 90%, Sp= 91%) while for the NIOX MINO, the optimal cut-off was 31 nL/min (Se= 90%, Sp= 86%).

## Results

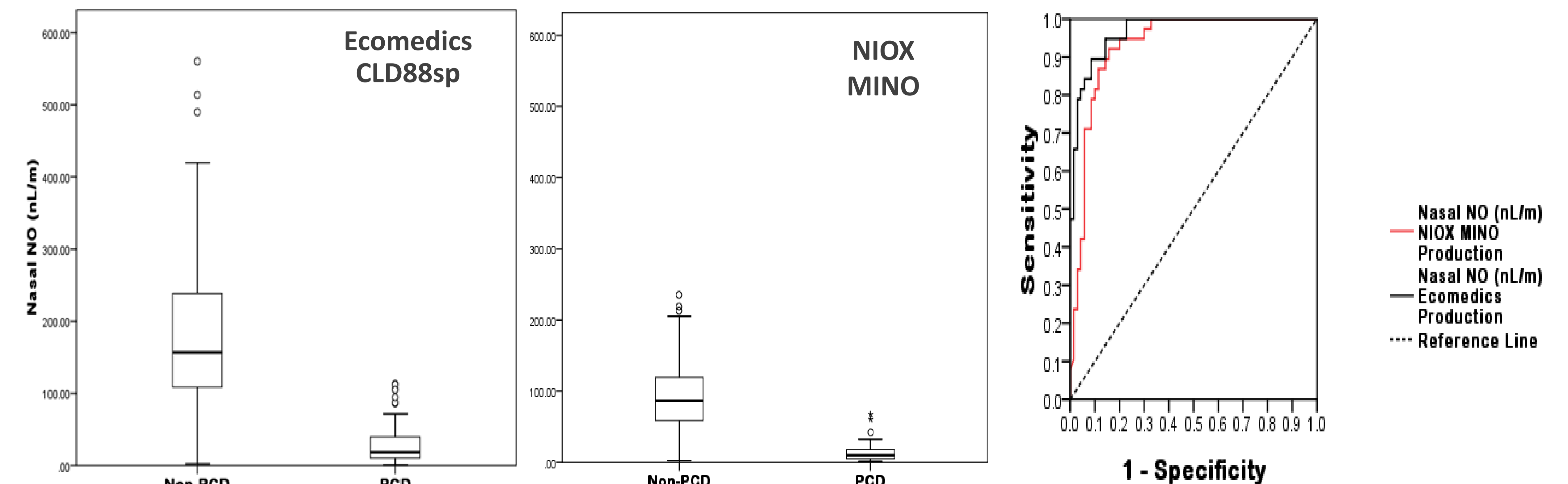


Figure 3: Production of nNO in both non-PCD and PCD subjects when measured with Ecomedics CLD 88sp and NIXO MINO.

Figure 4: ROC curve for both methods.

Table 1: Diagnostic accuracy of nNO when measured with chemiluminescence (Ecomedics CLD88sp) vs. electrochemical (NIOX MINO) method for already reported cut-offs.

Subject	Ecomedics CLD 88sp nNO cut-off value: 77 nL/min					NIOX MINO nNO cut-off value: 30 nL/min				
	PCD+ ( $< 77$ nL/min)	PCD- ( $\geq 77$ nL/min)	Total	Se	Sp	PCD+ ( $< 30$ nL/min)	PCD- ( $\geq 30$ nL/min)	Total	Se	Sp
Non-PCD	26	127	153	84%	83%	10	64	74	87%	86%
PCD	43	8	51			33	5	38		
Total	69	135	204			43	69	112		

Se: Sensitivity, Sp: Specificity

## Conclusions

- The chemiluminescence method (Ecomedics CLD 88sp) had higher discriminative ability for PCD compared to the electrochemical method (NIOX MINO).
- Both methods were characterized by good and comparable diagnostic accuracy and can be used effectively in the clinical setting as part of PCD diagnostic work-up.

## Bibliography

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