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24 hour Continuous Ocular Tonography Triggerfish and Biorhythms of the Cardiovascular System Functional Parameters in Healthy and Glaucoma Populations

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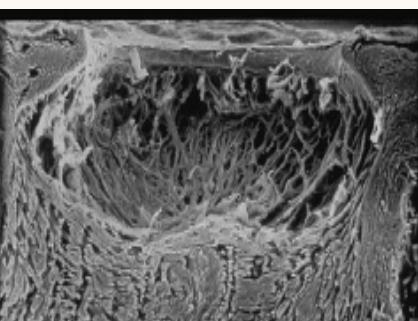
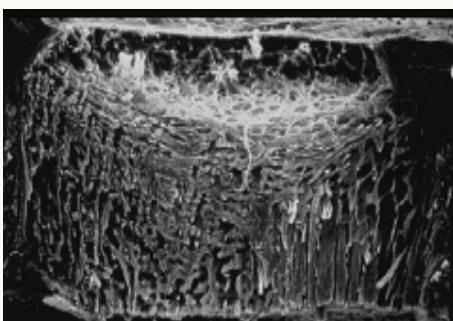
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AIM:

RULES INCLUDED IN BIORYTHMS

1. Eyeball volume changes
2. Cardiovascular system parameters

In NORMALs, OHs, POAGs and NTGs

METHOD:

Symultanous 24 h. evaluation of:

- a. Ocular volume changes and
- b. Cardiovascular system parameters (SAP/DAP/HR)

using:

- a. Continuous Ocular Volumetry - Triggerfish
- b. BP and ECG Holters



GENERAL ATRIBUTES

NORM

```
##      ID      D      GENDER      AGE      FLHAEM FSH
## Min.   : 1.0  -4: 0   1:33   Min.   :17.0   0:50   0: 0
## 1st Qu.:14.8  0 :50   2:17   1st Qu.:29.0   1: 0   1:12
## Median :82.5  1 : 0          Median :37.5   2:26
## Mean   :67.5  2 : 0          Mean   :38.1   3:12
## 3rd Qu.:102.2 3 : 0         3rd Qu.:44.8
## Max.   :117.0          Max.   :60.0
##
```

```
##      GATEC      GAT      GATend      CH
## Min.   :10.0   Min.   : 9.0   Min.   :10.0   Min.   : 8.3
## 1st Qu.:13.0   1st Qu.:12.0   1st Qu.:12.0   1st Qu.:10.3
## Median :14.0   Median :14.0   Median :14.0   Median :11.7
## Mean   :14.6   Mean   :14.5   Mean   :14.3   Mean   :11.9
## 3rd Qu.:17.0   3rd Qu.:16.0   3rd Qu.:16.0   3rd Qu.:13.3
## Max.   :21.0   Max.   :20.0   Max.   :21.0   Max.   :15.7
```

POAG

```
##      ID      D      GENDER      AGE      FLHAEM FSH
## Min.   :14.0  -4: 0   1:23   Min.   :22.0   0:24   0: 0
## 1st Qu.:31.5  0 : 0   2:12   1st Qu.:57.5   1:11   1: 5
## Median :50.0  1 : 0          Median :63.0   2:13
## Mean   :50.8  2 :35          Mean   :60.0   3:17
## 3rd Qu.:61.0  3 : 0         3rd Qu.:68.0
## Max.   :106.0          Max.   :77.0
##
```

```
##      GATEC      GAT      GATend      CH
## Min.   :16.0   Min.   :17.0   Min.   :18.0   Min.   : 5.60
## 1st Qu.:21.5   1st Qu.:21.0   1st Qu.:20.5   1st Qu.: 7.85
## Median :24.0   Median :24.0   Median :23.0   Median : 9.80
## Mean   :25.2   Mean   :24.9   Mean   :24.6   Mean   : 9.42
## 3rd Qu.:30.2   3rd Qu.:27.5   3rd Qu.:27.5   3rd Qu.:11.15
## Max.   :34.0   Max.   :38.0   Max.   :42.0   Max.   :13.90
```

OH

```
##      ID      D      GENDER      AGE      FLHAEM FSH
## Min.   :15.0  -4:0    1:4     Min.   :24.0   0:6   0:1
## 1st Qu.:49.0  0 :0    2:3     1st Qu.:45.0   1:1   1:1
## Median :64.0  1 : 7          Median :58.0   2:4
## Mean   :54.3  2 : 0          Mean   :54.6   3:1
## 3rd Qu.:65.5  3 : 0         3rd Qu.:68.0
## Max.   :72.0          Max.   :74.0
##
```

```
##      GATEC      GAT      GATend      CH
## Min.   :14     Min.   :14.0   Min.   :10.0   Min.   : 7.3
## 1st Qu.:15    1st Qu.:19.0   1st Qu.:18.5   1st Qu.:10.2
## Median :16    Median :25.0   Median :23.0   Median :11.3
## Mean   :16    Mean   :25.1   Mean   :24.9   Mean   :10.5
## 3rd Qu.:17    3rd Qu.:26.5   3rd Qu.:28.0   3rd Qu.:11.6
## Max.   :18    Max.   :46.0   Max.   :48.0   Max.   :12.0
```

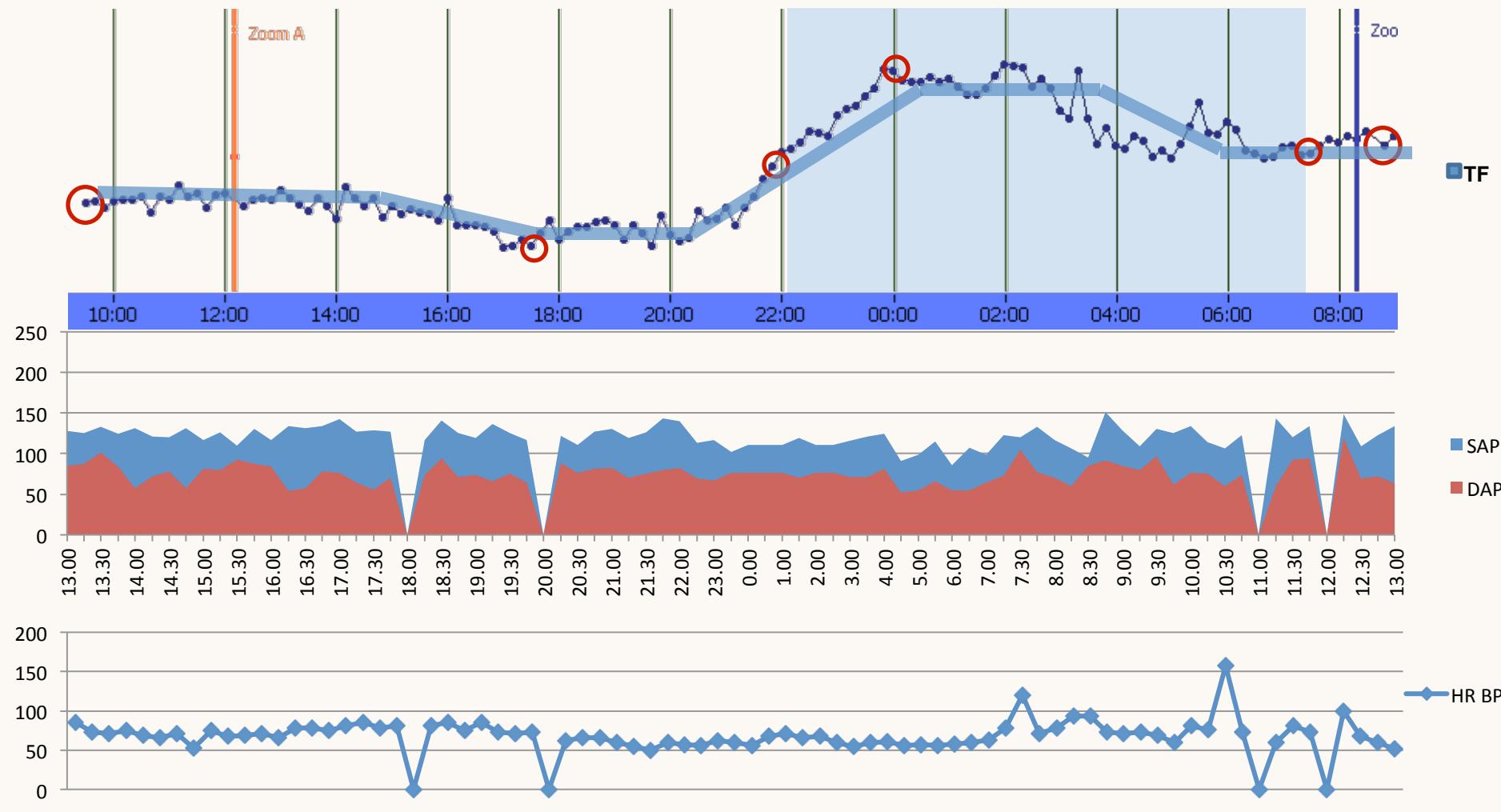
NTG

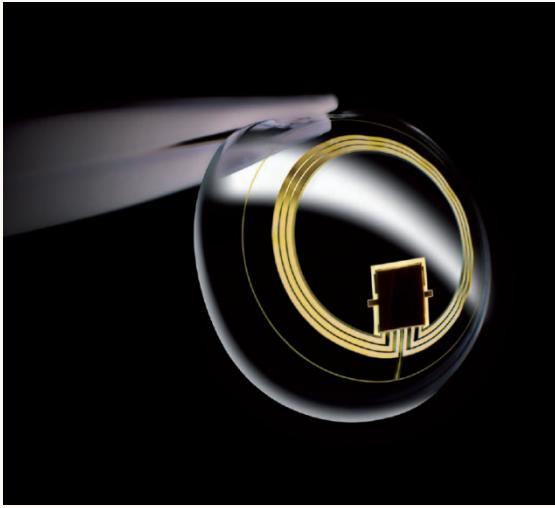
```
##      ID      D      GENDER      AGE      FLHAEM FSH
## Min.   :19.0  -4: 0   1:7     Min.   :22.0   0:3   0:0
## 1st Qu.:42.2  0 : 0   2:3     1st Qu.:58.2   1:7   1:2
## Median :44.5  1 : 0          Median :66.0   2:5
## Mean   :47.7  2 : 0          Mean   :61.3   3:3
## 3rd Qu.:52.0  3 :10          3rd Qu.:71.0
## Max.   :99.0          Max.   :76.0
##
```

```
##      GATEC      GAT      GATend      CH
## Min.   :17     Min.   :13.0   Min.   :12.0   Min.   : 8.60
## 1st Qu.:17    1st Qu.:14.2   1st Qu.:14.2   1st Qu.: 9.03
## Median :17    Median :16.0   Median :15.0   Median : 9.45
## Mean   :17    Mean   :16.1   Mean   :15.3   Mean   : 9.45
## 3rd Qu.:17    3rd Qu.:18.0   3rd Qu.:15.0   3rd Qu.: 9.88
## Max.   :17    Max.   :19.0   Max.   :19.0   Max.   :10.30
```

DATA ANALYSIS

1. GENERAL ANALYSIS - AREA UNDER CURVE (AUC) 24h
2. TIME-INTERVAL DEPENDENT ANALYSIS





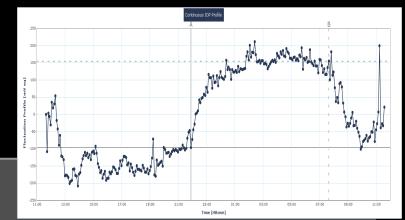
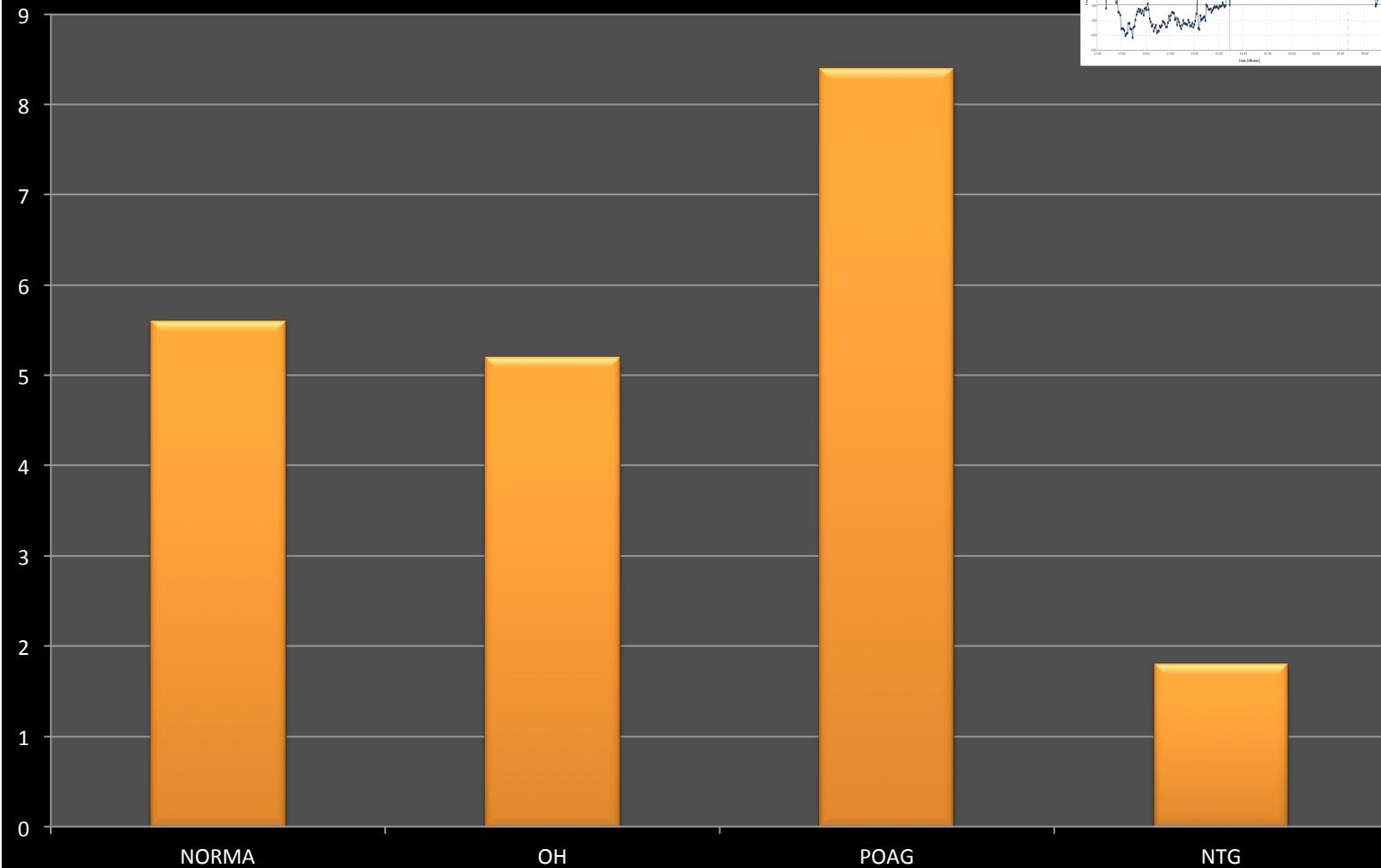
AUC

EYE CONTINUOUS VOLUMETRY

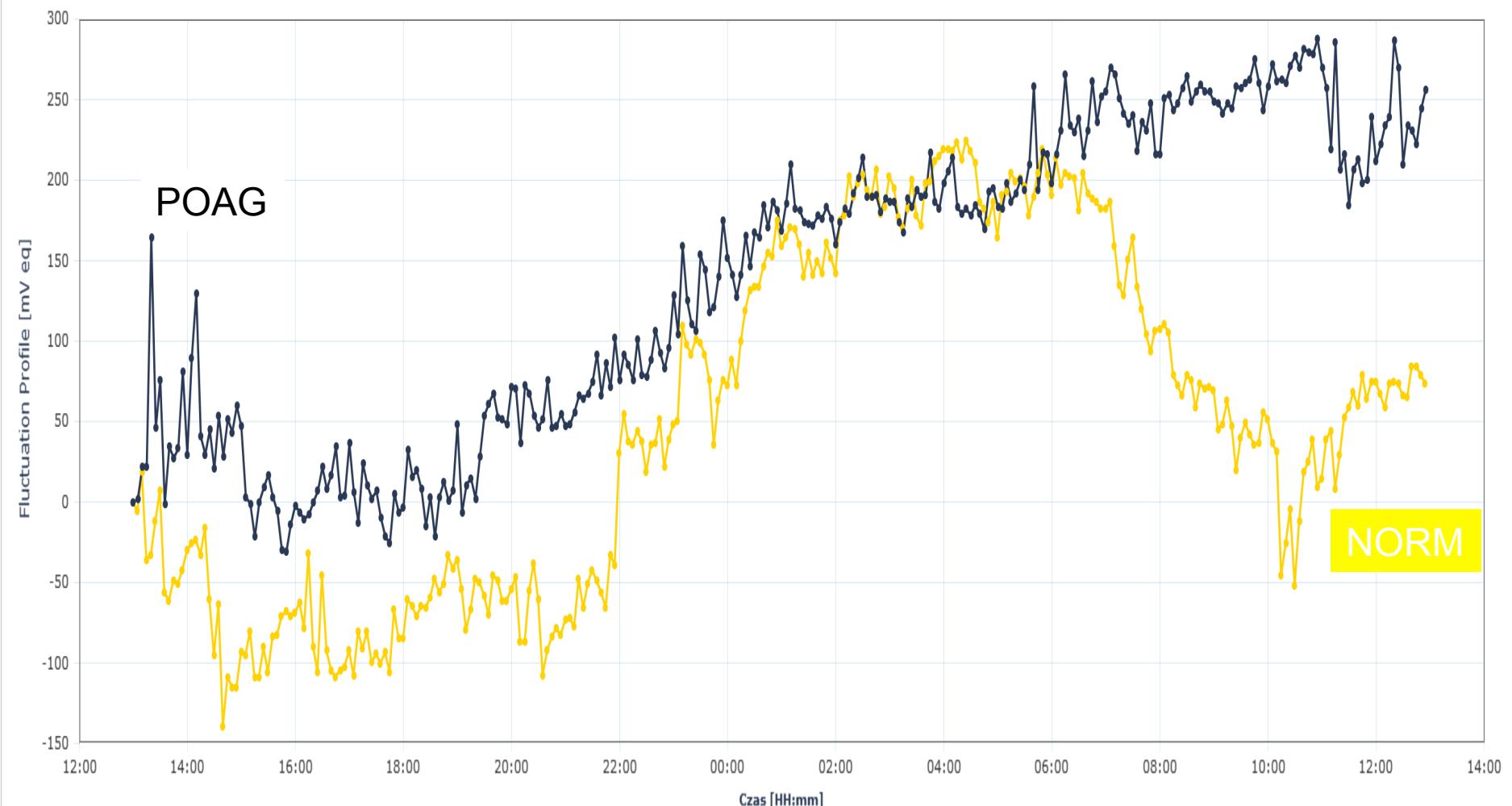
mV/10

mV/10

TF

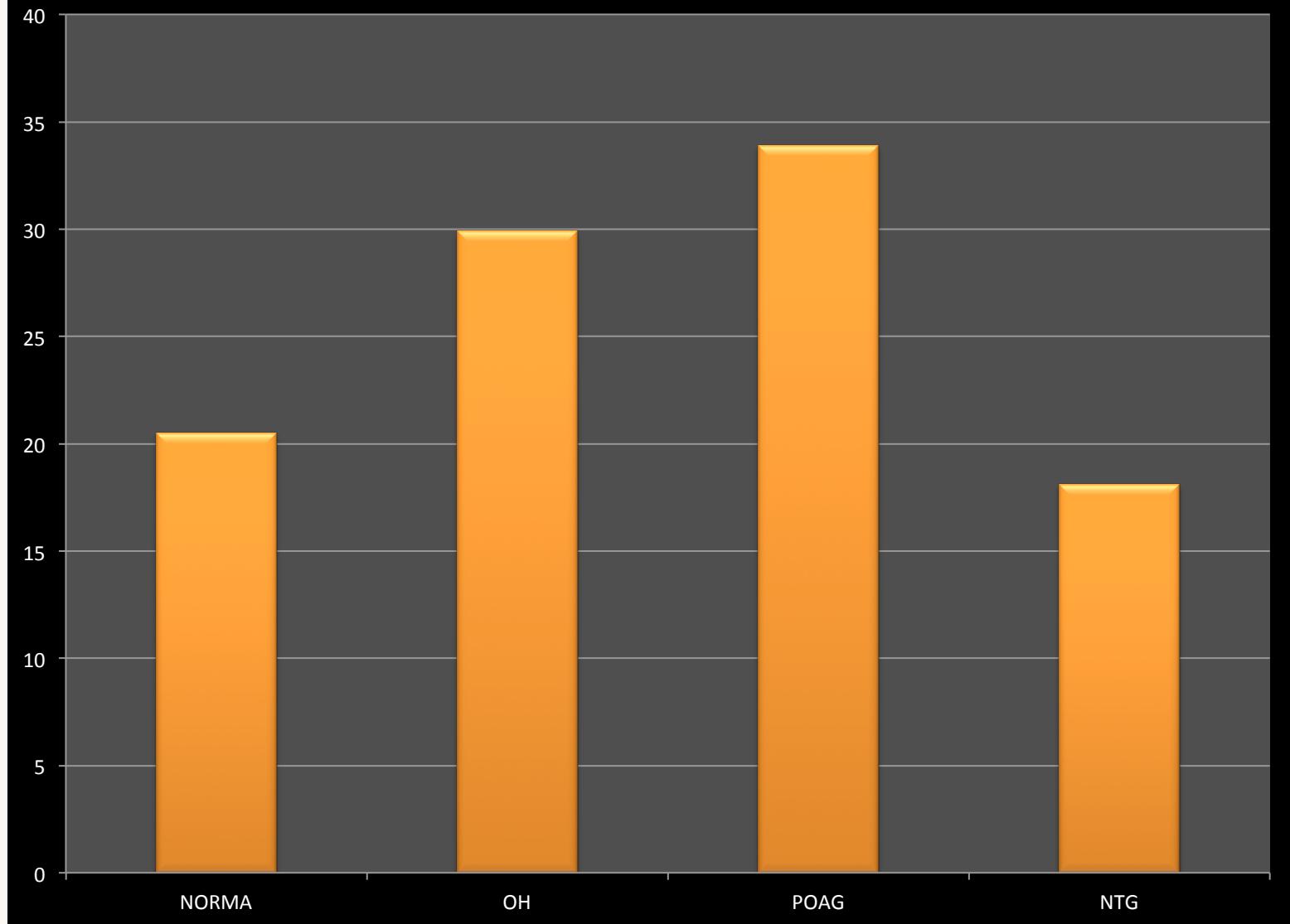


Continuous IOP Profile



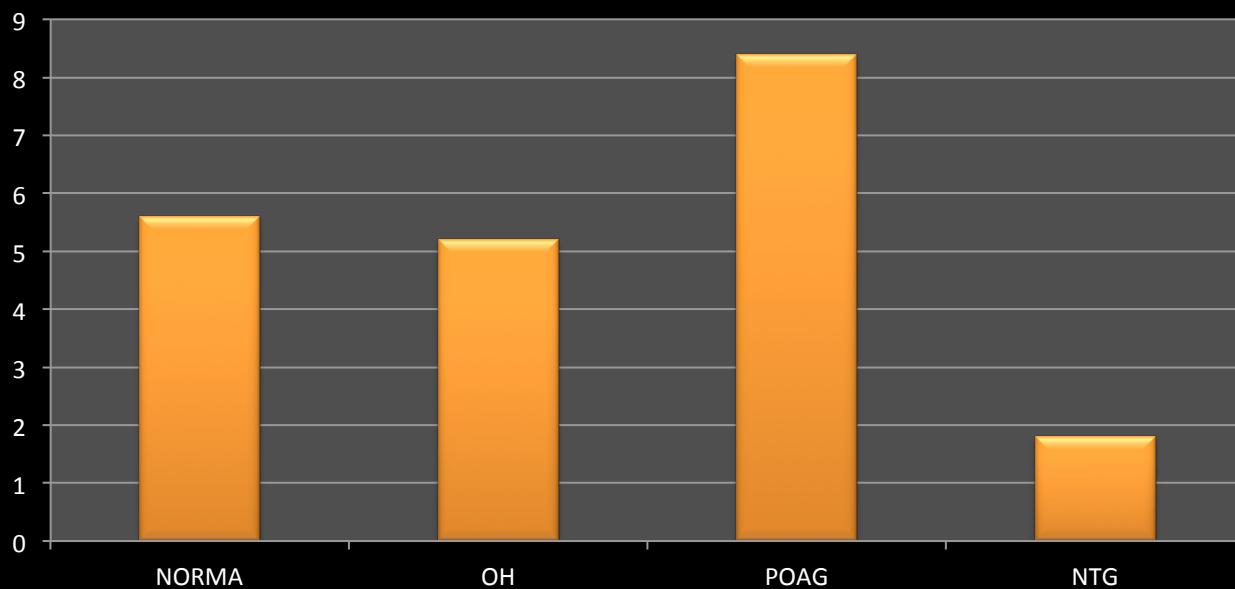
mV/10

TFGAT



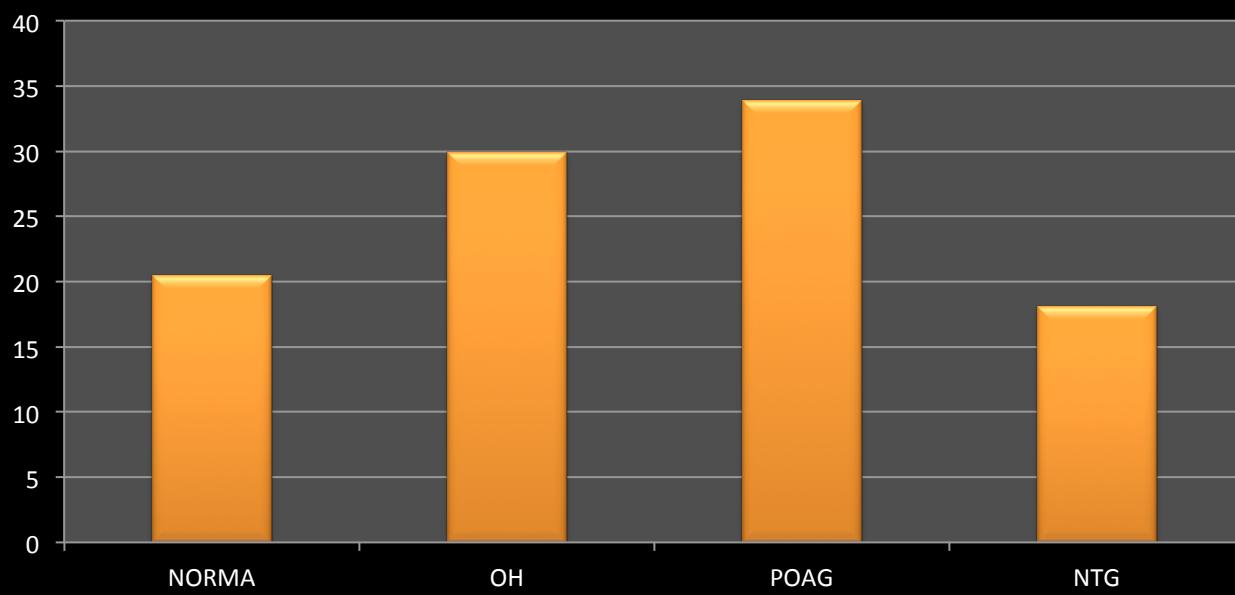
mV/10

TF



mmHg+mV/10

TFGAT

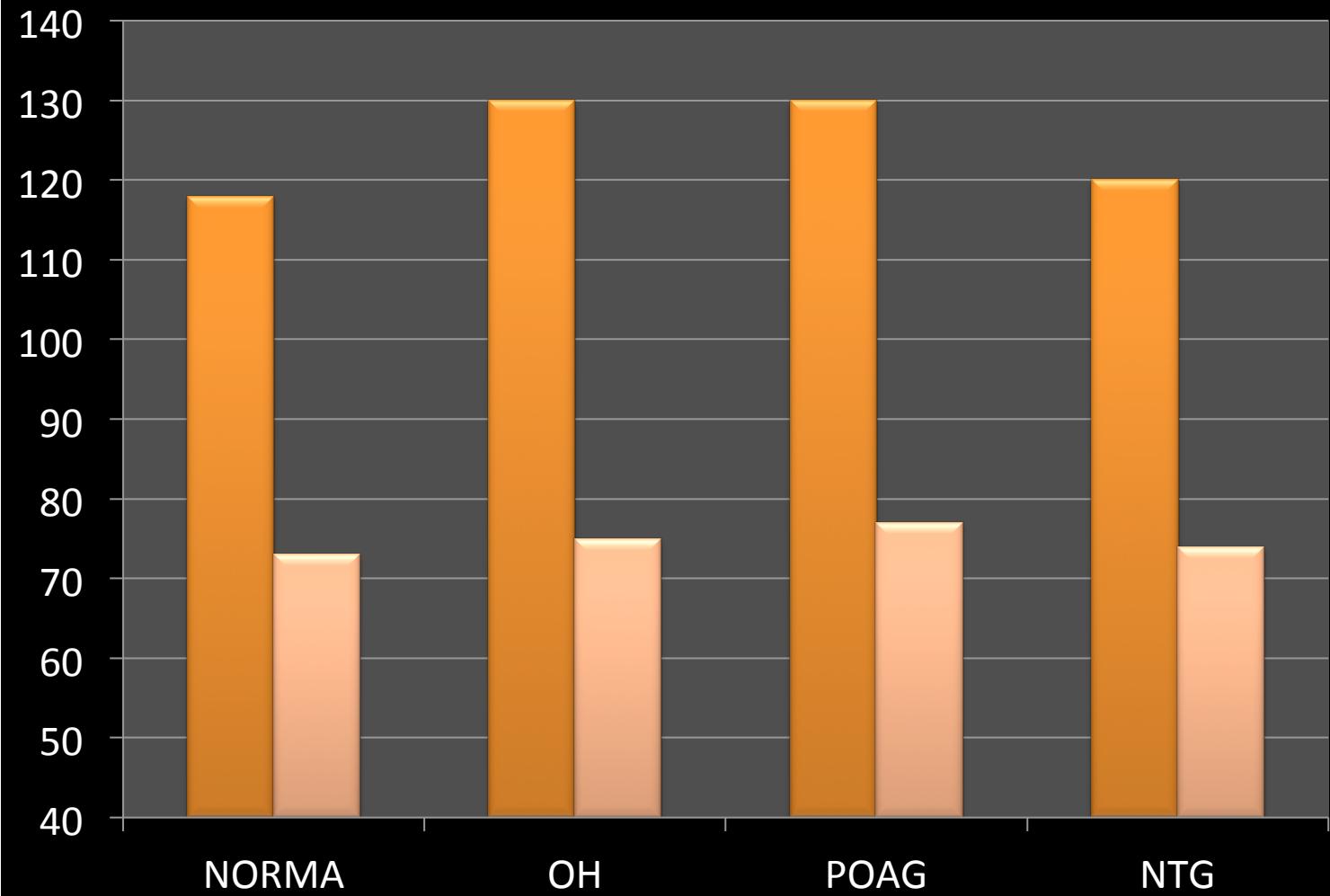


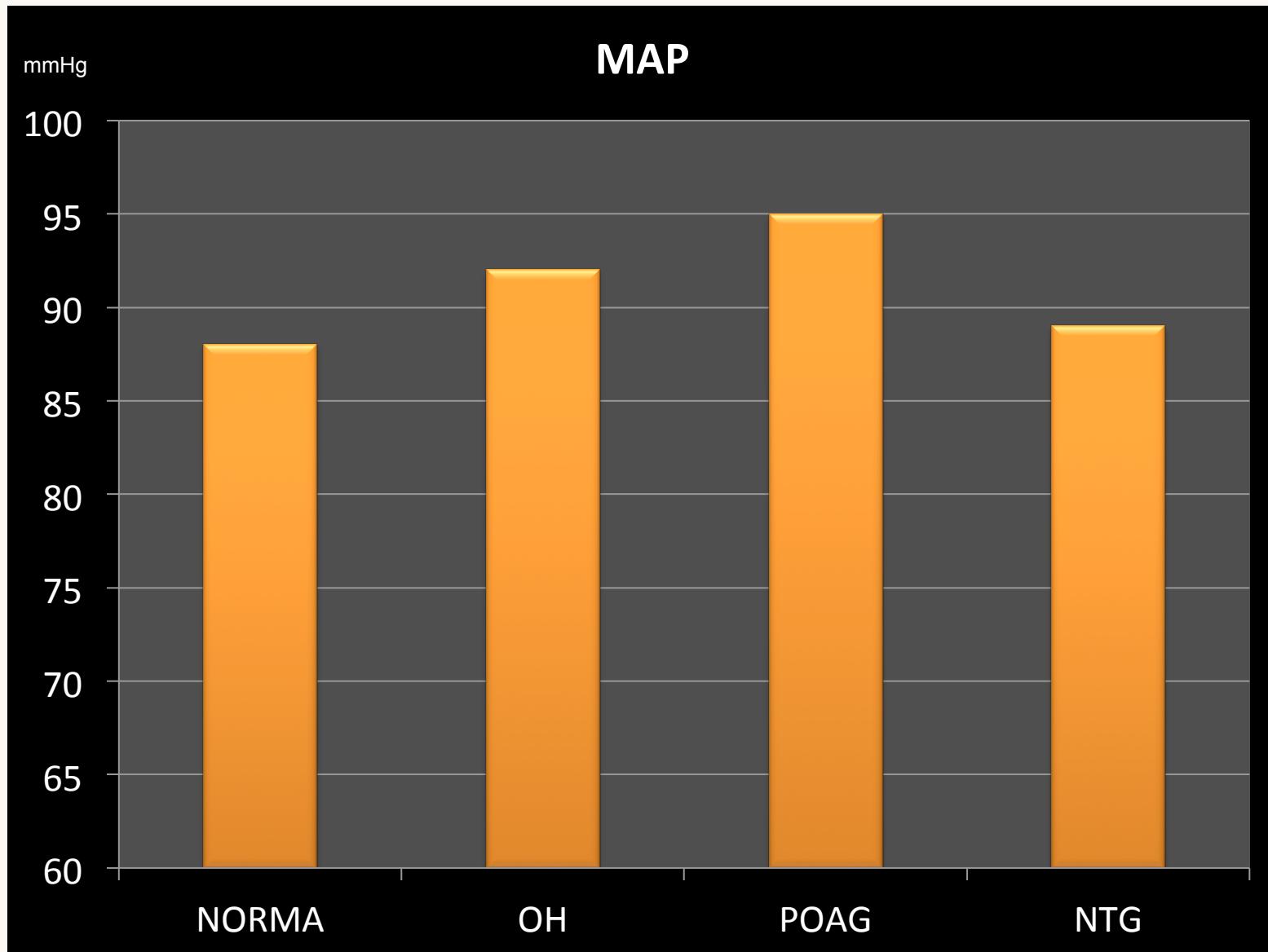


AUC

CARDIOVASCULAR FACTORS

SAP/DAP





bpm

HR

76

74

72

70

68

66

64

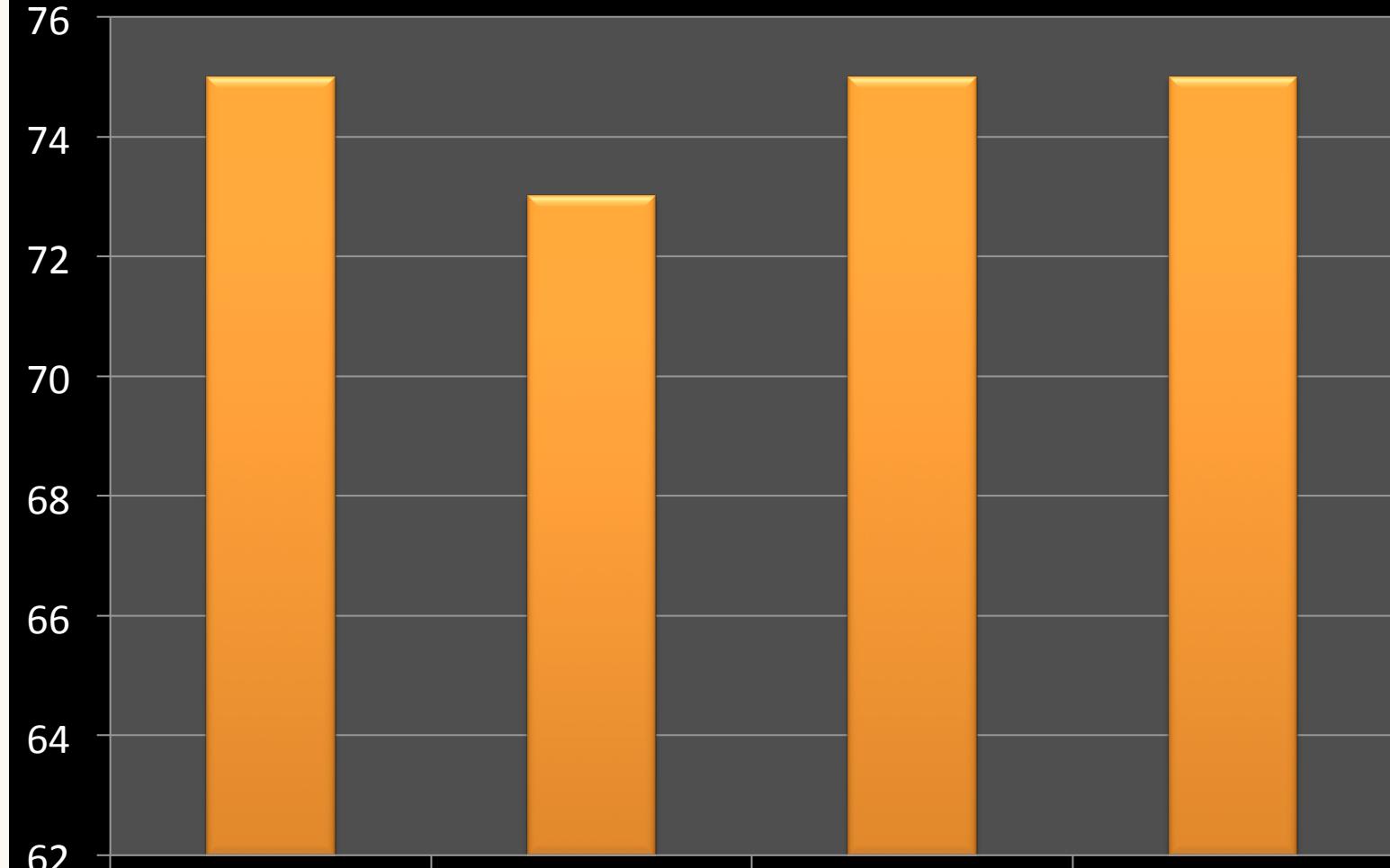
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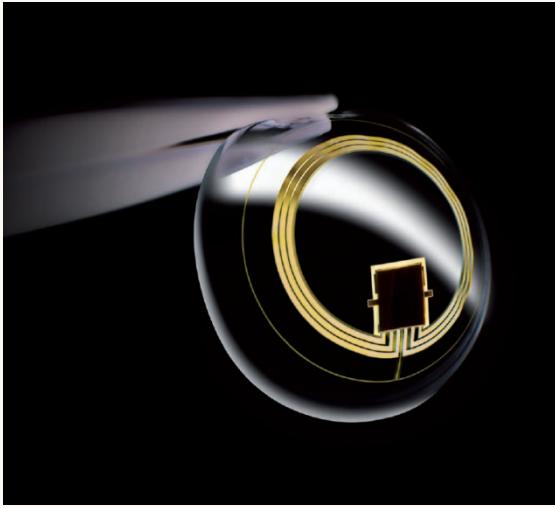
NORMA

OH

POAG

NTG





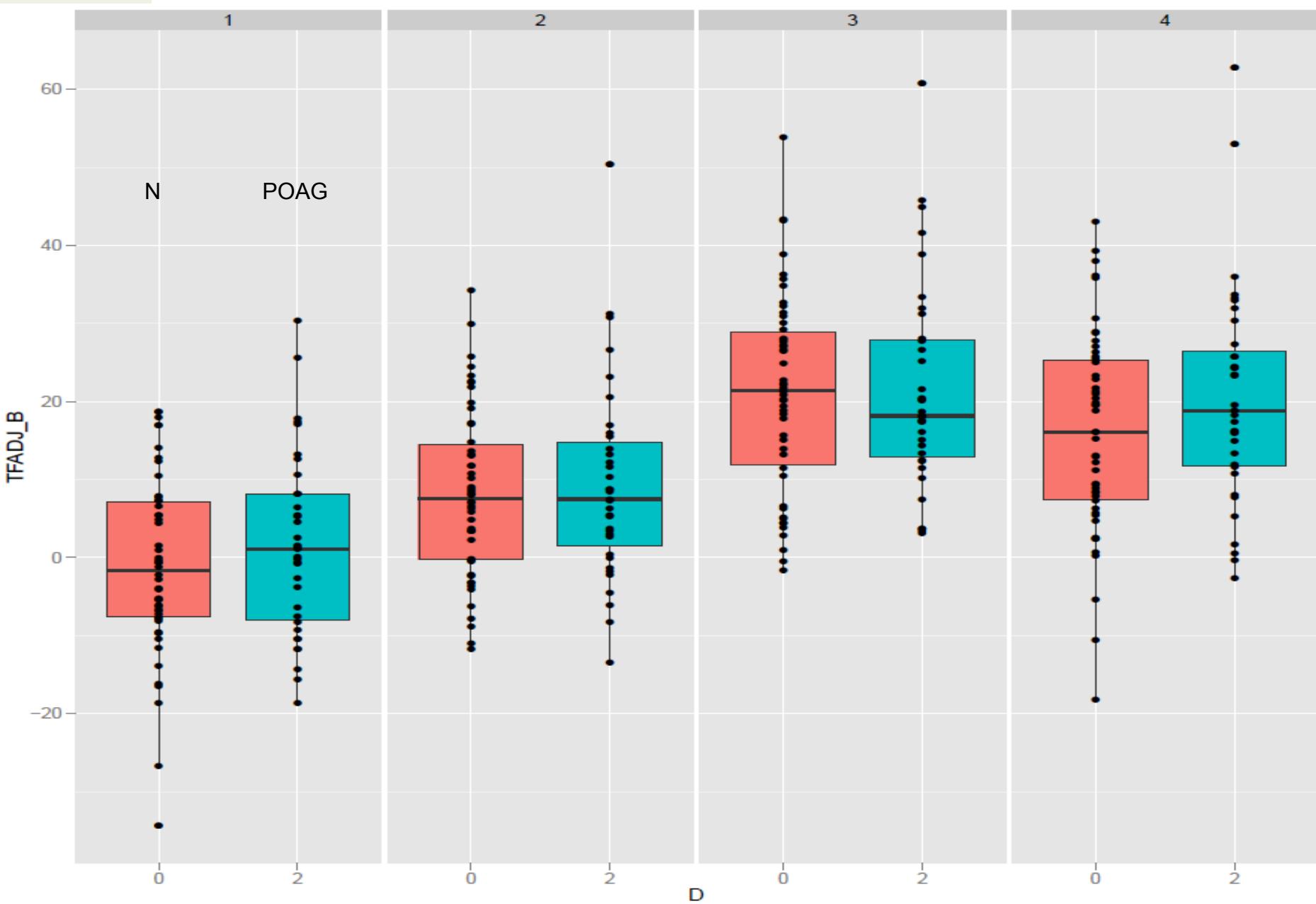
PATTERNS

EYE CONTINUOUS
VOLUMETRY

TF

 $\beta(\text{TFADJ})$

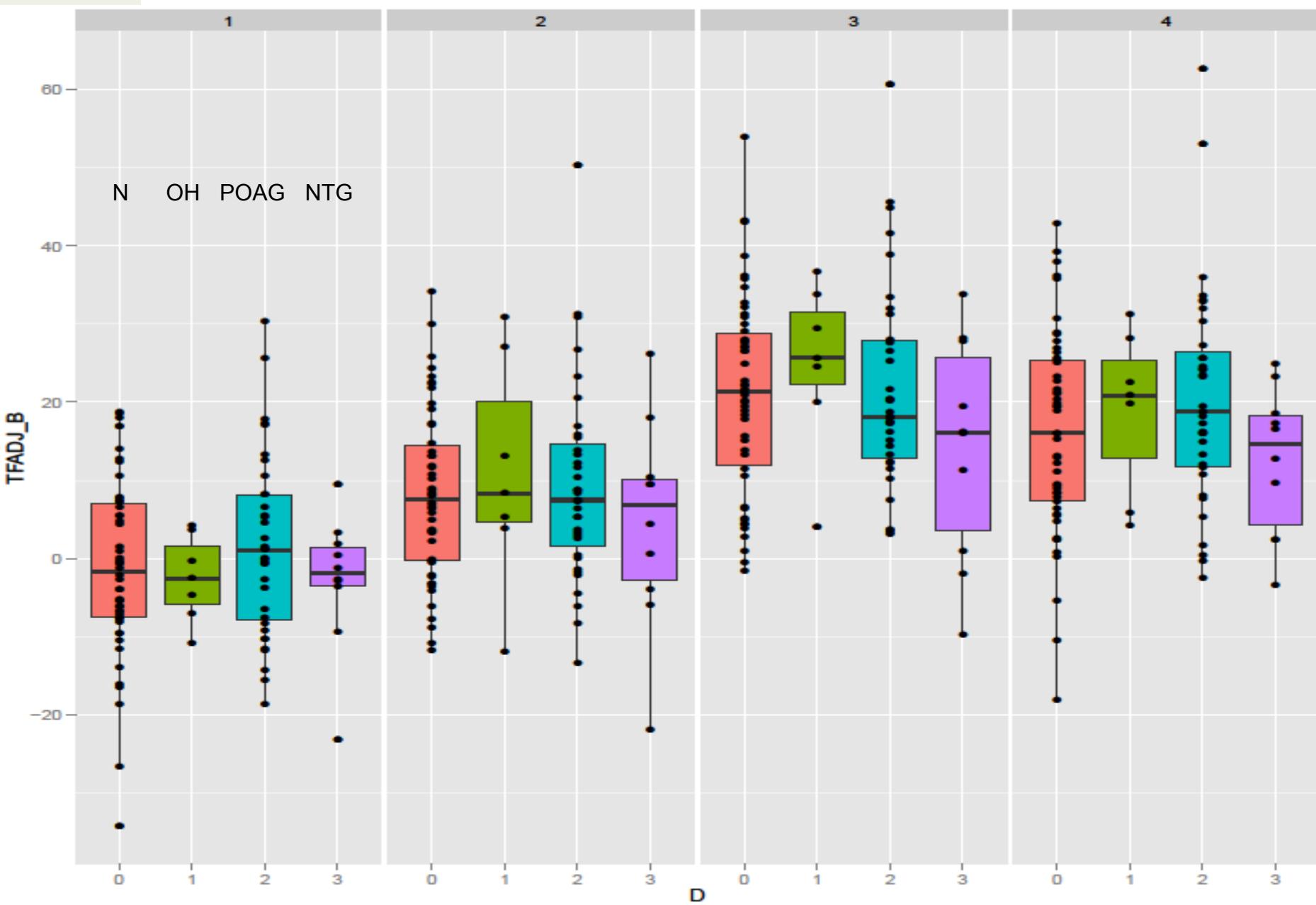
D 0 2



TF

 $\beta(\text{TFADJ})$

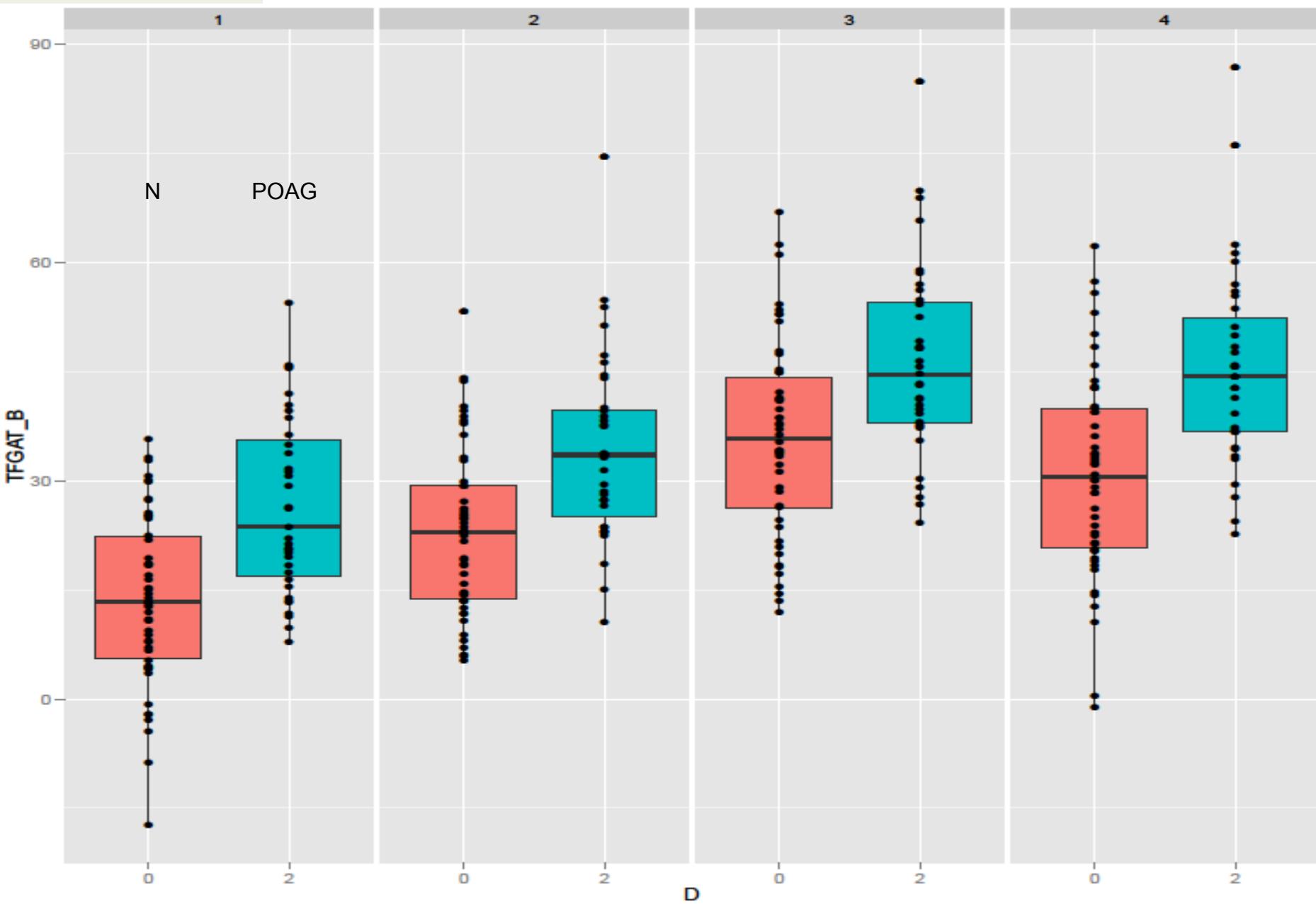
D 0 1 2 3



TFGAT

$\beta(\text{TFGAT})$

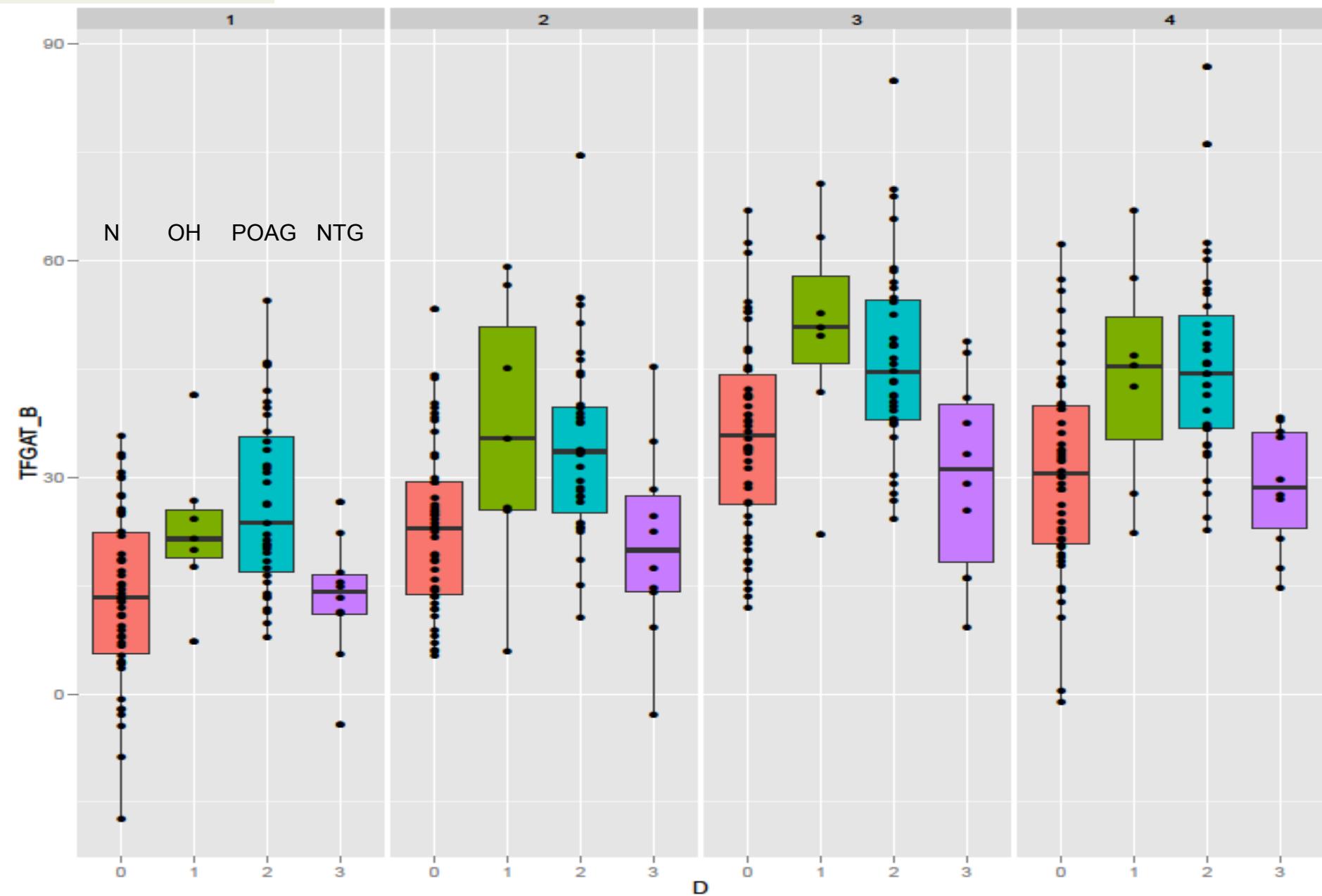
D 0 2



TFGAT

$\beta(\text{TFGAT})$

D 0 1 2 3





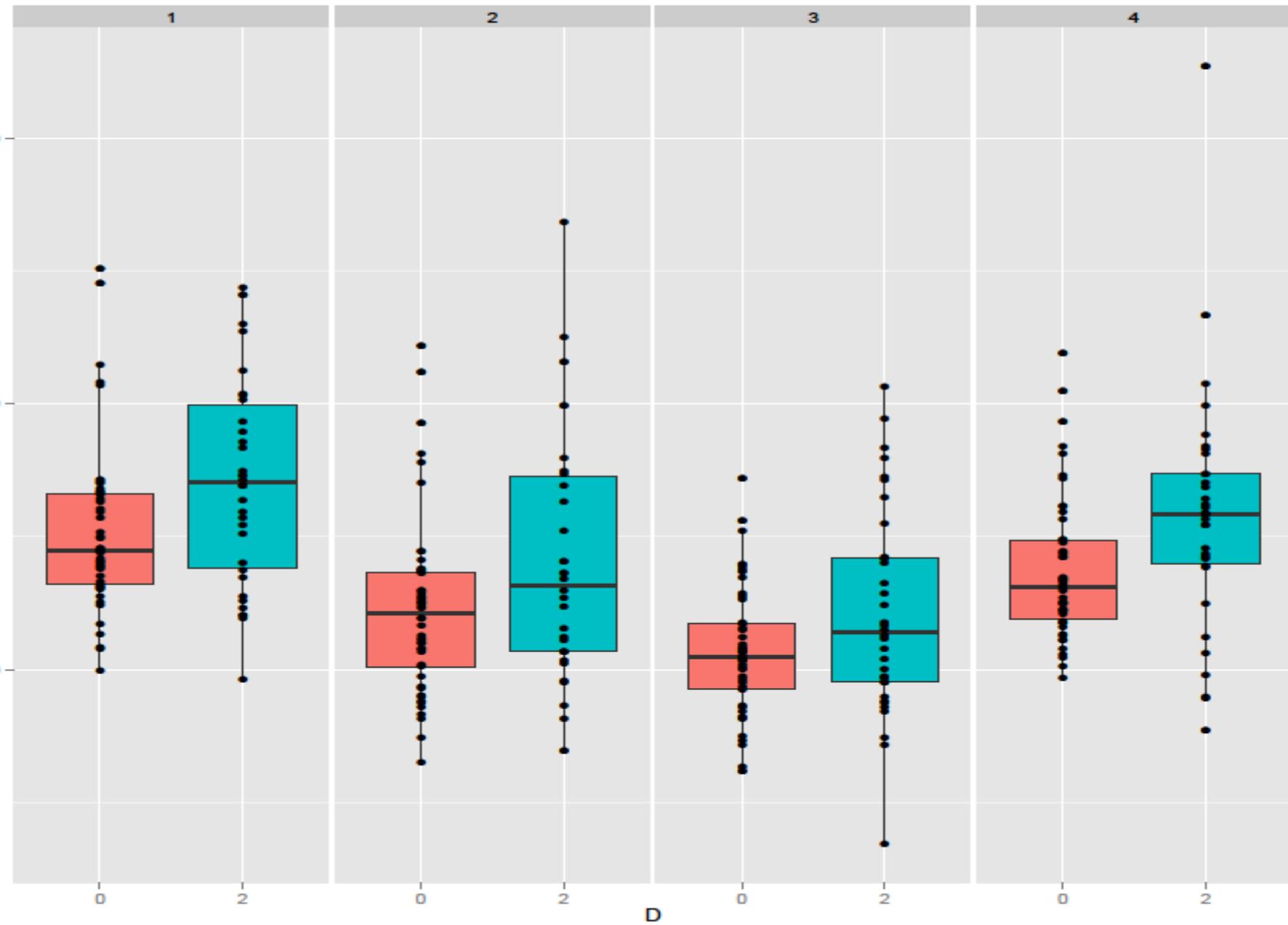
PATTERNS

CARDIOVASCULAR FACTORS

SAP

$\beta(\text{SAP})$

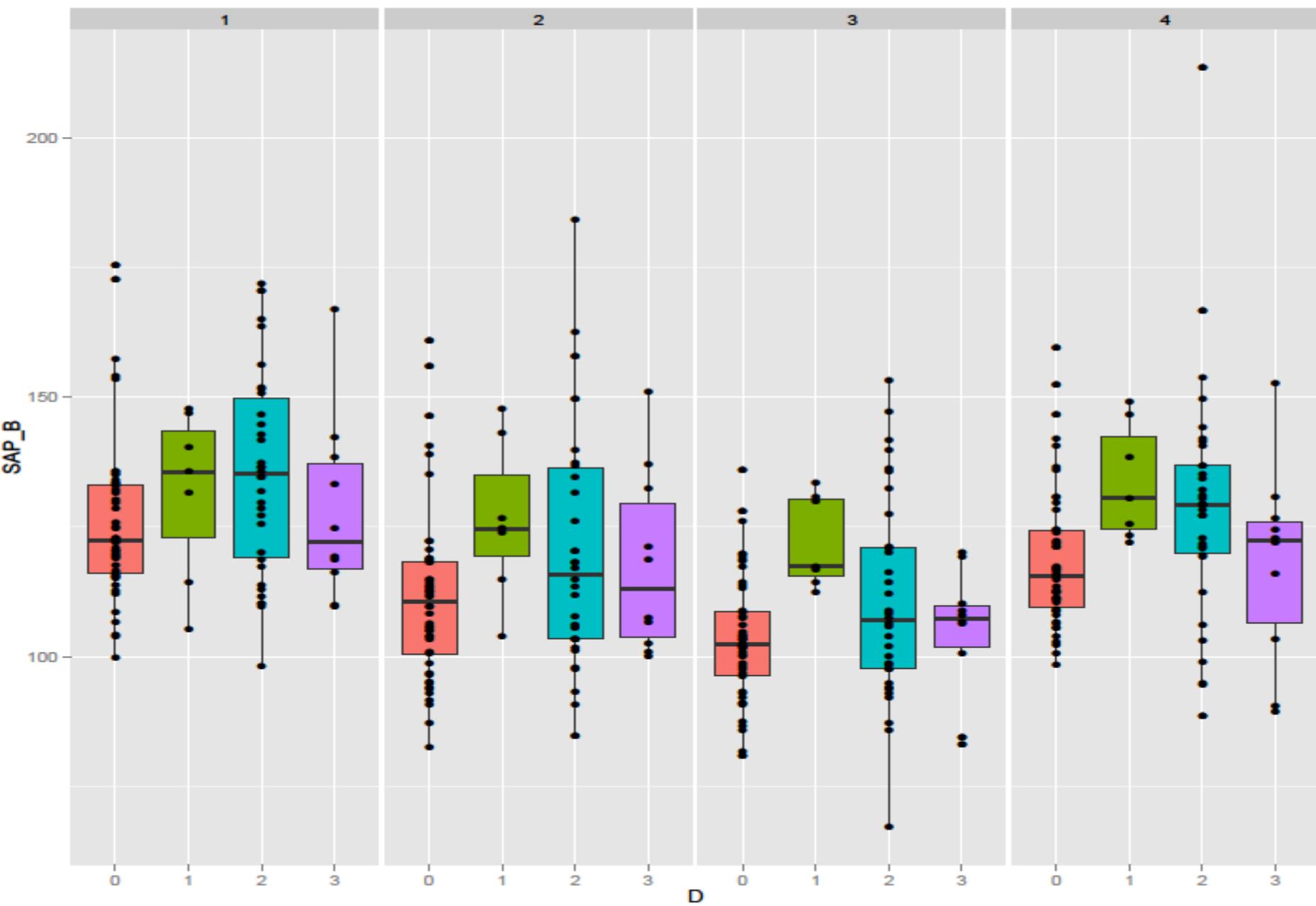
D 0 2



SAP

$\beta(\text{SAP})$

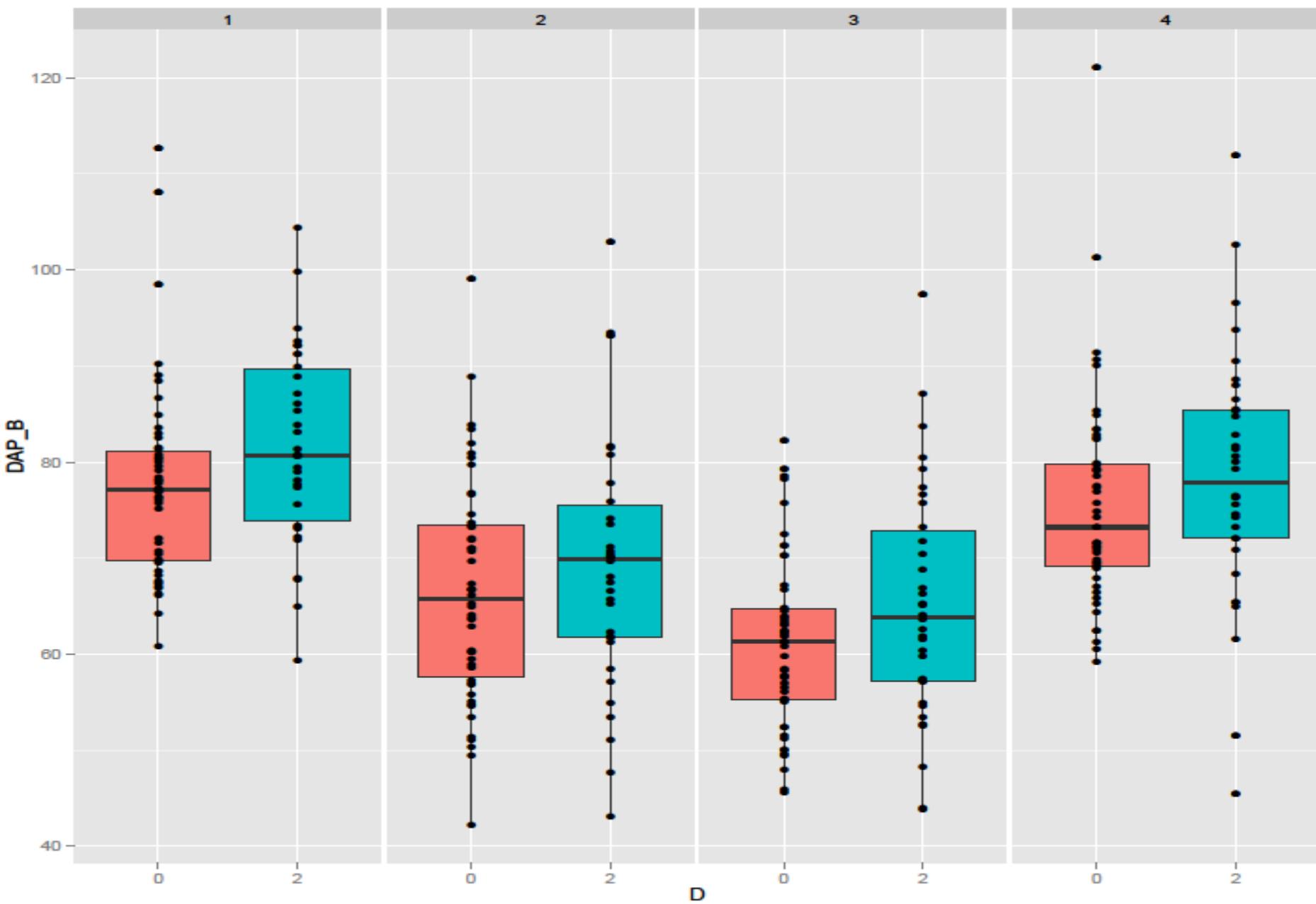
D 0 1 2 3



DAP

$\beta(\text{DAP})$

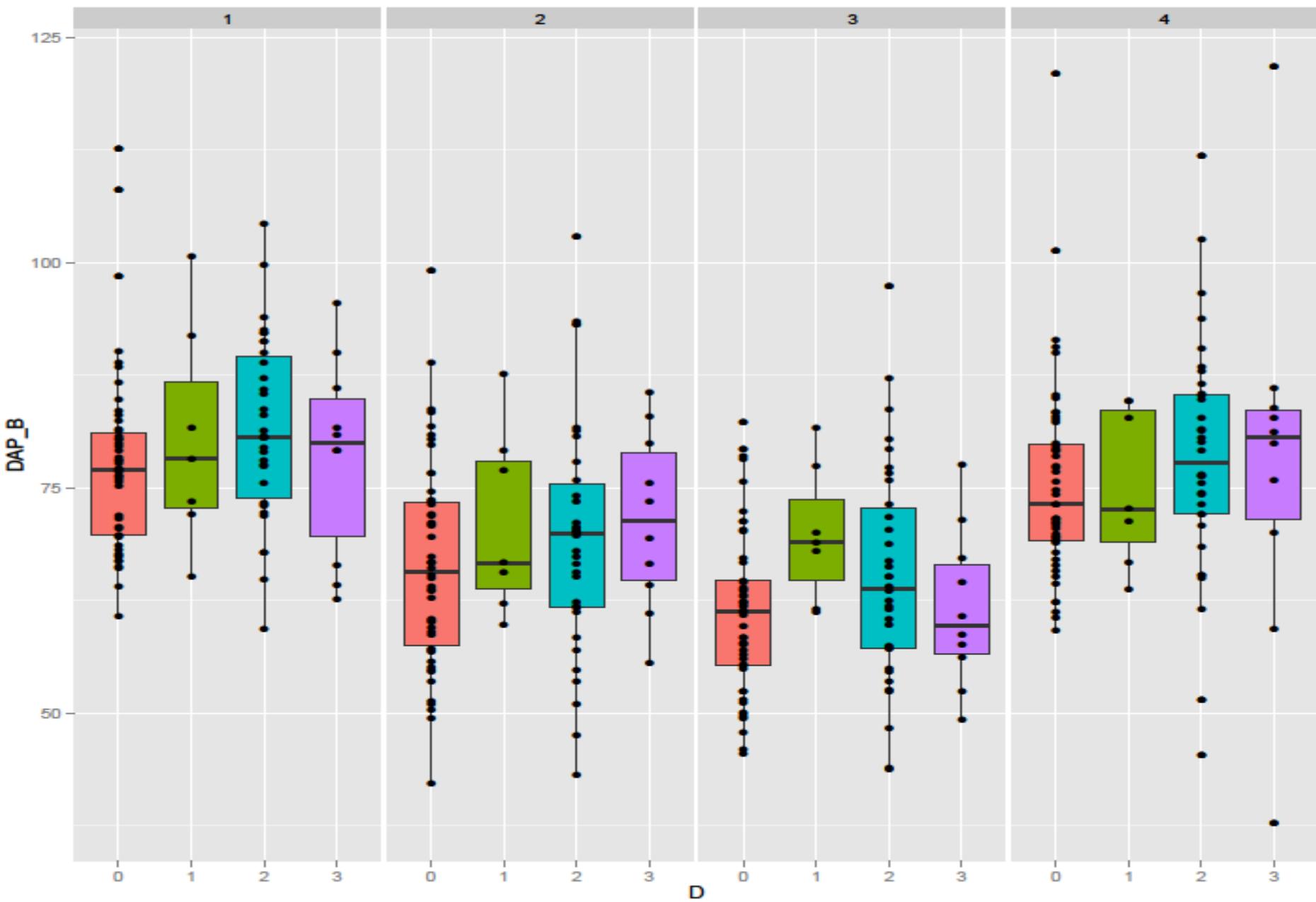
D 0 2



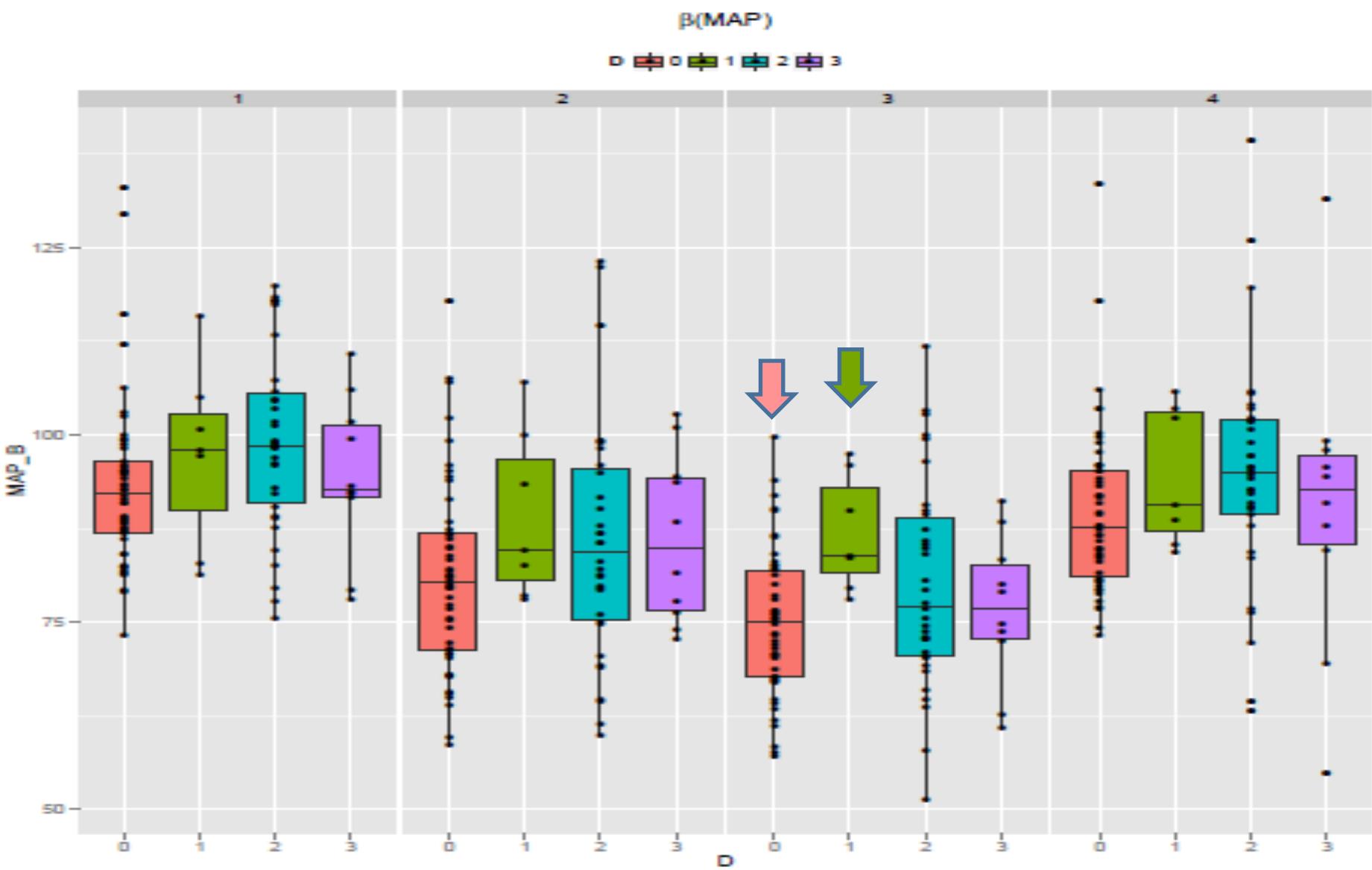
DAP

$\beta(\text{DAP})$

D 0 1 2 3



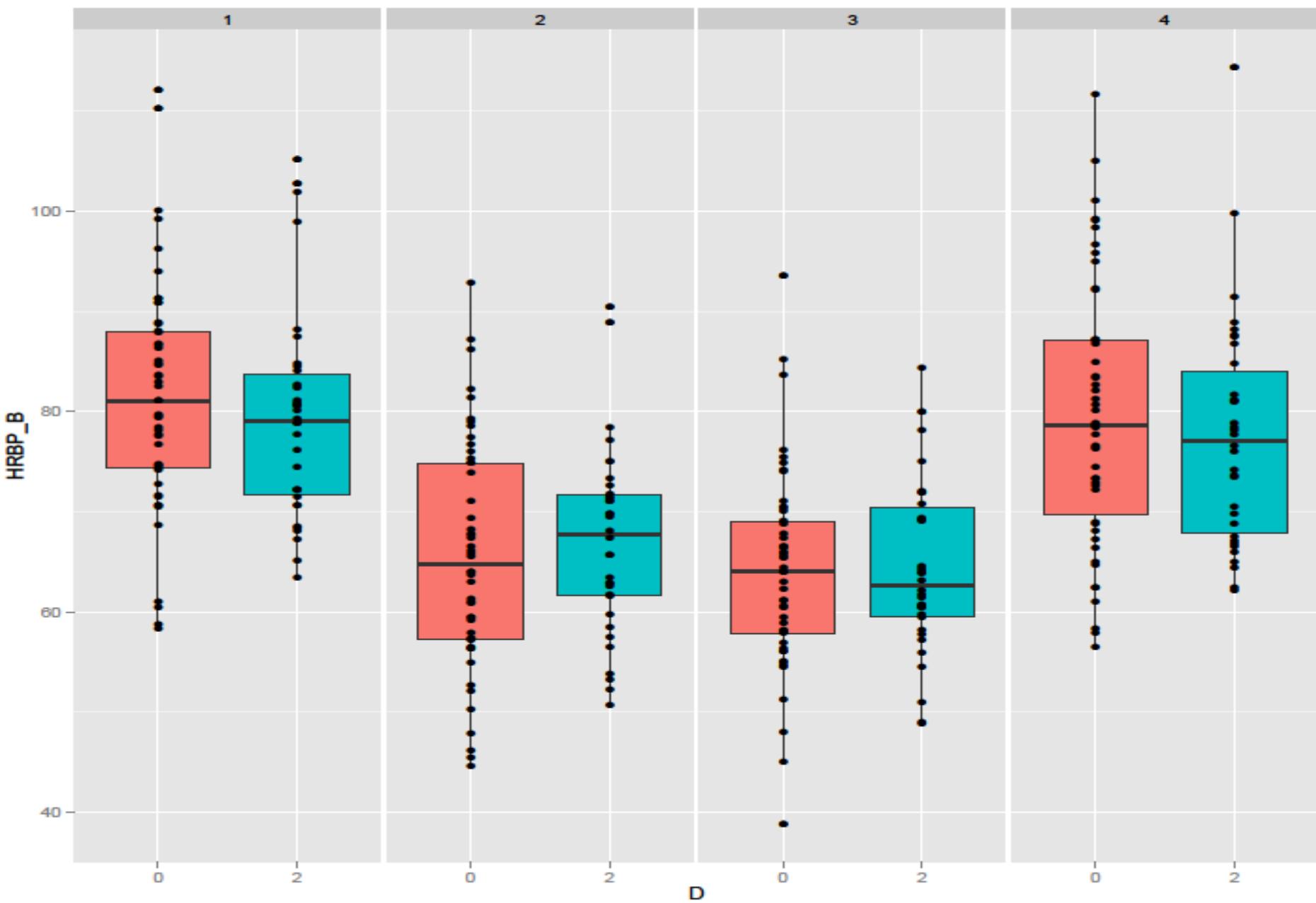
MAP



HR

$\beta(\text{HRBP})$

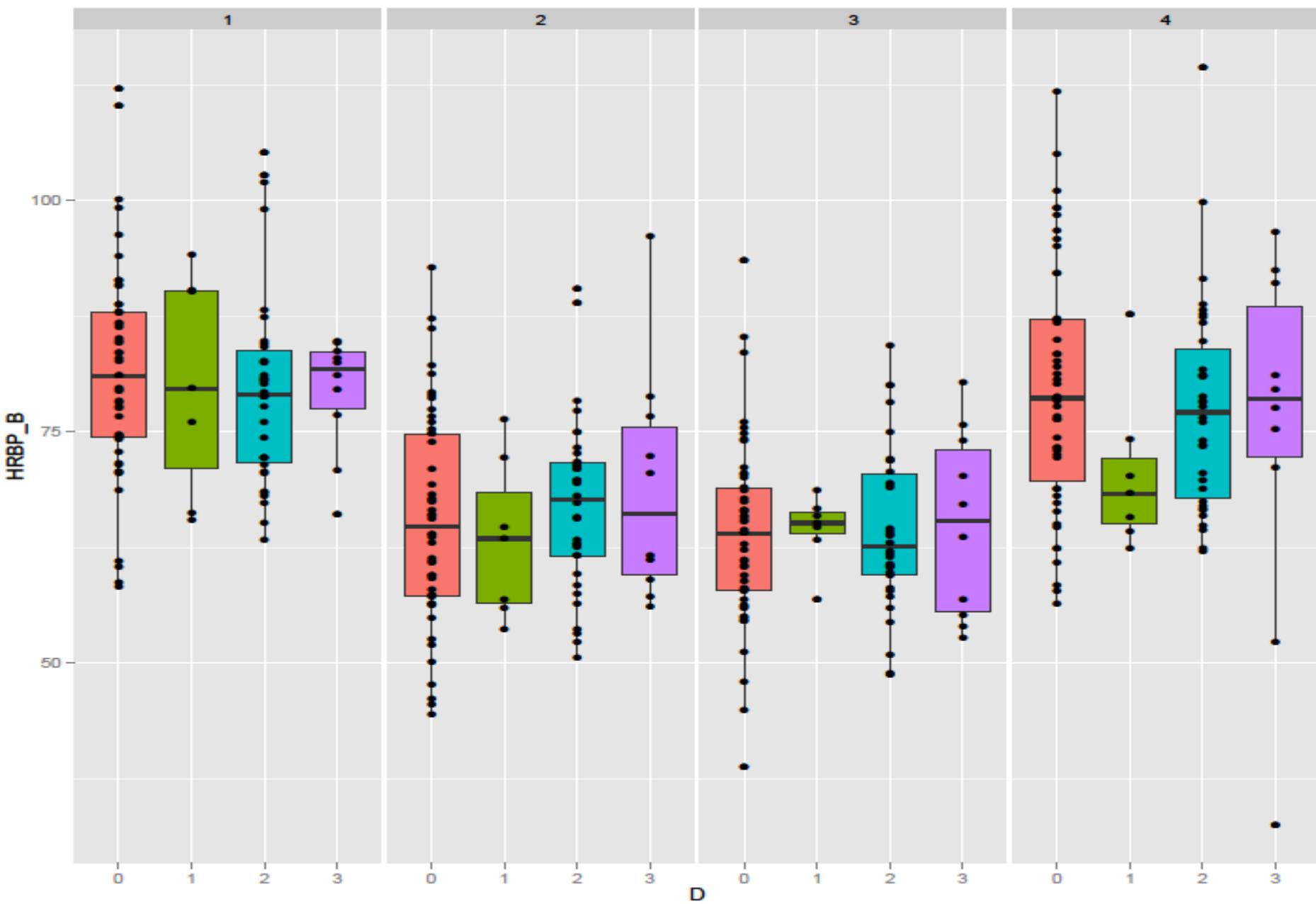
D 0 2



HR

$\beta(\text{HRBP})$

D 0 1 2 3



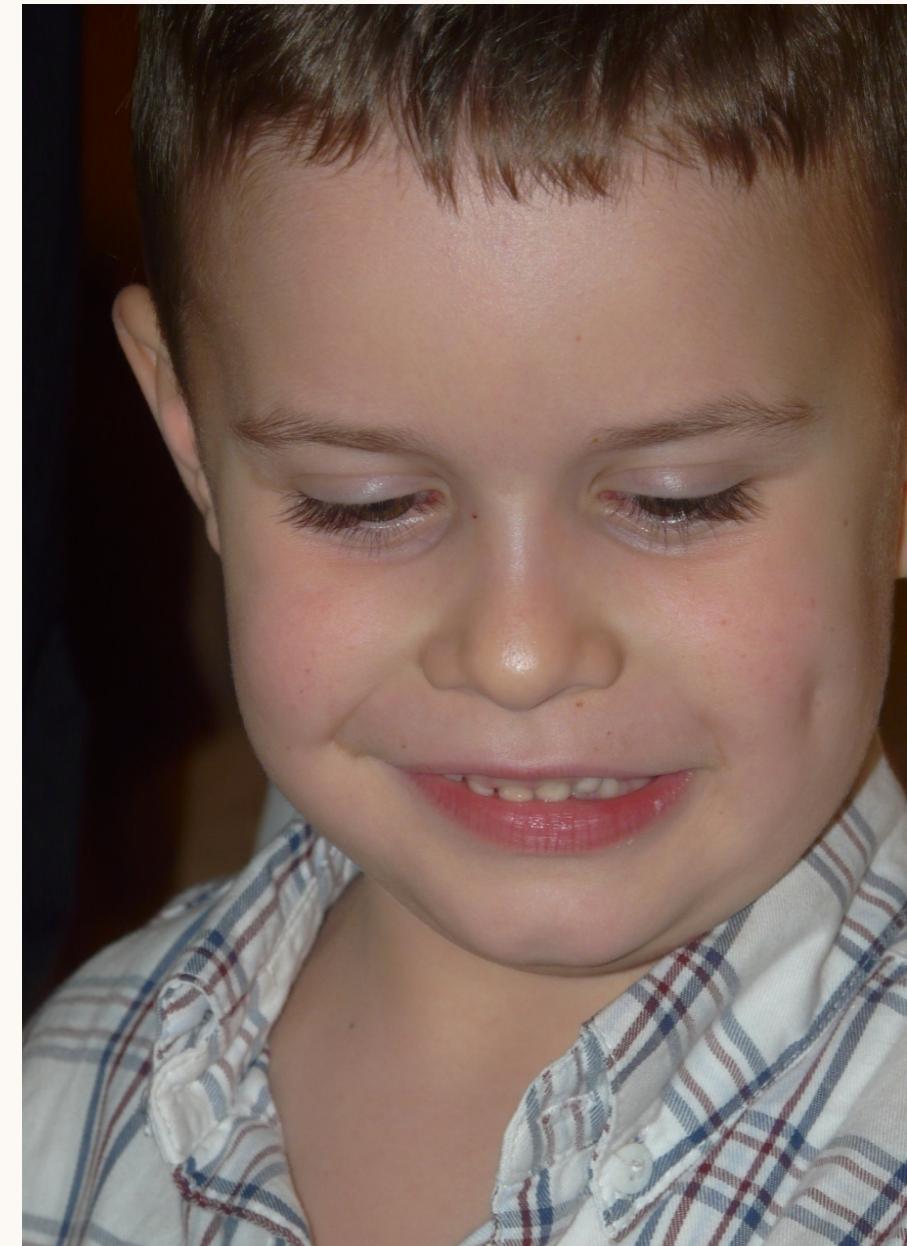
CONCLUSIONS:

24h. Monitoring Eyeball Volume

1. $\Sigma\Delta$ (AUC) Eyeball Volume **NORMALs** =OHs, <POAGs and >NTGs
2. Biorythms significantly differs between **Normals** and **POAGs** i NTGs,
(slower or non-present morning volume slope)

24h. Monitoring Cardiovascular System

1. $\Sigma\Delta$ (AUC) SAP/DAP **POAGs/OHs > NORMALs**
2. SAP&DAP in **NORMALs < POAGs** and OHs
3. SAP&DAP DAY-to-NIGHT FLUCTUATIONS are the HIGHEST
In **POAGs&NTGs**
4. HR seems to be slightly lower in OHs in morning hours



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