Prolongation of QT Interval - ECG

QT interval is the distance between Q wave of the QRS complex and the end of the following T wave. The problem is that the length of the QT depends on current heart rate and therefore we evaluate the so-called "normalized length of QT" (QTc). QTc means a conversion of a current QT to the corresponding actual heart rate (see below).

\[
Q T c = \frac{Q T}{\sqrt{R R}}
\]

QTc calculated as the length of the current QT divided by the square root of the distance between two average neighboring R waves of a particular ECG.

The physiological distance of this "normalized" QTc should be between 350-450ms (in normal ECG paper speed this corresponds to about 9-11 small squares). Shortening (rare) or especially extension (common) of the QT interval can lead to occurrence of serious ventricular arrhythmias, typically of a ventricular tachycardia known as Torsades de pointes.

Prolongation of the QT interval can be found as a congenital abnormality or it may be caused by some drugs (anti-arrhythmic drugs amiodarone and sotalol, numerous psychiatric drugs, etc.), by mineral imbalances (hypokalemia and hypocalcaemia) and by endocrine disorders (hypothyroidism).
This is an example ECG with a prolonged QT interval (red frame). We can estimate the distance to about 14 small squares that corresponds to about 560ms. ECG device calculated the QT distance as 536ms and at the given frequency it even calculated the QTc as 569ms. This means the prolongation of the QT interval.