



Pharmacological Properties, Molecular Mechanisms, and Pharmaceutical Development of Asiatic Acid: A Pentacyclic Triterpenoid of Therapeutic Promise

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Asiatic acid (AA) is a naturally occurring aglycone of ursane type pentacyclic triterpenoids. It is abundantly present in many edible and medicinal plants including *Centella asiatica* that is a reputed herb in many traditional medicine formulations for wound healing and neuropsychiatric diseases. AA possesses numerous pharmacological activities such as antioxidant and anti-inflammatory and regulates apoptosis that attributes its therapeutic effects in numerous diseases. AA showed potent antihypertensive, nootropic, neuroprotective, cardioprotective, antimicrobial, and antitumor activities in preclinical studies. In various *in vitro* and *in vivo* studies, AA found to affect many enzymes, receptors, growth factors, transcription factors, apoptotic proteins, and cell signaling cascades. This review aims to represent the available reports on therapeutic potential and the underlying pharmacological and molecular mechanisms of AA. The review also also discusses the challenges and prospects on the pharmaceutical development of AA such as pharmacokinetics, physicochemical properties, analysis and structural modifications, and drug delivery. AA showed favorable pharmacokinetics and found bioavailable following oral or interaperitoneal administration. The studies demonstrate the polypharmacological properties, therapeutic potential and molecular mechanisms of AA in numerous diseases. Taken together the evidences from available studies, AA appears one of the important multitargeted polypharmacological agents of natural origin for further pharmaceutical development and clinical application. Provided the favorable pharmacokinetics, safety, and efficacy, AA can be a promising agent or adjuvant along with currently used modern medicines with a pharmacological basis of its use in therapeutics.

Keywords: asiatic acid, pharmacological properties, phytochemicals, triterpenoids, small molecule, *C. asiatica*



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