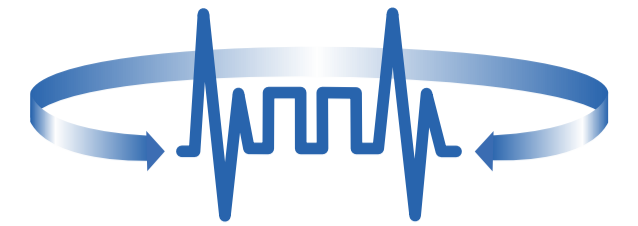


# Novel visual acuity charts with modified 3-bar optotypes: approbation in cataract patients



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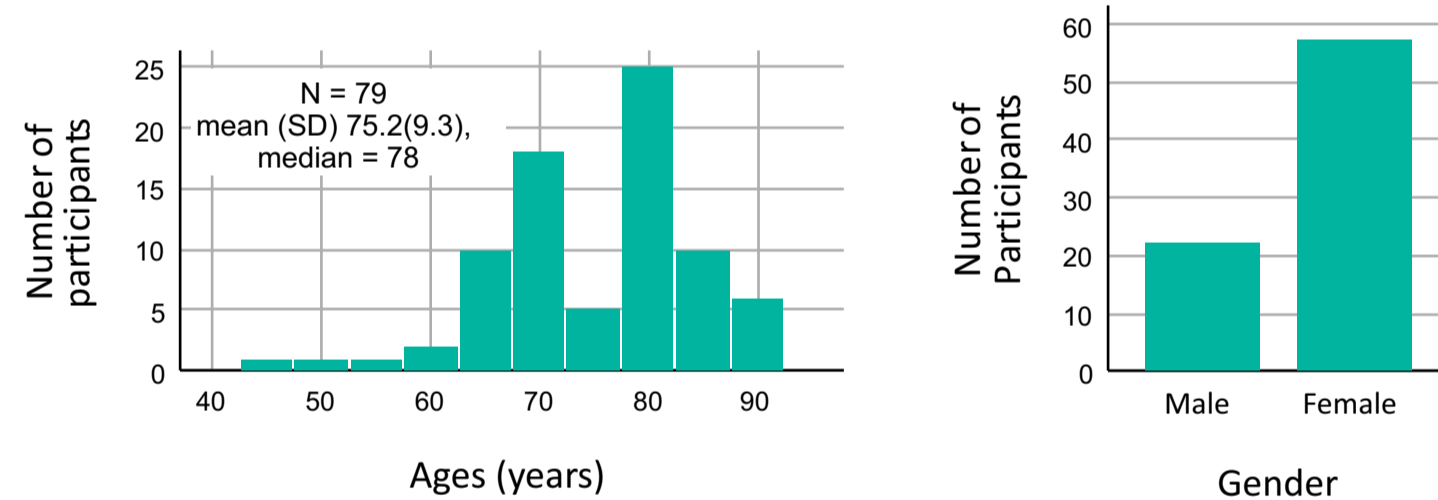
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## Background and aim

Two novel charts for visual acuity (VA) assessment with modified 3-bar optotypes were created. The aim of the work was to compare the novel charts and two standard charts (ETDRS and E-chart) in cataract patient examination.

## Participants

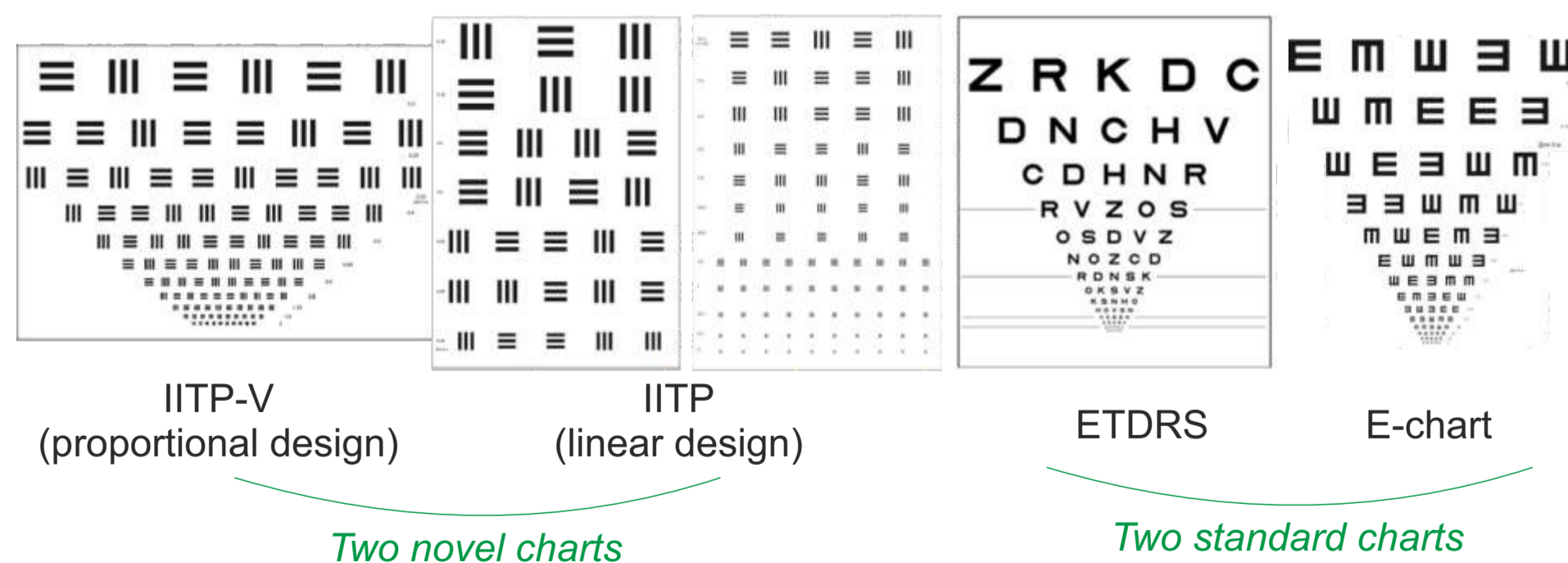
### Demographic information



All patients were prescribed to the cataract surgery on the eye assessed. Only one eye was assessed in each patient.

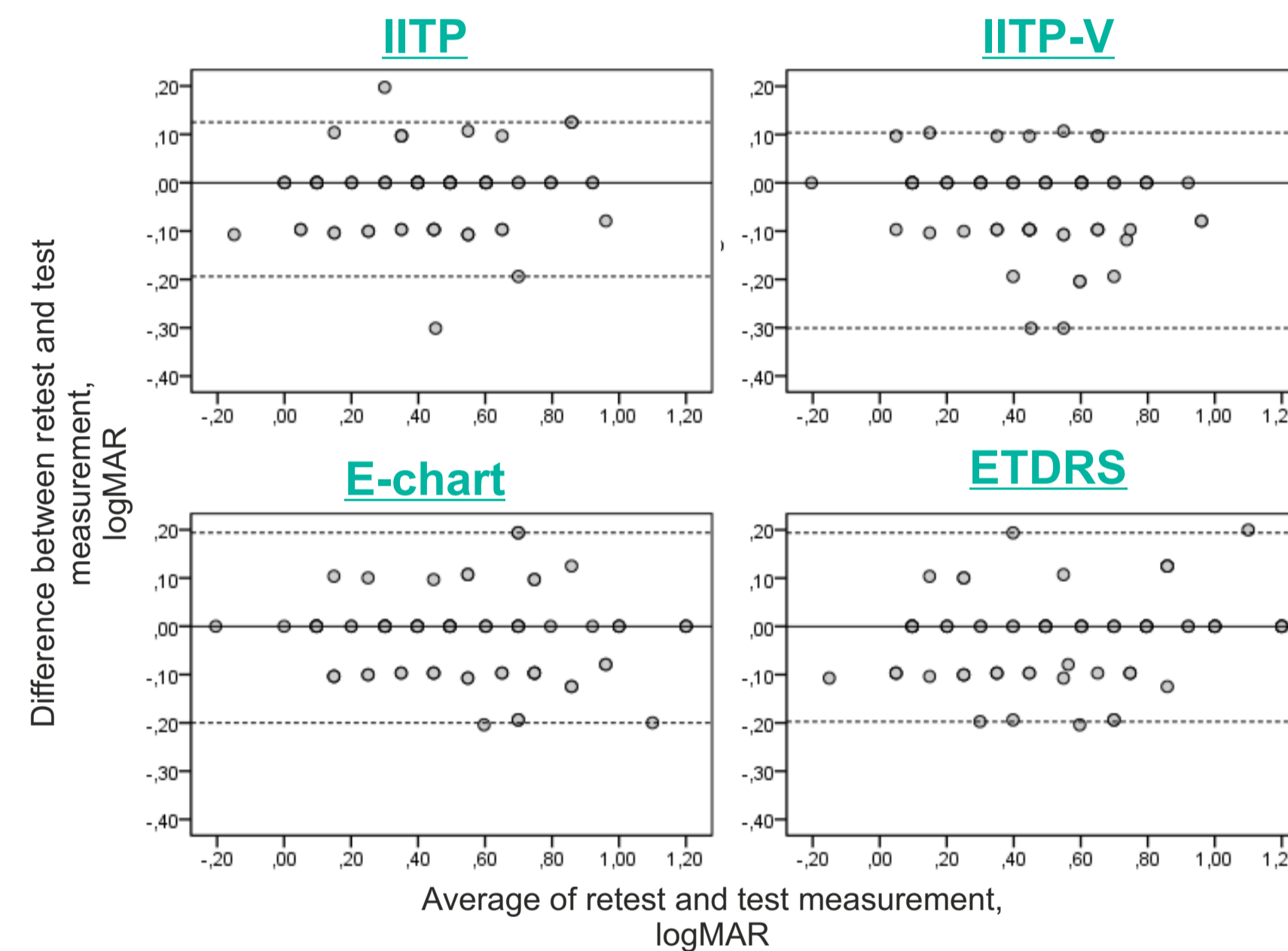
## Materials and methods

### The charts used in comparison



Unaided vision (without any optical correction) was measured twice (test and retest measurement) from the distance of 3 meters. The sequence in which the charts were tested for each subject was random. The measurements were repeated with re-randomized chart presentation order in several hours (not less than 1 hour) to obtain retest values. The ambient light level in the testing room was 300 Lx, the luminance of the white background of all charts was about 160 cd/m<sup>2</sup>.

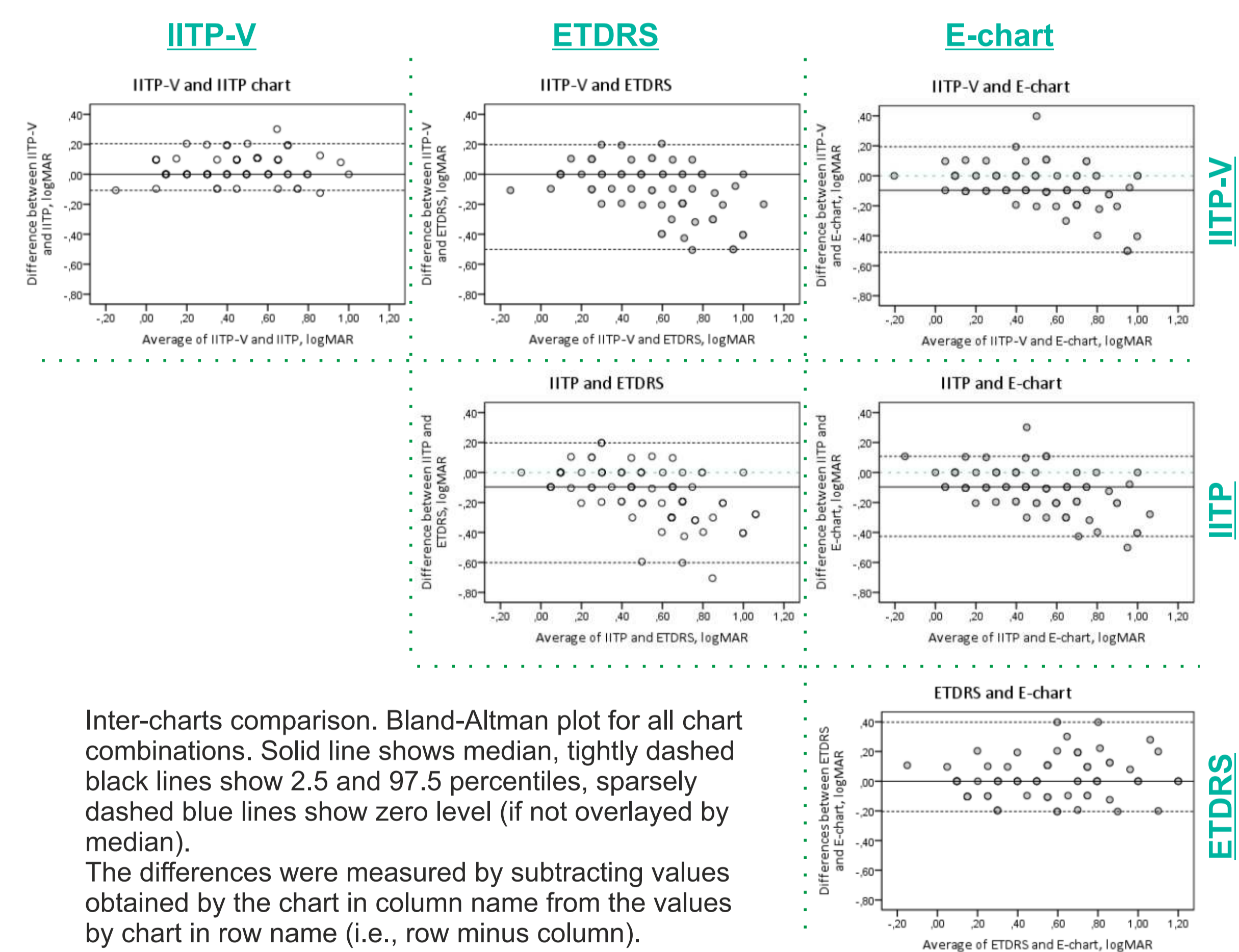
## Test-retest results



The Bland-Altman plots for test-retest repeatability assessment. The solid line marks the median (zero for all four charts tested). The dashed lines marks 2.5 percentile and 97.5 percentile, so the range between dashed line is 95% limits of agreement (LoA). Since the difference was obtained as retest measurements minus test measurements, and also these are logMAR values, so if the dots are lower than zero line, retest values were better, than test (in logMARs lower VA is better, in opposite to decimal units).

Chart name	95% LoA borders		95% LoA wideness (assessment of variability)
	Lower border (2.5 percentile)	Upper border (97.5 percentile)	
IITP	-0.19	0.12	0.31
ETDRS	-0.20	0.19	0.39
Tumbling-E	-0.20	0.19	0.39
IITP-PD	-0.30	0.10	0.40

## Between charts comparison results



Inter-charts comparison. Bland-Altman plot for all chart combinations. Solid line shows median, tightly dashed black lines show 2.5 and 97.5 percentiles, sparsely dashed blue lines show zero level (if not overlaid by median).

The differences were measured by subtracting values obtained by the chart in column name from the values by chart in row name (i.e., row minus column). That means that if dots are lower the zero line, the chart that is first in the title (row name chart) had better values of visual acuities (overestimates in comparison with the second chart in title).

## Conclusions

The IITP and IITP-V charts are comparable in repeatability with ETDRS and E-chart though novel charts slightly overestimate VA in comparison with those charts.

Nevertheless, IITP charts have the following benefits: they are easier to understand and to respond, do not require knowing of the alphabet or discriminating right-left directions.