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The slides for this presentation are online at http://slides.com/kittycooper/dna-triangulation#/

Overview

Triangulation is the standard by which we prove that a specific DNA segment is from a common ancestor that we share with at least two other people. The definition of triangulation is that you match person A and person B and they also match each other all on the same DNA segment. So a three way match. Why is this necessary?

We each have 23 pairs of chromosomes, one from each parent. The DNA testing mechanism cannot differentiate whether a segment match is on your maternal or paternal chromosome. This means that when you match two people, say A and B, on the same location, they may not share an ancestor because A could match the piece from your mother and B could match the piece from your father. Therefore you need to see if they match each other to confirm that they match on the same chromosome of the pair.

You don't need to use triangulation for close family: 2nd cousins and closer will be clearly indicated by the amount of shared DNA (use the total cM in segments greater than 7 not including the X). See the statistics listing at the ISOGG wiki to make these determinations:
http://www.isogg.org/wiki/Autosomal_DNA_statistics

or this beautiful chart recently created by Blaine Bettinger on his blog the genetic genealogist , as discussed on my blog
http://blog.kittycooper.com/2015/05/new-dna-relationship-statistics-from-blaine-bettinger/

Using triangulation to confirm a shaky paper trail

The first case study in this talk shows how autosomal DNA testing was used to confirm that Kristine, a possible relative, was in fact descended from my great-grandmother's brother when there were no candidates for a Y DNA test. This was done by getting autosomal DNA tests from eight different descendants of my great-great-grandparents via three other siblings. Five had matching DNA triangulating with another cousin and Kristine.

This case is also discussed in my blog post

http://blog.kittycooper.com/2015/02/triangulation-proving-a-common-ancestor/

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Using triangulation to place a new match in a specific family line

The next set of cases show how by using the children and father, several matches at different companies could be inferentially triangulated. So if A matches you at one company on a specific segment and B matches you at a different company you can use the child matches which are at both companies to see whether they match each other.

This requires the use of spreadsheets to track your matches. Sometimes a new match will triangulate with previous matches whose common ancestors are already known. Then you know which line to look on for the common ancestor of the new match (there ancestors could be further back)

Perhaps you would like this triangulation business automated? Well the GEDmatch.com site has a tool for that if you are a tier 1 member.

Summary

DNA triangulation can be used to confirm a relationship or to place a new DNA relative in a triangulated group and then perhaps find the common ancestor. Data from other tested close family members can help greatly with triangulations.

Further reading on triangulation:

From my blog
post on Triangulation:
http://blog.kittycooper.com/2015/02/triangulation-proving-a-common-ancestor/
and a deep triangulation
http://blog.kittycooper.com/2014/01/a-deep-dna-triangulation-success-story/
Using close relatives to help triangulatehttp://blog.kittycooper.com/2014/06/another-way-to-triangulate-using-close-relatives/

This blog post of Roberta Estes:
http://dna-explained.com/2013/06/21/triangulation-for-autosomal-dna/

This article at the ISOGG wiki:
http://www.isogg.org/wiki/Triangulation

Blog posts by Jim Bartlett
http://segmentology.org/2015/05/11/how-to-triangulate/
http://segmentology.org/2015/10/19/does-triangulation-work/

Extra Reading:
When is a match real?
http://blog.kittycooper.com/2014/10/when-is-a-dna-segment-match-a-real-match-ibd-or-ibs-or-ibc/