

# centiMorgan

*From ISOGG Wiki*

In [genetic genealogy](#), a **centiMorgan** (cM) or map unit (m.u.) is a unit of [recombinant](#) frequency which is used to measure [genetic distance](#). It is often used to imply distance along a [chromosome](#), and takes into account how often recombination occurs in a region. [...] The number of [base pairs](#) to which it corresponds varies widely across the genome (different regions of a chromosome have different propensities towards crossover). One centiMorgan corresponds to about 1 million base pairs in humans on average. The centiMorgan is equal to a 1% chance that a marker at one genetic locus on a chromosome will be separated from a marker at a second locus due to crossing over in a single generation.

The [genetic genealogy](#) testing companies [23andMe](#), [AncestryDNA](#), [Family Tree DNA](#) and [MyHeritage DNA](#) use centiMorgans to denote the size of matching DNA segments in [autosomal DNA tests](#). Segments which share a large number of centiMorgans in common are more likely to be of significance and to indicate a common ancestor within a [genealogical timeframe](#).

## centiMorgans vs megabases

CentiMorgans are interpolated numbers that take into consideration each area of a chromosome and its propensity to recombine. This means if two cousins share 40 cM on chromosome 1, and two different cousins share 40 cM on chromosome 5, they both can be predicted to share a certain degree of relationship statistically. [Megabases](#) vary slightly in different locations so that in the same scenario, if both sets shared 40 Mb pairs, it would be more difficult to ensure they are of a similar degree of relation without further accounting for location, chromosome and other factors.<sup>[1]</sup>

Ann Turner provides a useful explanation: "I think of the cM as being a unit of 'effective' distance. As an analogy, a mile is a fixed quantity (5280 feet), and so are megabases. But the probability that a person can walk a mile in 20 minutes is more fluid. If the terrain is very rough, the "effective" distance of a literal mile might be more like two miles if you're trying to

arrive at a certain time. We're more interested in the probability that a segment will be passed on intact than the size of the segment in Mb".<sup>[2]</sup>

## References

- 1 ↑ Matt Dexter. [Megabases versus centiMorgans](#) Message posted on the ISOGG Group Administrators' mailing list, 21 June 2014.
- 2 ↑ Ann Turner. [centiMorgans vs megabases](#). Message posted on the ISOGG Group Administrators' mailing list, 22 June 2014.