

ETDRS Guide

ETDRS Background

The ETDRS acuity test was developed to aid in evaluating the changes in vision following panretinal photocoagulation in patients with diabetic retinopathy. Previous studies had somewhat confusing results due to inadequacies of the acuity tests used in those early studies. For example, the Snellen acuity test has a different number of letters per row, e.g. 10 letters on the 20/20 line, but only 3 letters on the 20/70 line. Therefore, if the results of a study showed that the patients “gained three letters of acuity,” the results could indicate the gain of a full acuity line, as in the 20/70 line, or only a portion of an acuity line, as in the 20/20 line. Also, the individual lines on the Snellen acuity test are not equally spaced. For example, the change from the 20/25 line to the 20/20 line is a 20% change, while the change from the 20/30 line to the 20/25 line is a 16% change. Again, referring back to the diabetic studies, if a study demonstrated a two line increase in acuity, it could mean a 33% improvement from 20/30 to 20/20, or a 40% improvement from 20/50 to 20/30. These inadequacies of the Snellen acuity test made it impossible to properly evaluate the acuity data and to compare data from study to study.

Other inadequacies also exist in the Snellen Acuity test. These include the types of letters used on the test and the spacing of the letters. These details are beyond the scope of this website, but if there are questions involving the more detailed design characteristics of the ETDRS chart, please feel free to email us.

ETDRS Design

The ETDRS test incorporates specific design criteria to make it more accurate than the Snellen or Sloan acuity tests. These include:

- Same number of letters per row (five letters per row)
- Equal spacing of the rows on a log scale (the rows are separated by 0.1 log unit)
- Equal spacing of the letters on a log scale
- Individual rows balanced for letter difficulty

To prevent memorization, different versions of the ETDRS test chart are available. The three standard versions of the ETDRS chart are R, 1 and 2.

ETDRS Standardization

To properly evaluate ETDRS, the test should be conducted under standardized lighting conditions. The CSV-1000 and ESV-3000 are the only devices that self-standardizes the test lighting level to the recommended photopic test level of 85 cd/m². This light level has been recommended by the National Academy of Sciences and by the American National Standards Institute for ETDRS and contrast sensitivity vision testing.

Scoring the ETDRS Chart

ETDRS scoring can be accomplished in a number of different ways. The two most common methods are described below. Both of these

methods provide scores that can be used for statistical analysis, unlike the scores provided by the standard Snellen or Sloan Acuity tests.

ETDRS Scoring Method 1

The patient starts at the top of the chart and begins to read down the chart. The patient reads down the chart until he or she reaches a row where a minimum of three letters on a line cannot be read. The patient is scored by how many letters could be correctly identified.

ETDRS Scoring Method 2

The ETDRS charts were originally used in ETDRS studies where patients had relatively poor vision. For these studies, starting patients at the top of the chart to read down worked well since most patients could read only about half way down the chart. However, the ETDRS charts are now being widely used for many studies, including IOL and refractive surgery studies, where patients have very good vision. For these patients, it makes little sense to start them at the top of the chart and read down. For these patients, a second scoring method is used. The patient starts on the last row where he or she can read all of the letters, and then reads down until he or she reaches a row where a minimum of three lines cannot be read. For these patients, a decimal ETDRS acuity score can be used. To calculate the decimal acuity score, follow the guidelines below. (In reality, scoring method 1 can also be used for statistical analysis, by assuming that the patient could have read all of the letters above where he or she started on the test. Then add that number of letters on to the number of letters actually read by the patient.)

- Determine the last row where the patient can correctly identify all 5 letters on that row.
- Determine the log score for that row (these scores are shown in the margin of the ETDRS test, e.g. the 20/25 line has a log score of 0.1)
- Subtract 0.02 log units for every letter that is correctly identified beyond the last row where all of the letters are correctly identified. For example, if the patient reads all of the letters correctly on the 20/30 row and then 3 letters correctly on the 20/25 row, the Log Score would be calculated as follows:

$$20/30 \text{ Row} = 0.20$$

$$3 \text{ letters} \times 0.02 \text{ log/letter} = -0.06$$

$$\text{ETDRS Acuity Log Score} = 0.14$$