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Status of Applying Nanotechnology in Traditional Chinese Medicine in Taiwan

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Traditional Chinese Medicine (TCM) has formed a unique characteristic to cure illness. Usually, TCM formula contains at least two to twenty herbs. Pre-made formulas are available as pills, tablets, capsules, powders, alcohol-extracts and water-extracts, etc. Most of these formulas are very convenient and easily taken. However, these products are usually not as potent as the traditional preparation of decoction, and as well as poor solubility decreases bioavailability.

According to the Noyes–Whitney equation, decreased particle size gives rise to increased drug surface area and dissolution velocity. At present, nanotechnology has been widely used in materials science and also integrates into the field of traditional Chinese medicine. There are two basic techniques, bottom up or top down, to prepare TCM nanoparticles. A number of new nanotechnology-based TCM have been studied in Taiwan, the results indicated nanoscale TCM possess many benefits, such as improving active component solubility, enhancement of bioavailability, increasing absorption rate, decreasing doses, and achieving steady-state therapeutic levels over an extended period compared with TCM preparations.

This study will presents the recent advances in nanotechnology-based traditional Chinese medicine in Taiwan.

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Identification of Medicinal Plants and its Adulterant Using Nucleic Acid Isothermal Amplification

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The internal transcribed spacer 1 (ITS1) of nuclear ribosomal DNA (nrDNA) was cloned from *Hedyotis* plants, and served as species biomarker to discriminate *Hedyotis diffusa* (HD) from its adulterant *Hedyotis corymbosa* (HC). Using the extracted genomic DNA of *Hedyotis* plants as a template, nucleic acid isothermal amplification assay was developed and applied to rapidly and precisely detect the nrDNA of HD and HC using four specifically designed primers allowing identification under isothermal conditions after approximately 30–45 min. The minimum detection levels for identification of HD and HC are 1ng and 1pg of genomic DNA, respectively. This is the first work describing the use of ITS of nrDNA to discriminate HD from its adulterant HC by a nucleic acid isothermal amplification method. Obtained ITS od nrDNA combined with the nucleic acid isothermal amplification is a rapid, precise and powerful authentication and quality control method for traditional Chinese medicinal plants or other bio-resources.

Keywords

nucleic acid isothermal amplification, traditional Chinese medicinal, *Hedyotis* plants, internal transcribed spacers (ITS)