The reason for this is that the outlier of 129 has "warped" or seriously affected the stats calculated when it was included. In effect the inclusion of this figure has stopped the distribution being Gaussian, and Gaussian stats only work when the stats are distributed in a Gaussian manner.

This example illustrates several vital lessons, as follows.

1. Exclusion of outliers is essential if linear stats are to be used.
2. Visual examination of data is a highly sensitive "statistical" tool.
3. Considerable attention should be paid to setting up Levey-Jennings charts, i.e. your control limits must be carefully calculated.

The use of such control charts will be discussed in considerable detail in Module 3, but as an illustration of the effect of including outliers, we will now examine the result of 129 by both Levey-Jennings charts above. Before doing so, we have yet another definition, Standard Deviation Index (SDI).

SDI

SDI is defined as the number of SDs that an individual result is from the mean. There is a formula for this but it best approached from a descriptive viewpoint.

1. Subtract the mean from an individual result.
2. Divide the difference by the SD.
3. The figure obtained is the SDI for that individual result.

If we first of all work this out for the data set including all twenty results, we get the following for the result of 129.

1. 129 – 123.3 = 5.7
2. 5.7 / 2.0 = 2.85
3. SDI for the outlier is + 2.9

Now we will repeat it for the outlier against the data set of 19 excluding the outlier.

1. 129 – 123.0 = 6.0
2. 6.0 / 1.5 = 4.0
3. SDI for the outlier is + 4.0

This shows that the outlier had warped the stats in such a way that it seems to be closer to the mean. Without doubt the second result is s better illustration of how far from the mean the outlier had been.

Are my SDs good enough?

It should be obvious from the above example that your own SDs, the ones you work out for yourself can vary widely, depending on how dispersed your results are. Thus it is possible for one lab performing this imaginary analyte to have SDs of 1.5, as above. If another lab was, for example, using an entirely manual system perhaps being operated by a non-qualified medical technologist, it is possible to have a situation where the mean