

Description of the likelihood ratio (LR) changes in STRmix™ V2.4.06

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Discussion of code change effects on likelihood ratio (LR) calculations

STRmix™ V2.4.06 includes changes to both the database search LR (assuming you had forward stutter present and/or multiple drop-in alleles) and to the Highest Posterior Density (HPD) calculations.

Changes have been made to the calculation of the probability of drop-in within the database search LR. This change will only affect laboratories where forward stutter and/or drop-in modelling is enabled. The change will only affect profiles analysed using the database search function where forward stutter was proposed or where there was *more than one* drop-in allele considered at interpretation.

Changes have also been made to the calculation of the probability of drop-in within the HPD LR calculation, as well as how this calculation takes contributor order into account. This change will only affect laboratories using kit files where drop-in is enabled and calculations where the HPD is enabled. The change will only affect profiles where drop-in was proposed at interpretation.

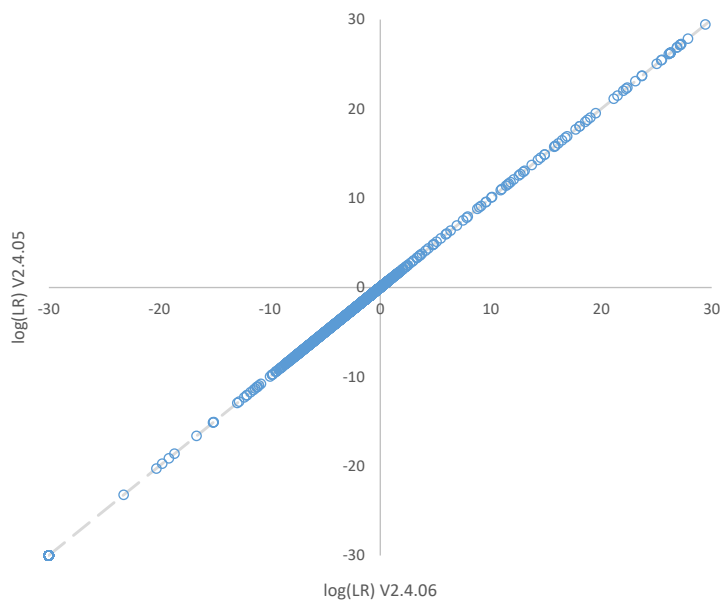
Relevance of these changes for users

- If a laboratory does not model drop-in or forward stutter (i.e. both are 'turned off' within the kit) there will be no change in the LR.
- If a laboratory models drop-in (turned on within the kit) minor differences in the LR will be observed from v1.0 onwards.
- If a laboratory models forward stutter (turned on within the kit) minor differences in the LR will be observed from v2.4 onwards.

Magnitude of the change to the database search LR

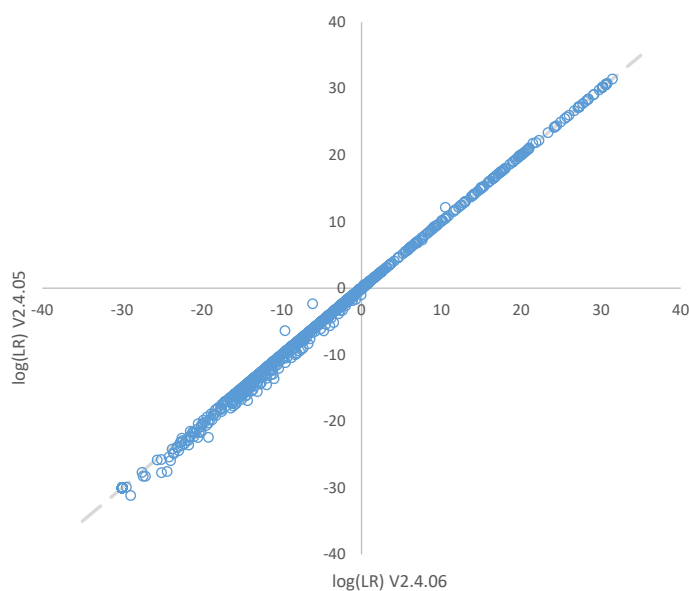
92 two to four person mixtures from a sensitivity and specificity experiment using the GlobalFiler™ kit where only forward stutter was modelled (and not drop-in) were interpreted. LRs were calculated by comparison to the true and 200 false contributors in both V2.4.05 and V2.4.06 using the STRmix™ database search function. Figure 1 is a comparison of log(LR) calculated in V2.4.06 versus V2.4.05. The dashed line is at $x=y$. There was no significant difference in LRs between versions.

Figure 1: Comparison of log(LR) calculated using database search function within V2.4.06 and V2.4.05 LR for 92 two to four person mixtures where forward stutter was modelled



91 two to four person mixtures from a sensitivity and specificity experiment using the GlobalFiler™ kit where both forward stutter and drop-in were modelled were interpreted. LRs were calculated by comparison to true and 200 false contributors in both V2.4.05 and V2.4.06 using the STRmix™ database search function. A comparison of log(LR) calculated in V2.4.06 versus V2.4.05 is given in Figure 2. The dashed line is at $x=y$. The log(LR) values were predominantly identical between versions with only a few minor differences observed.

Figure 2: Comparison of log(LR) calculated using database search function within V2.4.06 and V2.4.05 LR for 91 two to four person mixtures where forward stutter and drop-in were modelled



Magnitude of the change to the HPD LR

48 HPD LRs calculated via 'Start Analysis' within V2.4.05 were compared to LRs calculated using the 'LR From Previous Analysis' function within V2.4.06, for a set of one to three person mixtures where drop-in was modelled within the kit. The plot in Figure 3 is a comparison of log(LR)s. The seed has been set and all variation in the HPD LR is due to the code changes. The point estimate LRs are identical (as expected) and have not been plotted. The 99% lower bound of the HPD LR was slightly higher within V2.4.05, with the difference observed *only after the first significant figure*.

Figure 3: Comparison of log(HPD) calculated using start analysis function within V2.4.06 and V2.4.05 for 48 mixtures where drop-in was modelled

