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Capillary electrophoresis in the profiling and authentication of herbal medicines

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Abstract

While herbal medicines have been safely used for centuries, there is a distinct lack of evidence on efficacy. Many herbal medicines have a 'traditional' reputation for use, but little scientific documentation exists on active ingredients, pharmacological action or clinical efficacy. There are also problems with the supply of high quality herbal medicines due to the increased demand for alternative medicines. In some cases individual ingredients are being substituted for others with similar therapeutic actions. There is also confusion on the nomenclature of plant species which can lead to the wrong plant sometimes being substituted. One of the conclusions from a report [Blackwell, 1996] is that it is vitally important to establish proper identification and authentication as well as some form of QC of herbs by manufacturers and suppliers for the safe use of herbal medicines.

Electrophoresis has been defined as 'the differential movement or migration of ions by attraction or repulsion in an electric field'. When a positive (anode) and a negative (cathode) electrode are placed in a solution containing ions and a voltage is applied, ions of opposite charge migrate to the electrode of opposite charge. Capillary electrophoresis (CE) is carried out in a narrow capillary (25-100µm) which is filled with a specific pH buffer. Separation using electrophoresis depends on differences in the electrophoretic mobility of the compounds being separated. CE is a fairly modern separation technique which is capable of separating complex mixtures.

For this work the Scutellaria genus of plants was selected. Various Scutellaria (species baicalensis, amoena and lateriflora) were purchased from suppliers throughout the world and fingerprints developed using CE separation. It is sometimes quite difficult to visually see patterns within samples so a statistical approach is often used to analyse the data. For multivariate analysis 28 peaks were used to represent the chromatographic fingerprint for the 3 different Scutellaria species.

The results from this work show that a combination of CE and multivariate statistical analysis is capable of providing authentication of Scutellaria with one sample identified as poor quality.

Biography

Raymond Reid is qualified to Doctoral level. He has almost 40 years experience in Analytical Chemistry with expertise in chromatographic separation techniques. He has published 40 papers in scientific journals and has contributed chapters in two books. He was an editor of an online publication and regularly reviews papers for publication in scientific journals. His main interest now is in the field of herbal medicines and developing methods to determine quality of samples.