

# OptiPrep™ Reference List RC07

## Hepatic and pancreatic stellate cells

- ◆ This **Reference List RC07** provides a complete list of publications that report the use of OptiPrep™ for the purification of hepatic and pancreatic stellate cells. It complements **Application Sheet C25** which provides a brief overview of the separation technology and **Reference List RC08**: a complete list of published papers primarily reporting the analysis of hepatic Kupffer and sinusoidal endothelial cells; it also lists papers on non-parenchymal epithelial cells, NK cells, oval cells and progenitor cells.
- ◆ References are divided into following sections based on cell source:
  - ◆ **Human liver – p1**
  - ◆ **Human pancreas – p3**
  - ◆ **Mouse liver – p3**
  - ◆ **Mouse pancreas – p11**
  - ◆ **Rat liver – p11**
  - ◆ **Rat pancreas – p 17**
- ◆ **Sections on human, mouse and rat liver are further sorted into sub-sections alphabetically according research topic.**
- ◆ Within each section or sub-section references are listed alphabetically according to **first author** (multiple examples are listed chronologically).
- ◆ Important note: the number of published papers on rodent liver stellate cells that refer to fibrosis, fibrogenesis and liver injury is so huge that they are listed only under the analytical study.

### Important note

Detailed protocols can be accessed from the usual website: [www.Optiprep.com](http://www.Optiprep.com). Select “Cells” then scroll down to “Hepatic cells – stellate cells” or “Pancreatic stellate cells” to open the appropriate Application Sheet.

### Human liver

#### Activation

**Hong, Y.**, Li, S., Wang, J. and Li, Y. (2018) *In vitro inhibition of hepatic stellate cell activation by the autophagy-related lipid droplet protein ATG2A* Sci. Rep., **8**: 9232

**Longato, L.**, Andreola, F., Davies, S.S., Roberts, J.L., Fusai, G., Pinzani, M., Moore, K., Rombouts, K. (2017) *Reactive gamma-ketoaldehydes as novel activators of hepatic stellate cells in vitro* Radic. Biol. Med., **102**, 162-173

#### Apoptosis

**Singh, H.D.**, Otano, I., Rombouts, K., Singh, K.P., Peppas, D., Gill, U.S., Böttcher, K., Kennedy, P.T.F., Oben, J. et al (2017) *TRAIL regulatory receptors constrain human hepatic stellate cell apoptosis* Sci. Rep., **7**: 5514

#### Cirrhosis

**Casas-Grajales, S.**, Alvarez-Suarez, D., Ramos-Tovar, E., Buendía-Montaña, L.D., Reyes-Gordillo, K., Camacho, J., Tsutsumi, V., Lakshman, M.R. and Muriel, P. (2019) *Stevioside inhibits experimental fibrosis by down-regulating profibrotic Smad pathways and blocking hepatic stellate cell activation* Basic Clin. Pharmacol. Toxicol. 2019, **124**, 670–6800

**De Mesquita, F.C.**, Guixé-Muntet, S., Fernández-Iglesias, A., Maeso-Díaz, R., Vila, S., Hide, D., Ortega-Ribera, M., Rosa, J.L. et al (2017) *Liraglutide improves liver microvascular dysfunction in cirrhosis: Evidence from translational studies* Sci. Rep., **7**: 3255

## Cryopreservation

**Nakamura, A.**, Ueno, T., Yagi, Y., Okuda, K., Ogata, T., Nakamura, T., Torimura, T., Iwamoto, H., Ramadoss, S., Sata, M., Tsutsumi, V., et al (2010) *Human primary cultured hepatic stellate cells can be cryopreserved* Med. Mol. Morphol., **43**, 107–115

## Fibrosis

**Chen, J.Y.**, Newcomb, B., Zhou, C., Pondick, J.V., Ghoshal, S., York, S.R., Motola, D.L., Coant, N., Yi, J.K., Mao, C. et al (2017) *Tricyclic antidepressants promote ceramide accumulation to regulate collagen production in human hepatic stellate cells* Sci. Rep., **7**: 44867

**Casas-Grajales, S.**, Alvarez-Suarez, D., Ramos-Tovar, E., Buendía-Montaña, L.D., Reyes-Gordillo, K., Camacho, J., Tsutsumi, V., Lakshman, M.R. and Muriel, P. (2019) *Stevioside inhibits experimental fibrosis by down-regulating profibrotic Smad pathways and blocking hepatic stellate cell activation* Basic Clin. Pharmacol. Toxicol. 2019, **124**, 670–6800

## Gene transfer

**Perugorria, M.J.**, Wilson, C.L., Zeybel, M., Walsh, M., Amin, S., Robinson, S., White, S.A., Burt, A.D., Oakley, F., Tsukamoto, H., Mann, D.A. and Mann, J. (2012) *Histone methyltransferase ASH1 orchestrates fibrogenic gene transcription during myofibroblast transdifferentiation* Hepatology, **56**, 1129-1139

## Growth factors and growth factor receptors/signalling

**Barnaeva, E.**, Nadezhda, A., Hannappel, E., Sjogren, M.H. and Rojkind, M. (2007) *Thymosin  $\beta_4$  upregulates the expression of hepatocyte growth factor and downregulates the expression of PDGF- $\beta$  receptor in human hepatic stellate cells* Ann. N.Y. Acad. Sci., **1112**, 154-160

**Reyes-Gordillo, K.**, Shah, R., Popratiloff, A., Fu, S., Hindle, A., Brody, F. and Rojkind, M. (2011) *Thymosin- $\beta_4$  (T $\beta_4$ ) blunts PDGF-dependent phosphorylation and binding of AKT to actin in hepatic stellate cells* Am. J. Pathol., **178**, 2100–2108

## Hepatitis B

**Pallett, L.J.**, Gill, U.S., Quaglia, A., Sinclair, L.V., Jover-Cobos, M., Schurich, A., Singh, K.P., Thomas, N. et al. (2015) *Metabolic regulation of hepatitis B immunopathology by myeloid-derived suppressor cells* Nat. Med., **21**, 591-600

## Hepatitis (T-cell mediated)

**Chen, L.**, Gu, J., Qian, Y., Li, M., Qian, Y., Xu, M., Li, J., Wen, Y., Xia, L. et al (2019) *Deletion of C-C motif chemokine ligand 5 worsens invariant natural killer T-cell mediated hepatitis via compensatory up-regulation of CXCR2-related chemokine activity* Cell. Mol. Gastroenterol. Hepatol., **7**, 623–639

## Hypertension

**Jalan, R.**, De Chiara, F., Balasubramanian, V., Andreola, F., Khetan, V., Malago, M., Pinzani, M., Mookerjee, R.P. and Rombouts, K. (2016) *Ammonia produces pathological changes in human hepatic stellate cells and is a target for therapy of portal hypertension* J. Hepatol., **64**, 823–833

## Memory T-cells

**Swadling, L.**, Pallett, L.J., Diniz, M.O., Baker, J.M., Amin, O.E., Stegmann, K.A., Burton, A.R., Schmidt, N.M., Jeffery-Smith, A. et al (2020) *Human liver memory CD8+ T cells use autophagy for tissue residence* Cell Rep., **30**, 687–698

## Phosphoinositides

**Rombouts, K.** and Carloni, V. (2016) *Determination and characterization of tetraspanin-associated phosphoinositide-4 kinases in primary and neoplastic liver cells* In Methods Mol. Biol., **1376**, Astrocytes: Methods and Protocols (ed. Waugh, M.G.) Springer Science+Business Media, LLC pp 203-212

## RNA

**Zhou, C.**, York, S.R., Chen, J.Y., Pondick, J.V., Motola, D.L., Chung, R.T. and Mullen, A.C. (2016) *Long noncoding RNAs expressed in human hepatic stellate cells form networks with extracellular matrix proteins* Genome Med., **8**: 31

**Zhou, C.**, York, S.R., Chen, J.Y., Pondick, J.V., Motola, D.L., Chung, R.T. and Mullen, A.C. (2016) *Long noncoding RNAs expressed in human hepatic stellate cells form networks with extracellular matrix proteins* Genome Med., **8**: 31

## Transcription factors

### E-box DNA

**Vincent, K.J.**, Jones, E., Arthur, M.J.P., Smart, D.E., Trim, J., Wright, M.C. and Mann, D.A. (2001) *Regulation of E-box DNA binding during in vivo and in vitro activation of rat and human hepatic stellate cells* Gut, **49**, 713-719

### Metalloproteinases

**Bertrand-Philippe, M.**, Ruddell, R.G., Arthur, M.J.P., Thomas, J., Mungalsingh, N. and Mann, D.A. (2004) *Regulation of tissue inhibitor of metalloproteinase 1 gene transcription by RUNX1 and RUNX2* J. Biol. Chem., **279**, 24530-24539

**Perugorria, M.J.**, Wilson, C.L., Zeybel, M., Walsh, M., Amin, S., Robinson, S., White, S.A. et al (2012) *Histone methyltransferase ASH1 orchestrates fibrogenic gene transcription during myofibroblast transdifferentiation* Hepatology, **56**, 1129-1139

### Methylation

**Perugorria, M.J.**, Wilson, C.L., Zeybel, M., Walsh, M., Amin, S., Robinson, S., White, S.A. et al (2012) *Histone methyltransferase ASH1 orchestrates fibrogenic gene transcription during myofibroblast transdifferentiation* Hepatology, **56**, 1129-1139

### Vitamin D

**Beilfuss, A.**, Sowa, J-P., Sydor, S., Beste, M., Bechmann, L.P., Schlattjan, M., Syn, W-K., Wedemeyer, I. et al (2015) *Vitamin D counteracts fibrogenic TGF- $\beta$  signalling in human hepatic stellate cells both receptor-dependently and independently* Gut, **64**, 791–799

## Human pancreas

**Armstrong, T.**, Packham, G., Murphy, L.B., Bateman, A.C., Conti, J.A., Fine, D.R., Johnson, C.D., Benyon, R.C. and Iredale, J.P. (2004) *Type 1 collagen promotes the malignant phenotype of pancreatic ductal adenocarcinoma* Clin. Cancer Res., **10**, 7427-7437

**José, A.**, Rovira-Rigau, M., Luna, J., Giménez-Alejandre, M., Vaquero, E., García de la Torre, B., Andreu, D., Alemany, R. and Fillat, C. (2014) *A genetic fiber modification to achieve matrix-metalloprotease-activated infectivity of oncolytic adenovirus* Journal of Control. Release, **192**, 148–156

## Mouse liver

### Anthocyanins

**Jiang, X.**, Shen, T., Tang, X., Yang, W., Guo, H. and Ling, W. (2017) *Cyanidin-3-O- $\beta$ -glucoside combined with its metabolite protocatechuic acid attenuated the activation of mice hepatic stellate cells* Food Funct., 2017, 8, 2945–2957

### Antigenic targeting

**Wu, F.**, Wuensch, S.A., Azadniv, M., Ebrahimkhani, M.R. and Crispe, I.N. (2009) *Galactosylated LDL nanoparticles: a novel targeting delivery system to deliver antigen to macrophages and enhance antigen specific T cell responses* Mol. Pharmaceut., **6**, 1506-1517

### Apoptosis

**Duan, Y.**, Gu, X., Zhu, D., Sun, W., Chen, J., Feng, J., Song, K., Xu, F., He, X. and He, X. (2014) *Schistosoma japonicum soluble egg antigens induce apoptosis and inhibit activation of hepatic stellate cells: a possible molecular mechanism* Int. J. Parasitol., **44**, 217–224

**Tao, Y-y.**, Yan, X-c., Zhou, T., Shen, L., Liu, Z-l. and Liu, C-h., (2014) *Fuzheng Huayu recipe alleviates hepatic fibrosis via inhibiting TNF- $\alpha$  induced hepatocyte apoptosis* BMC Complement. Altern. Med., **14**: 449

### Autoimmune hepatitis

**Murthy, A.**, Shao, Y.W., Defamie, V., Wedeles, C., Smookler, D. and Khokha, R. (2012) *Stromal TIMP3 regulates liver lymphocyte populations and provides protection against Th1 T cell-driven autoimmune hepatitis* J. Immunol., **188**, 2876–2883

## Autophagy

Chen, M., Liu, J., Yang, W. and Ling, W. (2017) *Lipopolysaccharide mediates hepatic stellate cell activation by regulating autophagy and retinoic acid signalling* *Autophagy*, **13**, 813–1827

## B cell activity

Thapa, M., Chinnadurai, R., Velazquez, V.M., Tedesco, D., Elrod, E., Han, J-H., Sharma, P., et al (2015) *Liver fibrosis occurs through dysregulation of MyD88-dependent innate B-cell activity* *Hepatology*, **61**, 2067-2079

## Bile duct ligation

Cui, W., Matsuno, K., Iwata, K., Ibi, M., Matsumoto, M., Zhang, J., Zhu, K., Katsuyama, M., Torok, N.J. and Yabe-Nishimura, C. (2011) *NOX1/Nicotinamide adenine dinucleotide phosphate, reduced form (NADPH) oxidase promotes proliferation of stellate cells and aggravates liver fibrosis induced by bile duct ligation* *Hepatology*, **54**, 949-958

## Carcinogenesis

Seifert, L., Deutsch, M., Alothman, S., Alqunaibit, D., Werba, G., Pansari, M., Pergamo, M., Ochi, A. (2015) *Dectin-1 regulates hepatic fibrosis and hepatocarcinogenesis by suppressing TLR4 signalling pathways* *Cell Rep.*, **13**, 1–13

Wright, J.H., Johnson, M.M., Shimizu-Albergine, M., Bauer, R.L., Hayes, B.J., Surapisitchat, J., Hudkins, K.L., Riehle, K.J., Johnson, S.C., et al (2014) *Paracrine activation of hepatic stellate cells in platelet-derived growth factor C transgenic mice: Evidence for stromal induction of hepatocellular carcinoma* *Int. J. Cancer*, **134**, 778–788

Wright, J.H., Johnson, M.M., Shimizu-Albergine, M., Bauer, R.L., Hayes, B.J., Surapisitchat, J., Hudkins et al (2014) *Paracrine activation of hepatic stellate cells in platelet-derived growth factor C transgenic mice: Evidence for stromal induction of hepatocellular carcinoma* *Int. J. Cancer*, **134**, 778–788

## Cell-cell communication

Xiong, X., Kuang, H., Ansari, S., Liu, T., Gong, J., Wang, S., Zhao, X-Y., Ji, Y., Li, C., Guo, L. et al (2019) *Landscape of intercellular crosstalk in healthy and NASH liver revealed by single-cell secretome gene analysis* *Mol. Cell*, **75**, 644–660

## Chemokine receptor

Lee, Y-S., Eun, H.S., Kim, S.Y., Jeong, J-M., Seo, W., Byun, J-S., Jeong, W-I. and Yi, H-S. (2106) *Hepatic immunophenotyping for streptozotocin-induced hyperglycemia in mice* *Sci. Rep.*, **6**: 30656

## Chronic liver injury

Kim, J-W., Yang, D., Jeong, H., Park, S., Lee, M-H., Lim, C.W. and Kim, B. (2019) *Dietary zerumbone, a sesquiterpene, ameliorates hepatotoxin-mediated acute and chronic liver injury in mice* *Phytother. Res.*, **33**, 1538–1550

## Connective tissue/collagen

Huang, G. and Brigstock, D.R. (2011) *Integrin expression and function in the response of primary culture hepatic stellate cells to connective tissue growth factor (CCN2)* *J. Cell. Mol. Med.*, **15**, 1087-1095

Oben, J.A., Yang, S., Lin, H., Ono, M. and Diehl, A.M. (2003) *Acetylcholine promotes the proliferation and collagen gene expression of myofibroblastic hepatic stellate cells* *Biochem. Biophys. Res. Commun.*, **300**, 172-177

Oben, J.A., Yang, S., Lin, H., Ono, M. and Diehl, A.M. (2003) *Norepinephrine and neuropeptide Y promote proliferation and collagen gene expression of hepatic myofibroblastic stellate cells* *Biochem. Biophys. Res. Commun.*, **302**, 685-690

## Cytokines

Kandhi, R., Bobbala, D., Yeganeh, M., Mayhue, M., Menendez, A. and Ilangumaran, S. (2016) *Negative regulation of the hepatic fibrogenic response by suppressor of cytokine signalling 1* *Cytokine*, **82**, 58–69

Li, P., Li, Y., Zhu, L., Yang, Z., He, J., Wang, L., Shang, Q., Pan, H., Wang, H., Ma, X. et al (2018) *Targeting secreted cytokine BMP9 gates the attenuation of hepatic fibrosis* *BBA – Mol. Basis Dis.*, **1864**, 709–720

Ogiso, H., Ito, H., Ando, T., Arioka, Y., Kanbe, A., Ando, K., Ishikawa, T. et al (2016) *The deficiency of indoleamine 2,3-dioxygenase aggravates the CCl<sub>4</sub>-induced liver fibrosis in mice* *PLoS One*, **11**: e0162183

## Drug effects

**Liang, Y.-J.,** Luo, J., Yuan, Q., Zheng, D., Liu, Y.-P., Shi, L., Zhou, Y., Chen, A.-L. et al (2011) *New insight into the antifibrotic effects of praziquantel on mice in infection with Schistosoma japonicum* PLoS One **6**: e20247

## Dystroglycan

**Kastanis, G.J.,** Hernandez-Nazara, Z., Nieto, N., Rincón-Sanchez, A.R., Popratiloff, A., Dominguez-Rosales, J.A., Lechuga, C.G., Rojkind, M. (2011) *The role of dystroglycan in PDGF-BB-dependent migration of activated hepatic stellate cells/myofibroblasts* Am. J. Physiol. Gastrointest. Liver Physiol., **301**, G464–G474

## EphB2 receptor tyrosine kinase

**Mimche, P.N.,** Lee, C.M., Mimche, S.M., Thapa, M., Grakoui, A., Henkemeyer, M. and Lamb, T.J. (2018) *EphB2 receptor tyrosine kinase promotes hepatic fibrogenesis in mice via activation of hepatic stellate cells* Sci. Rep., **8**: 2532

## Epigenetic therapy

**Zeybel, M.,** Luli, S., Sabater, L., Hardy, T., Oakley, F., Leslie, J., Page, A., Salvador, E.M., Sharkey, V., Tsukamoto, H., Chu, D.C.K. et al (2017) *A proof-of-concept for epigenetic therapy of tissue fibrosis: inhibition of liver fibrosis progression by 3-deazaneplanocin A* Mol. Ther., **25**, 218-231

## Fatty liver disease

**Zhong, L.,** Huang, L., Xue, Q., Liu, C., Xu, K., Shen, W. and Deng, L. (2019) *Cell-specific elevation of Runx2 promotes hepatic infiltration of macrophages by upregulating MCP-1 in high-fat diet-induced mice NAFLD* J. Cell. Biochem. **120**, 11761-11774

## Fibrosis

**Ben-Shoshan, S.O.,** Kagan, P., Sultan, M., Barabash, Z., Dor, C., Jacob-Hirsch, J., Harmelin, A., Pappo, O. et al (2017) *ADAR1 deletion induces NFκB and interferon signaling dependent liver inflammation and fibrosis* RNA Biol., **14**, 587–602

**Casas-Grajales, S.,** Alvarez-Suarez, D., Ramos-Tovar, E., Buendía-Montaña, L.D., Reyes-Gordillo, K., Camacho, J., Tsutsumi, V., Lakshman, M.R. and Muriel, P. (2019) *Stevioside inhibits experimental fibrosis by down-regulating profibrotic Smad pathways and blocking hepatic stellate cell activation* Basic Clin. Pharmacol. Toxicol. **2019**, **124**, 670–6800

**Chen, L.,** Li, J., Zhang, J., Dai, C., Liu, X., Wang, J. et al (2015) *SI00A4 promotes liver fibrosis via activation of hepatic stellate cells* J. Hepatol., **62**, 156-164

**Chen, L.** and Brigstock, D.R. (2017) *Cellular or exosomal microRNAs associated with CCN gene expression in liver fibrosis* In CCN Proteins: Methods and Protocols, Methods Mol. Biol., 1489, (ed. Takigawa, M.) Springer Science+Business Media, LLC, pp 465-480

**Chen, L.** and Brigstock, D.R. (2017) *Analysis of pathological activities of CCN proteins in fibrotic diseases: liver fibrosis* In CCN Proteins: Methods and Protocols, Methods Mol. Biol., **1489**, (ed. Takigawa, M.) Springer Science+Business Media, LLC, pp 445-463

**Chen, W.,** Wu, X., Yan, Z., Xu, A., Yang, A. and You, H. (2019) *Multitranscriptome analyses reveal prioritized genes specifically associated with liver fibrosis progression independent of etiology* Am. J. Physiol. Gastrointest. Liver Physiol., **316**, G744–G754

**Chen, X.,** Li, X.-F., Chen, Y., Zhu, S., Li, H.-D., Chen, S.-Y., Wang, J.-N., Pan, X.-Y., Bu, F.-T., Huang, C. and Li, J. (2019) *Hesperetin derivative attenuates CCL4-induced hepatic fibrosis and inflammation by Gli-1-dependent mechanisms* Int. Immunopharm., **76**: 105838

**Jiang, X.,** Shen, T., Tang, X., Yang, W., Guo, H. and Ling, W. (2017) *Cyanidin-3-O-β-glucoside combined with its metabolite protocatechuic acid attenuated the activation of mice hepatic stellate cells* Food Funct., **2017**, **8**, 2945–2957

**Jiang, Y.,** Zhao, Y., He, F. and Wang, H. (2019) *Artificial microRNA-mediated Tgfb2 and Pdgfrb co-silencing ameliorates carbon tetrachloride-induced hepatic fibrosis in mice* Hum. Gene Ther., **30**, 179-196

**Kagan, P.,** Sultan, M., Tachlytski, I., Safran, M. and Ben-Ari, Z. (2017) *Both MAPK and STAT3 signal transduction pathways are necessary for IL-6-dependent hepatic stellate cells activation* PLoS One, **12**: e0176173

**Kim, J.,** Hyun, J., Wang, S., Lee, C., Lee, J.-W., Moon, E.-Y., Cha, H., Diehl, A.M. and Jung, Y. (2017) *Thymosin beta-4 regulates activation of hepatic stellate cells via hedgehog signalling* Sci. Rep., **7**: 3815

**Kong, De-L.,** Kong, F.-Y., Liu, X.-Y., Yan, C., Cui, J., Tang, R.-X. and Zheng, K.-Y. (2019) *Soluble egg antigen of Schistosoma japonicum induces pyroptosis in hepatic stellate cells by modulating ROS production* Parasites Vectors, **12**: 475

- Lao, Y.**, Li, Y., Zhang, P., Shao, Q., Lin, W., Qiu, B., Lv, Y., Tang, L., Su, S et al (2018) *Targeting endothelial Erk1/2-Akt axis as a regeneration strategy to bypass fibrosis during chronic liver injury in mice* Mol. Ther., **26**, 2779-2797
- Li, P.**, Li, Y., Zhu, L., Yang, Z., He, J., Wang, L., Shang, Q., Pan, H., Wang, H., Ma, X. et al (2018) *Targeting secreted cytokine BMP9 gates the attenuation of hepatic fibrosis* BBA – Mol. Basis Dis., **1864**, 709–720
- Li, Y.**, Pu, S., Liu, Q., Li, R., Zhang, J., Wu, T., Chen, L., Li, H. et al (2019) *An integrin-based nanoparticle that targets activated hepatic stellate cells and alleviates liver fibrosis* J. Control. Release, **303**, 77–90
- Mimche, P.N.**, Lee, C.M., Mimche, S.M., Thapa, M., Grakoui, A., Henkemeyer, M. and Lamb, T.J. (2018) *EphB2 receptor tyrosine kinase promotes hepatic fibrogenesis in mice via activation of hepatic stellate cells* Sci. Rep., **8**: 2532
- Strowitzki, M.J.**, Kirchberg, J., Tuffs, C., Schiedeck, M., Ritter, A.S., Biller, M., Harnoss, J.M., Lasitschka F. et al (2018) *Loss of prolyl-hydroxylase 1 protects against biliary fibrosis via attenuated activation of hepatic stellate cells* Am. J. Pathol., **188**, 2826-2838
- You, K.**, Li, S-Y., Gong, J., Fang, J-H., Zhang, M., Yuan, Y., Yang, J. and Zhuang, S-M. (2018) *Micro RNA-125b promotes hepatic stellate cell activation and liver fibrosis by activating RhoA signaling* Mol. Ther. Nucl. Acids, **12**, 57-66
- Yu, F.**, Dong, B., Dong, P., He, Y., Zheng, J. and Xu, P. (2020) *Hypoxia induces the activation of hepatic stellate cells through the PVT1-miR-152-ATG14 signaling pathway* Mol. Cell. Biochem., **465**, 115–123
- Zhan, T.**, Ma, H., Jiang, S., Zhong, Z., Wang, X., Li, C., Yu, D., Liu, L., Xu, J. and Xia, C. (2019) *Interleukin-9 blockage reduces early hepatic granuloma formation and fibrosis during Schistosoma japonicum infection in mice* Immunology, **158**, 296–303
- Zhao, X-K.**, Yu, L., Cheng, M-L., Che, P., Lu, Y-Y., Zhang, Q., Mu, M., Li, H. et al (2017) *Focal adhesion kinase regulates hepatic stellate cell activation and liver fibrosis* Sci. Rep., **7**: 4032
- Zhu, J.**, Luo, Z., Pan, Y., Zheng, W., Li, W., Zhang, Z., Xiong, P., Xu, D. et al (2019) *H19/miR-148a/USP4 axis facilitates liver fibrosis by enhancing TGF- $\beta$  signaling in both hepatic stellate cells and hepatocytes* J. Cell. Physiol. **234**, 9698–9710
- Zou, X.**, Ramachandran, P., Kendall, T.J., Pellicoro, A., Dora, E., Aucott, R.L., Manwani, K., Man, T.Y. et al (2018) *11Beta-hydroxysteroid dehydrogenase-1 deficiency or inhibition enhances hepatic myofibroblast activation in murine liver fibrosis* Hepatology, **67**, 2167-2181

### Gene transfer

- Perugorria, M.J.**, Wilson, C.L., Zeybel, M., Walsh, M., Amin, S., Robinson, S., White, S.A., Burt, A.D., Oakley, F., Tsukamoto, H., Mann, D.A. and Mann, J. (2012) *Histone methyltransferase ASH1 orchestrates fibrogenic gene transcription during myofibroblast transdifferentiation* Hepatology, **56**, 1129-1139

### Growth factors and growth factor receptors/signalling

- Bahrani, A.J.**, Gunaje, J.J., Hayes, J., Riehle, K.J., Kenerson, H.L., Yeung, R.S., Stempien-Otero, A.S., Campbell, J.S. and Mahoney Jr, W.M. (2014) *Regulator of G-protein signalling-5 is a marker of hepatic stellate cells and expression mediates response to liver injury* PLoS One, **9**: e108505
- Huang, G.**, Besner, G.E. and Brigstock, D.R. (2012) *Heparin-binding epidermal growth factor-like growth factor suppresses experimental liver fibrosis in mice* Lab. Invest., **92**, 703–712
- Kastanis, G.J.**, Hernandez-Nazara, Z., Nieto, N., Rincón-Sanchez, A.R., Popratiloff, A., Dominguez-Rosales, J.A., Lechuga, C.G., Rojkind, M. (2011) *The role of dystroglycan in PDGF-BB-dependent migration of activated hepatic stellate cells/myofibroblasts* Am. J. Physiol. Gastrointest. Liver Physiol., **301**, G464–G474
- Tsai, S-M.** and Wang, W-P. (2011) *Expression and function of fibroblast growth factor (FGF) 7 during liver regeneration* Cell. Physiol. Biochem., **27**, 641-652

### Gut microbiota

- Bigorgne, A.E.**, John, B., Ebrahimkhani, M.R., Shimizu-Albergine, M., Campbell, J.S. and Crispe, I.N. (2016) *TLR4-dependent secretion by hepatic stellate cells of the neutrophil-chemoattractant CXCL1 mediates liver response to gut microbiota* PLoS One, **11**: e0151063

### Hedgehog signalling

- Hyun, J.**, Wang, S., Kim, J., Rao, K.M., Park, S.Y., 2, Chung, I., Ha, C-S. et al (2016) *MicroRNA-378 limits activation of hepatic stellate cells and liver fibrosis by suppressing Gli3 expression* Nat. Comm., **7**: 10993
- Kim, J.**, Hyun, J., Wang, S., Lee, C., Lee, J-W., Moon, E-Y., Cha, H., Diehl, A.M. and Jung, Y. (2017) *Thymosin beta-4 regulates activation of hepatic stellate cells via hedgehog signalling* Sci. Rep., **7**: 3815

### **Hepatitis (T-cell mediated)**

**Chen, L.,** Gu, J., Qian, Y., Li, M., Qian, Y., Xu, M., Li, J., Wen, Y., Xia, L. et al (2019) *Deletion of C-C motif chemokine ligand 5 worsens invariant natural killer T-cell mediated hepatitis via compensatory up-regulation of CXCR2-related chemokine activity* Cell. Mol. Gastroenterol. Hepatol., **7**, 623–639

### **Hyperglycaemia**

**Lee, Y-S.,** Eun, H.S., Kim, S.Y., Jeong, J-M., Seo, W., Byun, J-S., Jeong, W-I. and Yi, H-S. (2106) *Hepatic immunophenotyping for streptozotocin-induced hyperglycemia in mice* Sci. Rep., **6**: 30656

### **Hypoxia**

**Yu, F.,** Dong, B., Dong, P., He, Y., Zheng, J. and Xu, P. (2020) *Hypoxia induces the activation of hepatic stellate cells through the PVT1-miR-152-ATG14 signaling pathway* Mol. Cell. Biochem., **465**, 115–123

### **Indoleamine 2,3-dioxygenase**

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### **Ischemia/reperfusion injury**

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### **Lipopolysaccharide**

**Chen, M.**, Liu, J., Yang, W. and Ling, W. (2017) *Lipopolysaccharide mediates hepatic stellate cell activation by regulating autophagy and retinoic acid signalling* Autophagy, **13**, 813–1827

### **Macrophage-mediated liver injury**

**Lee, Y.-S.**, Kim, M.-H., Yi, H.-S., Kim, S.Y., Kim, H.-H., Kim, J.H., Yeon, J.E., Byun, K.S. et al (2018) *CX3CR1 differentiates F4/80low monocytes into pro-inflammatory F4/80high macrophages in the liver* Sci. Rep., **8**:15076

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### **Methodology**

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### **MHC**

**Zhou, C.-L.**, Kong, D.-L., Liu, J.-F., Lu, Z.-K., Guo, H.-F., Wang, W., Qiu, J.-F., Liu, X.-J. and Wang, Y. (2017) *MHC II<sup>+</sup>, but not MHC II<sup>+</sup>, hepatic stellate cells contribute to liver fibrosis of mice in infection with Shistosoma japonicum* BBA – Mol. Basis Disease, **1863**, 1848–1857

### **Microfluidic chip mimicking**

**Du, Y.**, Li, N., Yang, H., Luo, C., Gong, Y., Tong, C., Gao, Y., Lü, S. and Long, M. (2017) *Mimicking liver sinusoidal structures and functions using a 3D-configured microfluidic chip* Lab. Chip, **17**, 782-794

### **NADPH oxidase – NOX1 isoform**

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### **NF $\kappa$ B signalling**

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### **Notch signalling**

**He, F., Guo, F-C., Li, Z., Yu, H-C., Ma, P-F., Zhao, J-L., Feng, L., Li, W-N. et al** (2015) *Myeloid-specific disruption of recombination signal binding protein J $\kappa$  ameliorates hepatic fibrosis by attenuating inflammation through cylindromatosis in mice* Hepatology, **61**, 303-314

### **Paracrine stimulation**

**Corbett, L., Mann, J. and Mann, D.A.** (2015) *Non-canonical Wnt predominates in activated rat hepatic stellate cells, influencing HSC survival and paracrine stimulation of Kupffer cells* PLoS One, **10**: e0142794

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### **Proteomics**

**Liu, W., Hou, Y., Chen, H., Wei, H., Lin, W., Li, J., Zhang, M., He, F. and Jiang, Y.** (2011) *Sample preparation method for isolation of single-cell types from mouse liver for proteomic studies* Proteomics **11**, 3556–3564

### **Retinoic acid/ester**

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### Schistosome infection

- Duan, Y.**, Gu, X., Zhu, D., Sun, W., Chen, J., Feng, J., Song, K., Xu, F., He, X. and He, X. (2014) *Schistosoma japonicum soluble egg antigens induce apoptosis and inhibit activation of hepatic stellate cells: a possible molecular mechanism* Int. J. Parasitol., **44**, 217–224
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### Steatohepatitis

- Asakawa, M.**, Itoh, M., Suganami, T., Sakai, T., Kanai, S., Shirakawa, I., Yuan, X., Hatayama, T., Shimada, S. et al (2019) *Upregulation of cancer-associated gene expression in activated fibroblasts in a mouse model of non-alcoholic steatohepatitis* Sci. Rep., **9**: 19601
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## T-cells

**Chinnadurai, R.** and Grakoui, A. (2010) *B7-H4 mediates inhibition of T cell responses by activated murine hepatic stellate cells* Hepatology, **52**, 2177-2185

**Dunham, R.M.**, Thapa, M., Velazquez, V.M., Elrod, E.J., Denning, T.L., Pulendran, B. and Grakoui, A. (2013) *Hepatic stellate cells preferentially induce Foxp3<sup>+</sup> regulatory T cells by production of retinoic acid* J. Immunol., **190**, 2009–2016

**Feng, M.**, Wang, Q., Jiang, Z., Ding, J., Wang, H., Wang, M., Lu, L. and Guan, W. (2016) *Adoptive transferred hepatic stellate cells attenuated drug-induced liver injury by modulating the rate of regulatory T cells/T helper 17 cells* Clin. Immunol., **165**, 12–18

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## TGF- $\beta$ signalling

**Li, Y.**, Lua, I., French, S.W. and Asahina, K. (2016) *Role of TGF- $\beta$  signalling in differentiation of mesothelial cells to vitamin A-poor hepatic stellate cells in liver fibrosis* Am. J. Physiol. Gastrointest. Liver Physiol., **310**, G262–G272

## Toll-like receptor signalling

**Seifert, L.**, Deutsch, M., Allothman, S., Alqunaibit, D., Werba, G., Pansari, M., Pergamo, M., Ochi, A. (2015) *Dectin-1 regulates hepatic fibrosis and hepatocarcinogenesis by suppressing TLR4 signalling pathways* Cell Rep., **13**, 1–13

**Seo, W.**, Eun, H.S., Kim, S.Y., Yi, H-S., Lee, Y-S., Park, S-H., Jang, M-J., Jo, E., Kim, S.C. et al (2016) *Exosome-mediated activation of toll-like receptor 3 in stellate cells stimulates interleukin-17 production by  $\gamma\delta$  T cells in liver fibrosis* Hepatology **64**, 616-631

## Transcription

### Inflammatory response

**Elsharkawy, A.M.**, Oakley, F., Lin, F., Packham, G., Mann, D.A, and Mann, J. (2010) *The NF- $\kappa$ B p50:p50:HDAC-1 repressor complex orchestrates transcriptional inhibition of multiple pro-inflammatory genes* J. Hepatol., **53**, 519-527

**Oakley, F.**, Mann, J., Nailard, S., Smart, D.E., Mungalasingh, N., Constandinou, C., Ali, S., Wilson, S.J. et al (2005) *Nuclear factor- $\kappa$ B1 (p50) limits the inflammatory and fibrogenic responses to chronic injury* Am. J. Pathol., **166**, 695-708

### Metalloproteinases

**Murthy, A.**, Shao, Y.W., Defamie, V., Wedeles, C., Smookler, D. and Khokha, R. (2012) *Stromal TIMP3 regulates liver lymphocyte populations and provides protection against Th1 T cell-driven autoimmune hepatitis* J. Immunol., **188**, 2876–2883

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### Methylation

**Perugorria, M.J.**, Wilson, C.L., Zeybel, M., Walsh, M., Amin, S., Robinson, S., White, S.A. et al (2012) *Histone methyltransferase ASH1 orchestrates fibrogenic gene transcription during myofibroblast transdifferentiation* Hepatology, **56**, 1129-1139

## Viral hepatitis

**Jie, Z.**, Liang, Y., Yi, P., Tang, H., Soong, L., Cong, Y., Zhang, K. and Sun, J. (2017) *Retinoic acid regulates immune responses by promoting IL-22 and modulating S100 proteins in viral hepatitis* J. Immunol., **198**, 3448–3460

## Wnt system

**Corbett, L.**, Mann, J. and Mann, D.A. (2015) *Non-canonical Wnt predominates in activated rat hepatic stellate cells, influencing HSC survival and paracrine stimulation of Kupffer cells* PLoS One, **10**: e0142794

## Mouse pancreas

**Erkan, M.**, Adler, G., Apte, M.V., Bachem, M.G., Buchholz, M., Detlefsen, S., Esposito, I., Friess, H. et al (2012) *StellaTUM: current consensus and discussion on pancreatic stellate cell research* Gut, **61**, 172-178

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**Lawrencia, C.**, Charrier, A., Huang, G. and Brigstock, D.R. (2009) *Ethanol-mediated expression of connective tissue growth factor (CCN2) in mouse pancreatic stellate cells* Growth Factors, **27**, 91–99

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**Ulmasov, B.**, Xu, Z., Tetri, L.H., Inagami, T. and Neuschwander-Tetri, B.A. (2009) *Protective role of angiotensin II type 2 receptor signaling in a mouse model of pancreatic fibrosis* Am. J. Physiol. Gastrointest. Liver Physiol., **296**, G284–G294

## Rat liver (majority of papers relate to fibrosis)

### Adipogenesis

**Jiang, Y.**, Wang, S., Zhao, Y., Lin, C., Zhong, F., Jin, L., He, F. and Wang, H. (2015) *Histone H3K9 demethylase JMJD1A modulates hepatic stellate cells activation and liver fibrosis by epigenetically regulating peroxisome proliferator-activated receptor  $\gamma$*  FASEB J. **29**, 1830–1841

### Alcoholic liver injury

**Byun, J.-S.**, Suh, Y.-G., Yi, H.-S., Lee, Y.-S. and Jeong, W.-I. (2013) *Activation of toll-like receptor 3 attenuates alcoholic liver injury by stimulating Kupffer cells and stellate cells to produce interleukin-10 in mice* J. Hepatol., **58**, 342–349

### Apoptosis

**Habens, F.**, Srinivasan, N., Oakley, F., Mann, D.A., Ganesan, A. and Packham, G. (2005) *Novel sulfasalazine analogues with enhanced NF- $\kappa$ B inhibitory and apoptosis promoting activity* Apoptosis, **10**, 481-491

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### Atorvastatin effects

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