

Potential therapeutic strategies for hepatic fibrosis: current and in development

Strategies	Approach
Remove injurious stimuli	Abstinence from alcohol for alcoholic liver diseases
	Antiviral therapy for viral hepatitis
	Anthelmintic therapy for schistosomiasis
	Copper chelation for Wilson disease
	Phlebotomy for hemochromatosis
	Discontinue hepatotoxins (eg, methotrexate) in drug-induced liver injury
Suppress or modulate hepatic inflammation	Corticosteroids in autoimmune hepatitis and severe alcoholic liver diseases
	Caffeine (possibly)
	Farnesoid X receptor ligands
	Serum amyloid P pentamer
	Galectin-3 antagonists
	Chemokine and chemokine receptor antagonists
	LPA-1 antagonists
	Antioxidants (eg, vitamin E, cysteamine, butein)
	HMG-CoA reductase inhibition (eg, statins)
Hepatoprotectants	Caspase inhibitors
	Farnesoid X receptor ligands
	PPAR alpha/delta agonists
	Hepatocyte growth factor mimetics
	Fatty acid/bile acid conjugates to reduce liver fat
Downregulate stellate cell activation (proliferation, fibrogenesis and/or contractility)	Stellate cell-targeted gamma interferon
	Antioxidants (eg, vitamin E, cysteamine, butein)
	Cytokine and chemokine-antagonists and agonists:
	Targeted TGF-beta antagonists (eg, integrin alpha V antagonists)
	Endothelin receptor antagonists; nitric oxide donors
	Hepatocyte growth factor mimetics
	Chemokine and chemokine receptor antagonists
	Connective tissue growth factor inhibitors
	Receptor tyrosine kinase antagonists (eg, sorafenib, imatinib)
	Peripheral cannabinoid receptor antagonists

	Angiotensin receptor antagonists
	Liposomal delivery of siRNA to Hsp-47
	HMG-CoA reductase inhibition (eg, statins)
	Bone morphogenic protein 7
	Histone deacetylase inhibitors
	Hedgehog pathway inhibitors
	Interleukin-22
	Perfenidone
	Herbal medicines: (eg, Sho-saiko-to [Xiao-Chaihu-Tang])
Promote matrix degradation	Lysyl oxidase-2 inhibitors
	Cell-specific TGF-beta inhibitors (eg, integrin alpha V antagonists)
Promote specific apoptosis of hepatic stellate cells	Gliotoxin, sulfasalazine

LPA: lysophosphatidic acid; HMG: hydroxy methylglutaryl; PPAR: peroxisome proliferator-activated receptor; TGF: transforming growth factor; siRNA: short-interfering ribonucleic acid; Hsp: heat-shock protein.

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