

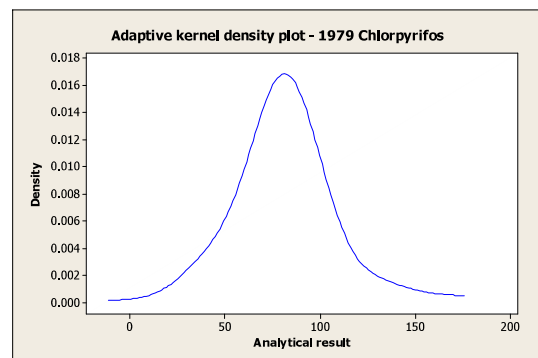
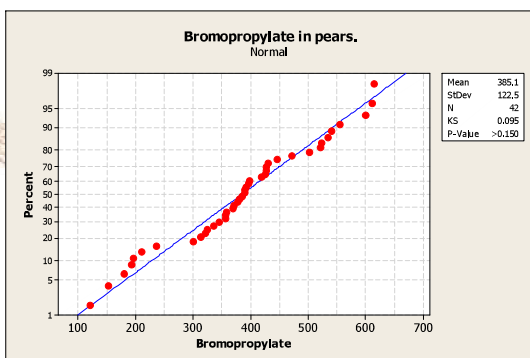
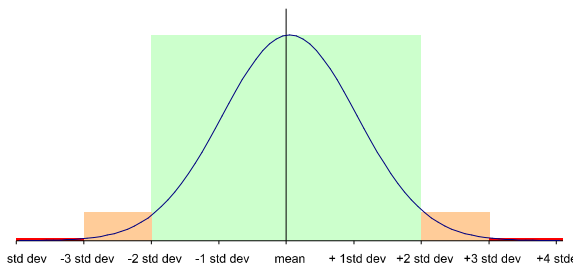
# Asymmetric proficiency test distributions – cause and analysis

Mark Sykes

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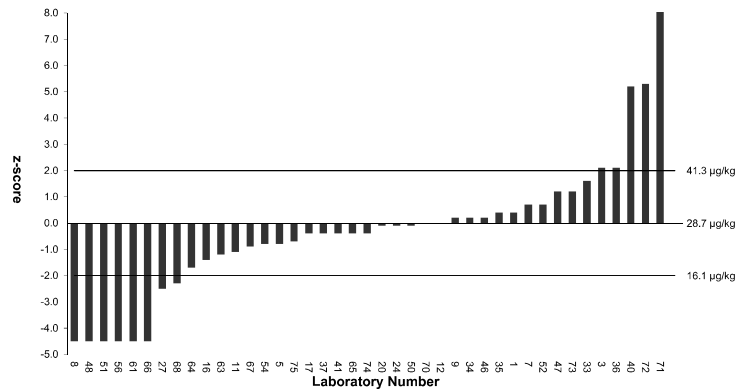


## Normal or Symmetrical?

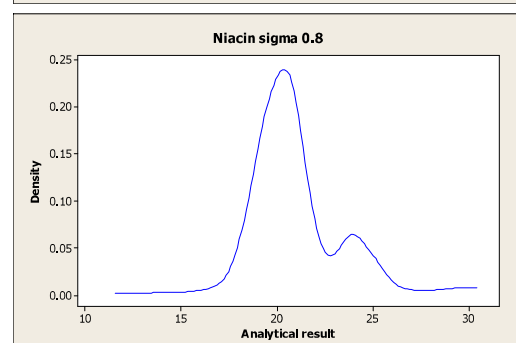
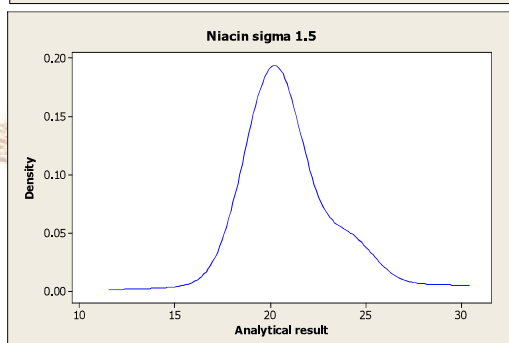
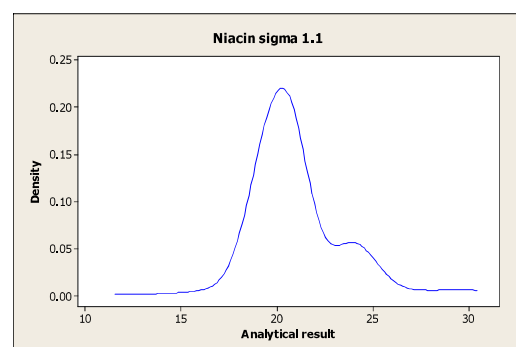
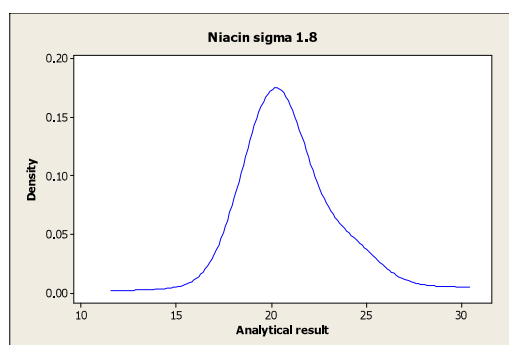


# Outliers or Asymmetry?

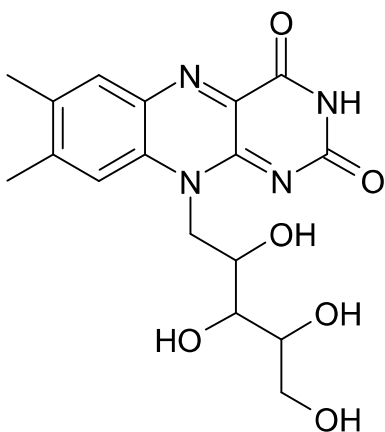
5.068	5.49	5.772
5.09	5.53	5.78
5.18	5.56	5.79
5.2	5.6	5.8
5.21	5.62	5.81
5.22	5.62	5.84
5.23	5.64	5.842
5.3	5.64	5.88
5.31	5.683	5.89
5.387	5.7	5.96
5.4	5.754	5.97
5.485	5.76	<b>4139</b>



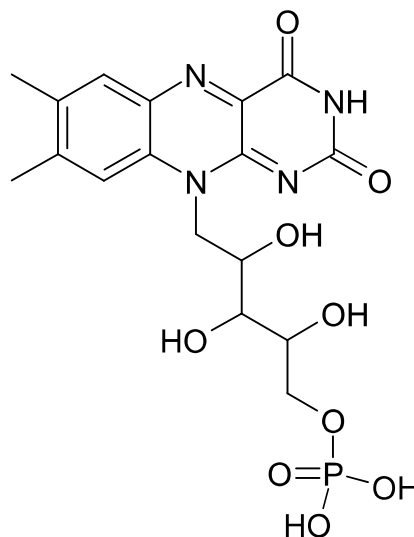
# Multi-modal or Asymmetric?



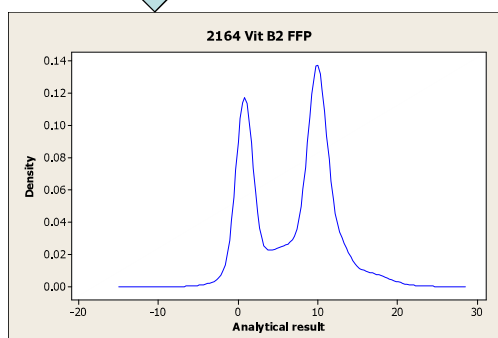
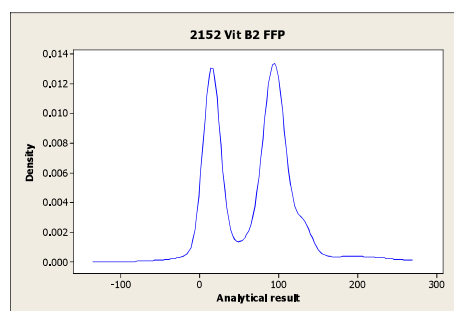
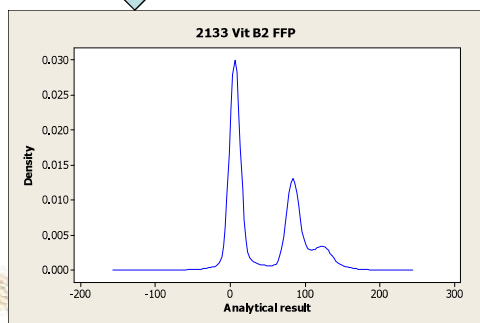
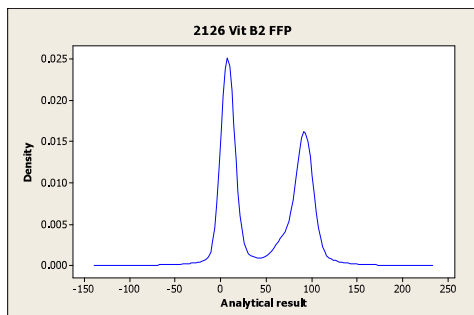
# Vitamin B2



Riboflavin

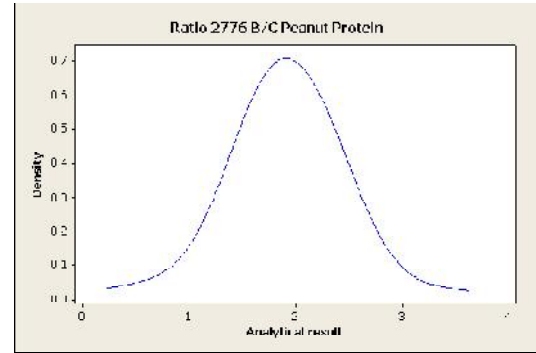
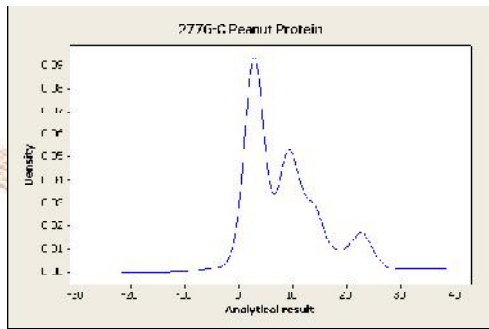
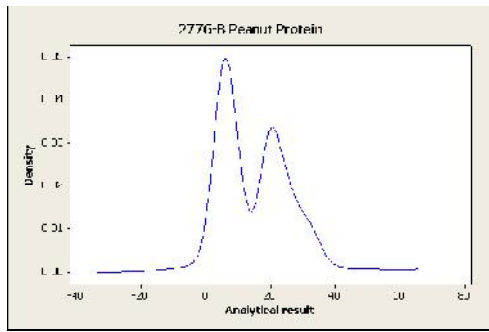


Riboflavin 5'-phosphate



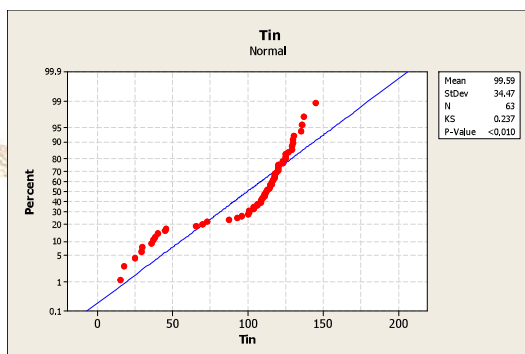
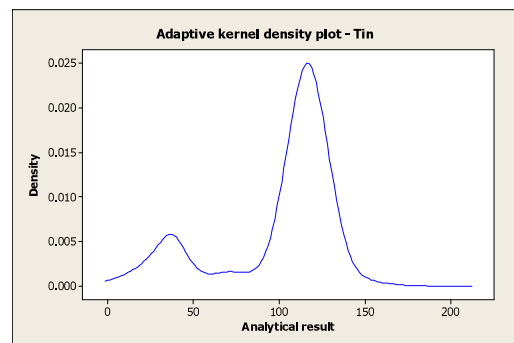
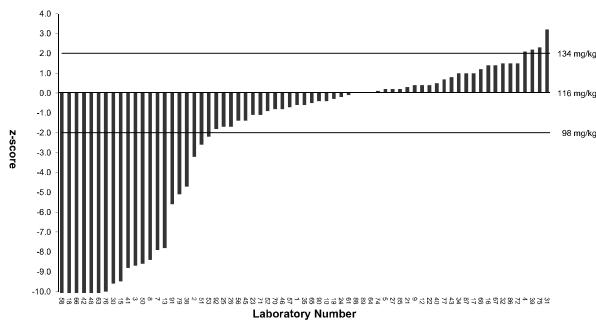
Sykes *et al*, Anal Bioanal Chem, 2011, 400:305-310

# Allergens



Sykes *et al*, Anal Bioanal Chem, 2012, 403:3069-3076

# Tin in Tomato Paste (1)



## Tin in Tomato Paste (2)

Extraction critical (Goldilocks point)

Sufficiently vigorous

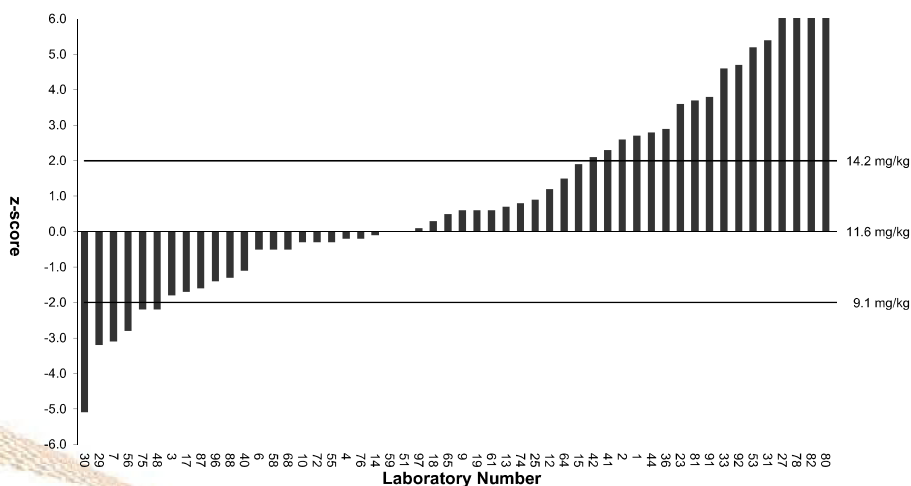
Not too vigorous

Reference value by IDMS

Expensive!

Test	IDMS, mg/kg	h15	Mode
07157	140.8	128	137
07140	178	148	168
07122	255	231	238
07103	306	286	291
0794	254	229	248

## Aluminium in Soya



Monoisotopic, no IDMS



## Summary

Assumption of normal distribution  
Consider asymmetry and multi-modality  
Causes of asymmetry  
Justify reference value  
Alternatives to reference value  
Re-consider PT results



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