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EGCG as a therapeutic agent: a systematic review of recent advances and challenges in nanocarrier strategies

Key words: Epigallocatechin-3-gallate (EGCG); Nanoparticle; Nanocarrier; Nanosystem; Nanoformulation; Stability; Biological activity

Epigallocatechin-3-gallate (EGCG)



A potent polyphenol found in green tea, is recognized for its therapeutic potential, including antioxidant, anti-inflammatory, and possible anticancer effects.

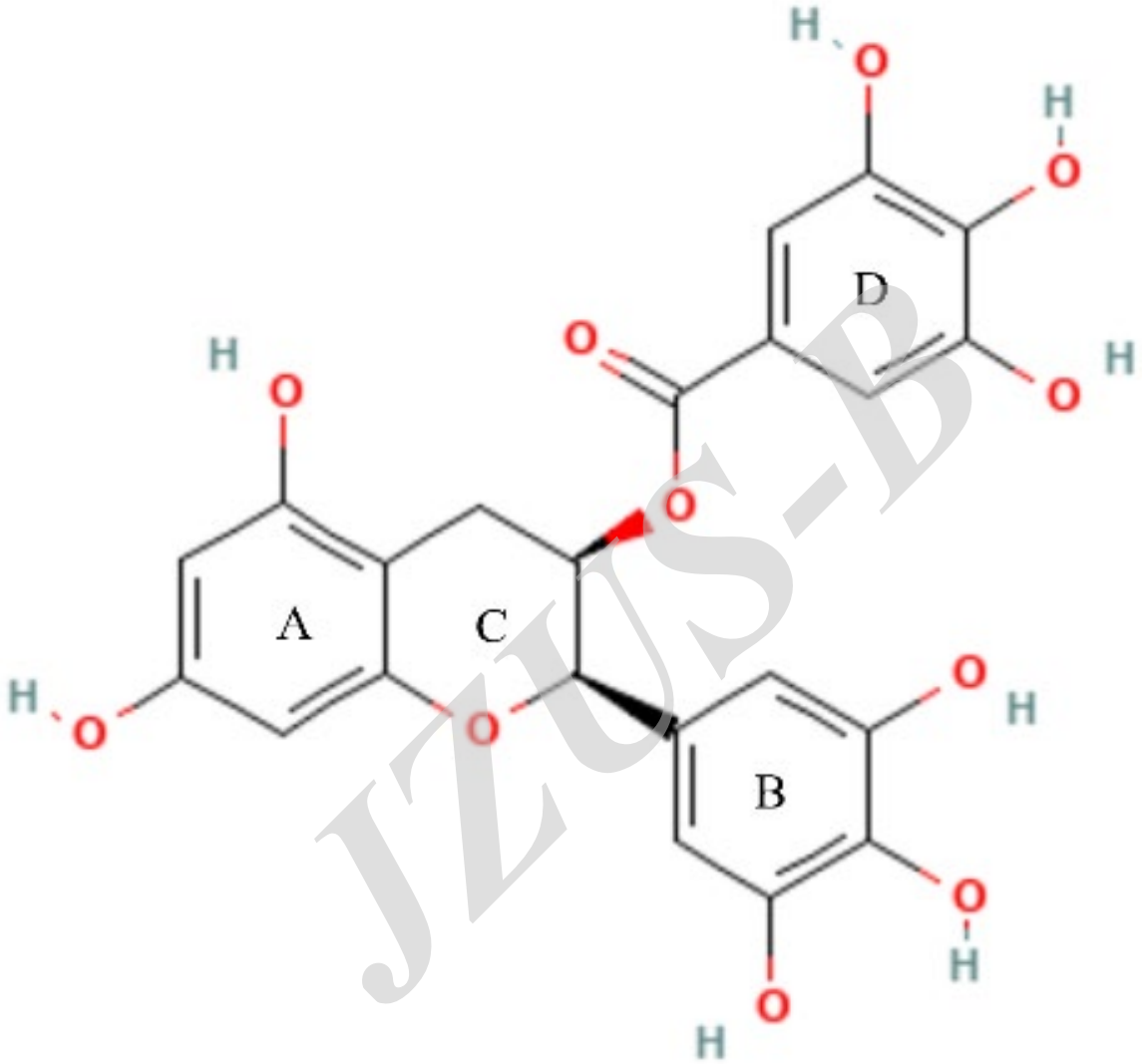


Its clinical application is limited by poor bioavailability, instability, and rapid degradation.



Recent studies have focused on nanoparticle-based formulations to overcome these challenges.

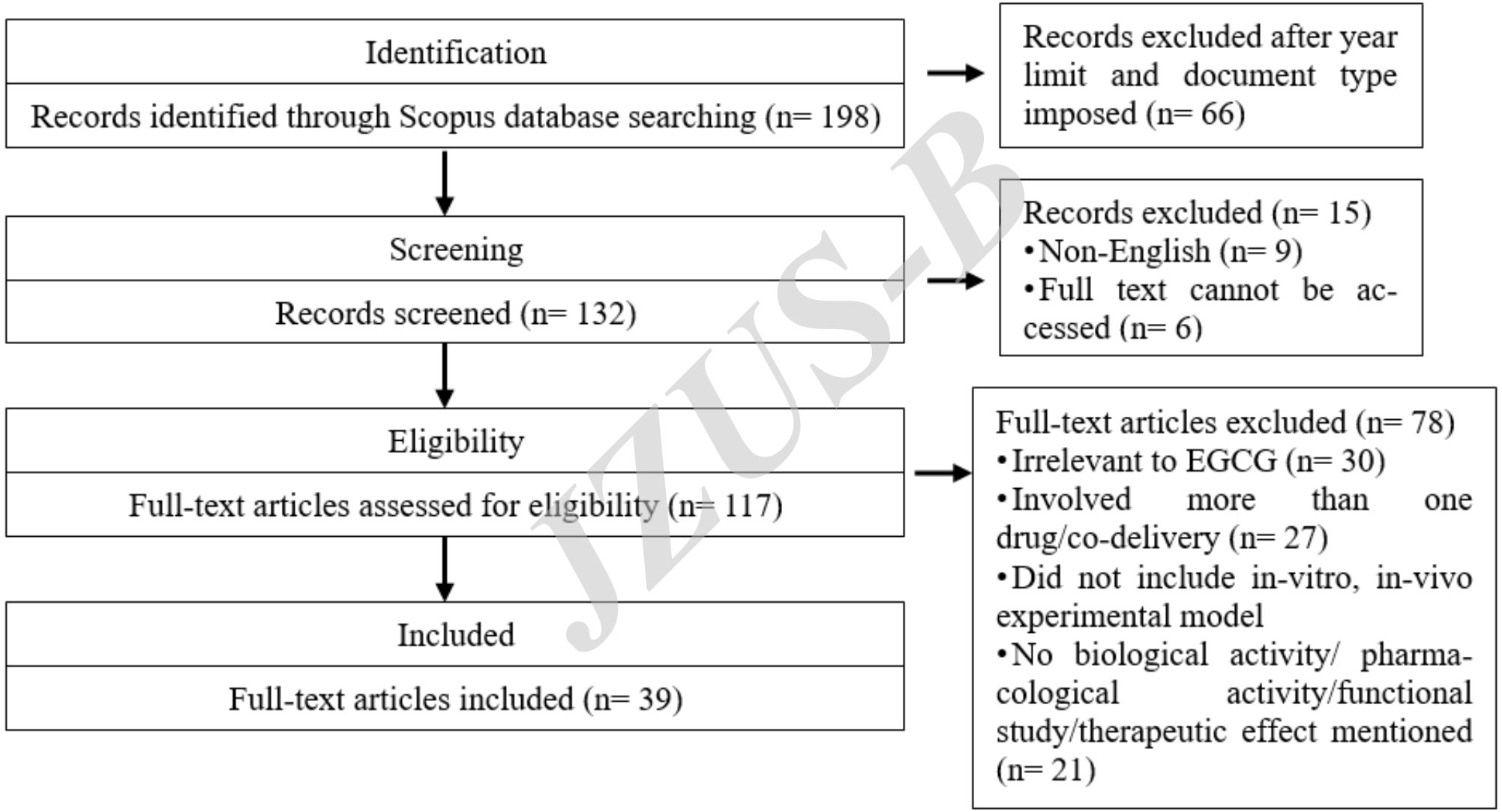
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Fig. 1 2D structure image of CID 65064 (Epigallocatechin Gallate)

PRISMA flow chart



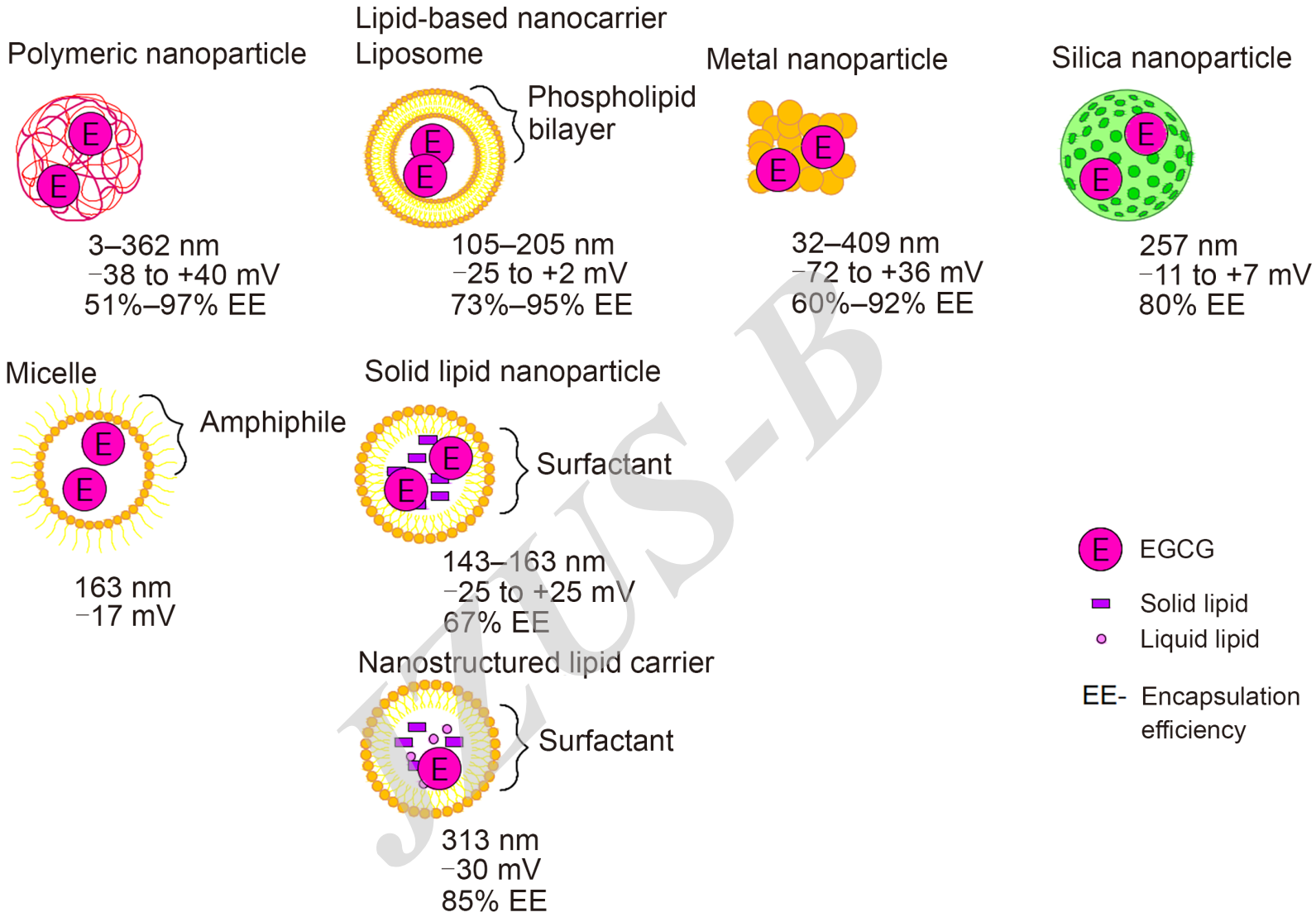
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Fig. 2 PRISMA Flowchart of Study Selection

Main findings

- Current strategies involve polymeric nanoparticles, micelles, lipid-based nanocarriers, metal nanoparticles, and silica nanoparticles. These formulations typically have particle sizes around 300 nm and encapsulation efficiencies between 51% to 97%.
- EGCG-loaded nanoparticles exhibit significantly improved pharmacological activities—such as antioxidative, anti-inflammatory, anticancer, and antimicrobial effects—compared to free EGCG.

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Fig. 3 Illustration of various epigallocatechin-3-gallate (EGCG) nanocarriers. Current strategies involve polymeric nanoparticles, micelles, lipid-based nanocarriers, metal nanoparticles, and silica nanoparticles. These formulations typically have particle sizes around 300 nm and encapsulation efficiencies between 51% to 97%.