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(57) Abstract :

The invention relates to a multi-layer hepatic detoxifying and regenerative patch (100) comprising a hydrogel matrix layer (102), a multifunctional pH-responsive polymer layer (104), and a bioadhesive layer (106). The pH-responsive polymer layer (104) integrates both hepatoprotective agents—including curcumin-loaded liposomes, Hepatocyte Growth Factor (HGF), and Vascular Endothelial Growth Factor (VEGF)—and detoxifying nanoparticles such as activated carbon, zeolite, and metal-organic framework particles to enable simultaneous therapeutic release and toxin adsorption under acidic or enzyme-rich pathological liver conditions. The patch adheres directly to hepatic tissue via the bioadhesive layer (106), provides localized and controlled delivery of regenerative agents, achieves efficient detoxification, and undergoes safe biodegradation following completion of therapeutic activity. Reference Fig 1

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