Advantages:
- New dimensions for complex mixtures
- Unrivaled separation performance
- New perspectives for proteomics

Multidimensional chromatography allows separation of complex mixtures by using multiple columns with different stationary phases. These columns are coupled orthogonally, which means that fractions from the first column can be selectively transferred to other columns for additional separation. This enables separation of complex mixtures that cannot be separated using a single column.

Common applications for multidimensional LC are:
- Proteins and peptides
- Drug isolation from urine and plasma
- Polysaccharides
- Homopolymers, oligomers, copolymers
- Surfactants
- Polycyclic aromatic hydrocarbons
- DNA fragments

One of the most important applications area for this technique is proteomics, where complex protein digests are separated by multi-dimensional liquid chromatography instead of using the two-dimension gel electrophoresis.

Here we show only one example of how easily you can convert the Agilent 1100 Series system into a two-dimensional LC system-just by using an additional 2-position/6-port valve. Proteomics applications in particular require very low flow rates in combination with small inner diameter columns for high detection sensitivity. The micro valve, with low internal volume, can be positioned closely to the mass spectrometer for highest separation performance.

In the first dimension, fractions of the peptide mixture elute from an ion exchange column by a salt step gradient. Each fraction is trapped on a small reversed-phase trapping column and then separated after the valve switches to a reversed column (the second dimension). The trapping column is first used to prevent salt from entering the mass spectrometer (ion suppression). Second, the column allows an enrichment step, which together with the low flow rate in the 2nd dimension provides high detection sensitivity.