Quality Control Charts in chemical analysis of Long-Lasting Insecticidal Mosquito Nets

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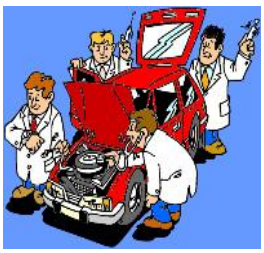
1. Introduction



Quality control charts can be used to determine easily whether or not an analytical method is under control and hence validate the results obtained by using this analytical method. The acceptable limits where the result of a quality control sample has to be in and the measurement of the extended uncertainty (U) on the result can be calculated with the recorded raw data used to build the quality control chart. This schedule was applied in the framework of chemical analysis of Long-Lasting Insecticidal Mosquito Nets (LNs).

2. Chemical analysis

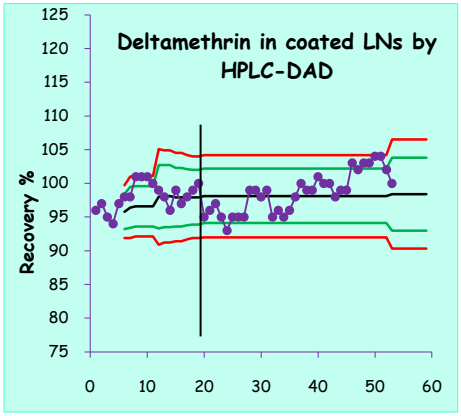
The ISO 17025 accredited analytical methods used in our lab are :

➢ ***CIPAC method 333/LN/(M)/3*** (deltamethrin in coated LNs)
Deltamethrin is extracted from net samples by sonication and shaking with isooctane/dioxane (80/20, v/v) and then determined by HPLC-DAD (CN column, mobile phase : isooctane/dioxane (94/6, v/v) + 0.15% water)) using internal standard calibration (ISTD = dipropyl phthalate)

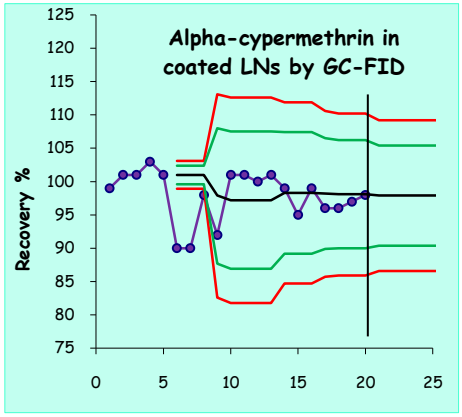
➢ ***CIPAC method 454/LN/M/3.1*** (alpha-cypermethrin in coated LNs)
Alpha-cypermethrin is extracted from net samples by heating under reflux for 5 minutes with tetrahydrofuran and determined by GC-FID using internal standard calibration (ISTD = dioctyl phthalate)

➢ ***CIPAC method 454/LN/M/3.2*** (alpha-cypermethrin in incorporated LNs)
Alpha-cypermethrin is extracted from net samples by heating under reflux for 30 minutes with xylene and determined by GC-FID using internal standard Calibration (ISTD = dioctyl phthalate)

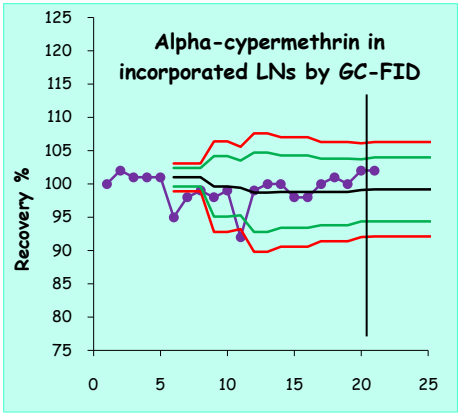
3. Quality control charts



CIPAC method 333/LN/(M)/3
U=8.3% (n=52)



CIPAC method 454/LN/M/3.1
U=11.4% (n=20)



CIPAC method 454/LN/M/3.2
U=6.4% (n=20)

Quality Control Charts are built using recovery results from untreated LNs spiked with known amounts of active ingredient. Charts are in building up to 20 points. After that they can be used for quality control. Charts are reviewed every 20 points (if necessary). If 1 to 6 points are between the green (2xSD from the central line) and the red (3xSD from the central line) limits, these limits are kept. If not, the central line and the limits are calculated on 60 points (40 old and 20 new).

4. Conclusion

Quality Control Charts are very useful tools to follow the performance of the analytical methods for chemical analysis of LNs and to validate the results. Moreover, the extended uncertainty of the result can also be determined from raw data.

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