

# Interpreting the GPS Printout

**Patient data:**

This section displays general patient data as patient name, birth date, patient ID and descent.

**Quality:**

Evaluation of image quality based on the standard deviation (SD) of the image. Below, focus setting and astigmatic lens used for the acquisition are given, as well as the operator name.

**Sectorial measurements:**

The table shows the five parameters measured for the individual sectors. Three parameters relate to the cup shape, two relate to the shape of the peripapillary nerve fiber layer. Cup size and rim steepnes are measured for all seven sectors, the other coefficients are only measured for the global sector, i.e. for the entire optic nerve head.

**Graphic display of the classification result:**

For each sector, the classification result is displayed as a column, based on the probability values. The height of the columns indicates how close the individual GPS value is to the next threshold value.

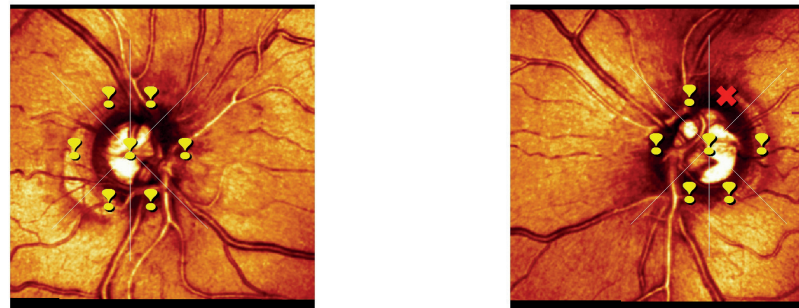
**Heidelberg Retina Tomograph GPS Report**



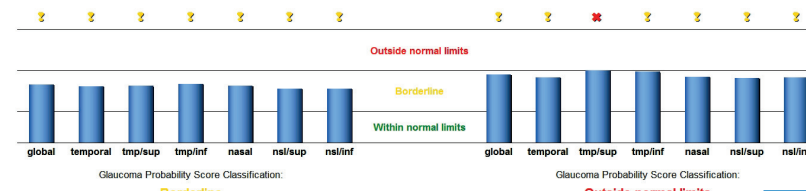
Patient: \_\_\_\_\_ DOB: \_\_\_\_\_ Examination: \_\_\_\_\_  
 Pat-ID: \_\_\_\_\_ Gender: \_\_\_\_\_ Ethnicity: \_\_\_\_\_  
 Quality: **Very good** (SD 11 µm) Initial Report Quality: **Very good** (SD 11 µm)  
 Focus: 1.00 dpt Focus: 1.00 dpt  
 Operator: \_\_\_\_\_ Operator: \_\_\_\_\_

**OD OS**

**Glaucoma Probability Score (GPS)**



	global	temporal	tmp/sup	tmp/inf	nasal	nsi/sup	nsi/inf	Parameter	global	temporal	tmp/sup	tmp/inf	nasal	nsi/sup	nsi/inf
	0.52	0.50	0.50	0.52	0.51	0.48	0.48	Glaucoma prob.	0.60	0.58	0.64	0.63	0.59	0.57	0.58
	-0.47	-0.45	-0.53	-0.57	-0.48	-0.38	-0.61	Rim steepness	-0.40	-0.52	-0.42	-0.56	-0.32	-0.16	-0.57
	0.50	0.16	0.07	0.08	0.11	0.07	0.05	Cup size [mm <sup>2</sup> ]	0.62	0.17	0.09	0.11	0.13	0.09	0.06
	0.73	---	---	---	---	---	---	Cup depth [mm]	0.78	---	---	---	---	---	---
	-0.03	---	---	---	---	---	---	H. RNFL curv.	-0.02	---	---	---	---	---	---
	-0.10	---	---	---	---	---	---	V. RNFL curv.	-0.11	---	---	---	---	---	---



Glaucoma Probability Score Classification:

- Within normal limits (Green checkmark)
- Borderline (Yellow question mark)
- Outside normal limits (Red cross)

Comments: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**Sectorial classification:**

For each sector, a Glaucoma Probability Score (GPS) is calculated. The classification result for each sector is indicated as an overlay on the reflectivity image:

- Within normal limits
- Borderline
- Outside normal limits

**Overall GPS result:**

The overall GPS result is derived from the sectorial classifications. Only if all sectors are „within normal limits“, the overall result will be „within normal limits“. The Glaucoma Probability Score is a measure for the likelihood that the examined eye belongs to a group of early glaucomatous eyes.

# Classification using Glaucoma Probability Score

## A user-independent classification method

# HFT3

### A method to assess the patients glaucoma risk

The Glaucoma Probability Score (GPS) is an objective method for structural analysis of the optic nerve head. The optic disc is compared to models of normal and early glaucomatous discs derived from referenced databases.

- Cup (cup size, -depth and rim steepness) as well as the peripapillary nerve fiber layer are incorporated into the model.
- The measured values are compared to values from the respective descent-specific reference database.
- GPS is an objective, user-independent classification method.

### Methods of artificial intelligence

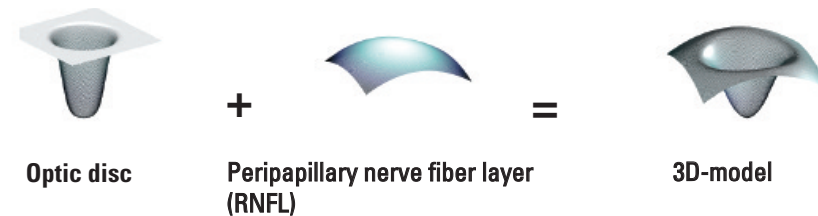
In order to assess the optic disc for typical structural change patterns, GPS employs a method of artificial intelligence, a „Machine Learning Classifier“. This is a computer program which has developed models of normal and glaucomatous eyes by comparing different data sets of healthy and glaucomatous eyes.

### Comparison with Moorfields Regression Analysis

Both, Moorfields Regression Analysis (MRA) and GPS use different structural characteristics to classify an optic nerve head. While MRA relies on rim area in relation to disc size, GPS is based on the 3-D structure of the optic nerve head. Therefore, both classification methods may give different results for an eye. However, sensitivity and specificity of GPS are comparable to those of MRA.

### Constructing a 3D-model

The GPS model comprises information on the optic disc as well as the peripapillary nerve fiber layer:



### Shape analysis

The shape of the optic nerve head changes with progression of glaucoma. The GPS software analyses the anatomical structure of the optic nerve head and compares it to structures of 3-D models of healthy and glaucomatous eyes.



The models represent the typical structures of normal eyes and structures developing during the glaucomatous process:

- The RNFL surface becomes flatter
- The cup becomes larger, deeper and the rim slope steeper

From this comparison, the GPS classification is calculated.

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