Introduction Multidimensional (MDGC) and comprehensive two–dimensional gas chromatography (GCXGC) are hyphenated separation techniques, which address separation difficulties faced in complex sample analysis that require superior resolution in order to achieve improved analysis of compounds. Both techniques can also be applied to achieve faster separations in less complex samples, especially when there is an important region to be better resolved. Relatively few publications report the parallel analysis of samples by both a GCXGC and MDGC method, compared with a carefully optimised 1D GC method. In some cases, commentary is made that the MDGC method permitted identification or separation of many more compounds, and so this is accepted as stated. On a simple capacity basis, GCXGC and MDGC outperform ID GC, although it is recognised that many ID GC methods are not applied to give an ultimate resolution performance. While MDGC is composed of two (or more) separation steps that progressively 'deconvolute' target analytes or a fraction, GCXGC is a two–dimensional modulated untargeted separation, which is used to obtain improved resolution of the whole sample. The separation columns are referred to as dimensions–first column or dimension Dand second column D–which highlights that they operate as independent elution stages. Both techniques use substantively different stationary phases in each dimension, in order to obtain improved resolution by means of changing the separation mechanism (orthogonality). Although multidimensional GC separations have been applied since the early 1960s and the comprehensive technique was introduced in the early 1990s, the number of publications in this field was boosted in the past 20 years by the continuous technological advances in instrumentation, software and data processing [1–3].