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Regenerative Medicine Laboratory

Lab Introduction

Recent research advances in stem cells and regenerative medicine have provided insightful curing strategies for several genetic diseases. To enhance the knowledge flow from basic developmental biology to clinical medicine, the Regenerative Medicine Laboratory was established in E-Da Hospital in 2010. This lab hopefully could serve as an interactive platform where basic scientists communicate with physicians, thereby facilitating the translation of bench findings to practical applications and enhancing human health and well-being. At the present time, our on-going studies may be categorized into the following 3 fields:

1. Mechanistic studies on liver cirrhosis, fatty liver, and regeneration (in particular focusing on the functions of hepatoma-derived growth factor and nerve growth factor).
2. Differentiation of mesenchymal stem cells and derivative for cytotherapy in experimental disease models.
3. Mechanistic studies on tissue remodeling and regeneration.

Principal Investigator:

Ying-Hsien Kao, Ph.D.
Research Fellow

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Educations:
Ph.D. degree,
Department of Biological Sciences, National Sun Yat-Sen University, Kaohsiung, TAIWAN

Academic Experiences:

Duration	Department	Position
2013 Apr to date	Center of Translational Medicine, Dept. of Medical Research, EDA Hospital	Technical Director
2018/11~present	Dept. of Medical Research, EDA Hospital	Research Fellow
2015/01~2018/10	Dept. of Medical Research, EDA Hospital	Associate Research Fellow

2014/08~present	Dept of Medical Laboratory Science and Biotechnology	Assistant Professor
2010/01~2014/12	Dept. of Medical Research, EDA Hospital	Assistant Research Fellow
2003~2010	Liver Transplantation Center, Kaohsiung Chang-Gung Memorial Hospital	Research Assistant
1996~1997	Dept. of Pathology, University of Southern California	Visiting Researcher
1994~2003	Dept. of Dermatology, Kaohsiung Medical University Hospital	Medical Technician
1991~1993	Dept. of Dermatology, Kaohsiung Medical University Hospital	Research Assistant

Team Members:

Collaborating Investigators:

Po-Huang Lee, M.D., Ph.D	Professor	Department of Surgery
Cheuk-Kwan Sun, M.D., Ph.D.	Director	Department of Medical Research
Wen-Yu Chang, M.D., Ph.D.	Director	Department of Dermatology
Chih-Yang Chang, M.D.	Physician	Department of Obstetrics and Gynecology
Yo-Chen Chang, M.D.	Physician	Department of Ophthalmology, Kaohsiung Medical University
Yu-Chun Lin, Ph.D.	Postdoctoral fellow	Department of Surgery

Assistants:

Shang-Chieh Lu, M. Sc. (2010/02~2013/06)

Chia-Wei Lin, M. Sc. (2011/08~2022/10)

Po-Han Chen, M. Sc. (2011/10~present)

Ting-Chia Chiou, M. Sc. (2013/10~2018/12)

Yueh-Hong Lee, M. Sc. (2013/11~2016/03)

Ting-I Wang, M.Sc. (2016/09~2019/01)

Yu-Ting Hong, M.Sc. (2017/09~2019/01)

Chen-Han Tsai, M.Sc. (2021/10~2023/12)

Techniques & Equipments

A. Cell & tissue culture:

Laminar flow

CO_2 incubator

Inverted phase contrast microscope

Vacuum suction pump

Magnetic cell sorting (MACS) system

B. Molecular biology:

Polymerase chain reaction cycler

Devices for protein electrophoresis (including power supply, vertical electrophoretic and electrotranferring sets)

Devices for nucleic acid (including power supply and horizontal electrophoretic tank

Digital image capturing system

C. General purpose equipments:

Low temperature centrifuge

Microcentrifuge

Digital dry bath

Thermostatic water bath

Magnetic stirrer

Vortex, orbital and rocking shakers

Balance

pH meter

Oven

D. Sample storage devices:

4℃, -20℃, -80℃ refrigerators, and liquid nitrogen tank (35 L)

E. Frequently used techniques:

Cell and tissue culture

Cell-based assays

RT-PCR

qPCR

Western blotting

Flow cytometry

ELISA

Paraffin block sectioning

Immunohistochemistry

Immunfluorescent stain

Animal disease models (fatty liver, liver fibrosis and regeneration . . .etc.)

Research Projects

Project titles	PI	Source	Duration
Effect of free fatty acid-induced inflammasome activation in human retinal pigment epithelial ARPE-19 cells (MOST107-2314- B-037-062)	Chang YC	MOST	2018/08~2019/07
Explore the regulatory role of microRNA 100 in peroxidative stress-induced death of human retinal pigment epithelial ARPE-19 cells (MOST107-2314- B-384-009)	Chang YS	MOST	2018/08~2019/07
The pathophysiological role of nitro-oleic acid in the pathogenesis of age-related macular degeneration (MOST108-2314-B-037-089)	Chang YC	MOST	2019/08~2020/07
Regulation of cellular plasticity via autophagy-mediated tissue repair: A study implicating molecular mechanisms and clinical applications (MOS108-2314-B-650-008)	Lee PH	MOST	2019/08~2020/07
The protective role of nitro-oleic acid in animal models of age-related macular degeneration (MOST109-2314-B-037-025)	Chang YC	MOST	2020/08~2021/07
Exploring the genotype and molecular characteristics of Ets-1 gene-deficient mice as an animal model for studying vitiligo (MOST109-2635-B-650-001)	Chang WY	MOST	2020/08~2021/07
Research on the impact of intestinal flora changes on diseases after weight loss and metabolic surgery (EDAHI110003;EDAHP111007)	Yen YC	EHAH	2021/01~2023/01
Effects of capsaicin or resveratrol combined with anti-tumor drugs on resistant ovary cancer cells (ISU-112-IUC-04)	Chang HR	ISU	2023/06~2024/05
Effect of glucagon-like peptide receptor agonistic drug therapy on vascular calcification in chronic kidney disease (NSTC112-2314-B-182A-MY2)	Cheng CI	NSCT	2023/08~2025/07

Selected Publications (2019~present) **(Annotations: #** Co-1st author; *Corresponding author**)**

1. Tsao DA*, Huang SY, Yang SM, Chien CY, Tseng WC, **Kao YH**, Chang HR*. Resveratrol enhances paclitaxel efficacy to inhibit human lung cancer. *Pakistan Journal of Pharmaceutical Sciences* (In press) 2022 Nov. (**SCI**)
2. **Kao YH***#, Chang CY#, Lin YC, Chen PH, Lee PH, Chang HR, Chang WY, Chang

YC, Wun SF, Sun CK*. Mesenchymal stem cell-derived exosomes mitigate acute murine liver injury via Ets-1 and heme oxygenase-1 up-regulation. *Current Stem Cell Research and Therapy* 19(6): 906-918, 2024 (**SCI**) DOI: 10.2174/1574888X19666230918102826

3. Chung YH, Hu MH, Kao SC, **Kao YH**, Wang FH, Hsieh CY, Shen CI, Chuang CH, Chen DWC, Kuo CC, Su HL*, Lin CL*. Preclinical animal study and pilot clinical trial using enriched peripheral blood-derived mononuclear cells for intervertebral disc degeneration. *Cell Transplantation* 33:1-16, 2024 Jan. (**SCI**) DOI: 10.1177/09636897231219733
4. Yu SF, Huang GK, Hsu CY, Cheng TT, **Kao YH***, Chung YH*. Targeting FGFR3 is a useful therapeutic strategy for rheumatoid arthritis treatment. *Current Molecular Pharmacology* 17(1): e18761429261684, 2024 Jan. (**SCI**) DOI: 10.2174/0118761429261684231002062505
5. Chung YH, Huang GK, Kang CH, Cheng YT, **Kao YH***, Chien YS*. MiR-26a-5p restoration ameliorates unilateral ureteral obstruction- induced renal fibrosis in mice through modulating TGF-祺1 signaling. *Laboratory Investigation* 103(7): 100131, 2023 July. (**SCI**) DOI: 10.1016/j.labinv.2023.100131
6. Weng SW, Wu JC, Shen FC, Chang YH, Su YJ, Lian WS, Tai MH, Su CH, Chuang JH, Lin TK, Liou CW, Chu TH, **Kao YH**, Wang FS*, Wang PW*. Chaperonin counteracts diet-induced nonalcoholic fatty liver disease by aiding sirtuin 3 in the control of fatty acid oxidation. *Diabetologia* 66(5): 913-930, 2023 May. (**SCI**) DOI: 10.1007/s00125-023-05869-9
7. Huang GK, Huang CC, Kang CH, Cheng YT, Tsai PC, **Kao YH***, Chung YH*. Genetic interference of FGFR3 impedes invasion of upper tract urothelial carcinoma cells by alleviating RAS/MAPK signal activity. *International Journal of Molecular Sciences* 24(2): 1776 2023 Jan. **(SCI)** DOI: 10.3390/ijms24021776
8. Chung YH, Cheng YT, **Kao YH**, Tsai WC, Huang GK, Chen YT, Shen YC, Tai MH*, Chiang PH*. MiR-26a-5p as a useful therapeutic target for upper tract urothelial carcinoma by regulating WNT5A/β-catenin signaling. *Scientific Reports* 12(1): 6955 2022 Apr. (**SCI**) DOI: 10.1038/s41598-022-08091-6
9. Hsiao CC#, Chang YC#, Hsiao YT, Chen PC, Hsieh MC, Wu WC*, **Kao YH***.

Triamcinolone acetonide modulates TGF-β2-induced angiogenic and tissue remodeling effects in cultured human retinal pigment epithelial cells. *Molecular Medicine Reports* 24: 802, 2021 Sep. **(SCI)** DOI: 10.3892/mmr.2021.12442

10. Cheng CI*, Tai MH, Chang HR, Chou MH, Chen GT, Chen PH, **Kao YH***. Oxidized low-density lipoprotein induced hepatoma-derived growth factor upregulation mediates foam cell transformation of cultured rat aortic vascular smooth muscle cells. *European Journal of Cell Biology* 100(5-6): 151169, 2021 July. (**SCI**) DOI: 10.1016/ejcb.2021.151169
11. Tai TS, Lee PH, Sun CK, Lin YC, Chen PH, Chang CY*, **Kao YH***. Differentiation and characterization of natural killer cells derived from human umbilical cord blood mononuclear cells. *E-Da Medical Journal* 8(2):1-10, 2021 Jun. (**Non-SCI**) DOI: 10.6966/EDMJ.202106_8(2).0001
12. Chang YS#, Chang YC#, Chen PH, Li CY, Wu WC*, **Kao YH***. MicroRNA-100 mediates hydrogen peroxide-induced apoptosis of human retinal pigment epithelium ARPE-19 cells. *Pharmaceuticals* 14(4): 314, 2021. Apr (**SCI**) DOI: 10.3390/ph14040314
13. Chou MH, Chuang HC, Lin YT, Tsai MH, **Kao YH**, Lin IC, Huang TL, Fang FM, Chien CY*. Targeting mTOR-CCL20 signaling may improve response to docetaxel in head and neck squamous cell carcinoma. *International Journal of Molecular Sciences* 22(6): 3046, 2021. Mar (**SCI**) DOI: 10.3390/imjs220630046
14. Chang YC, Lin CW, Chang YS, Chen PH, Li CY, Wu WC*, **Kao YH***. Monounsaturated oleic acid modulates autophagy flux and upregulates angiogenic factor production in human retinal pigment epithelial ARPE-19 cells. *Life Sciences* 259: 118391 2020 Oct. (**SCI**) DOI:10.1016/j.lfs.2020.118391
15. **Kao YH**#, Lin YC#, Lee PH, Lin CW, Chen PH, Tai TS, Chang YC, Chou MH, Chang CY*, Sun CK*. Infusion of human mesenchymal stem cells improves regenerative niche in thioacetamide-injured mouse livers. *Tissue Engineering and Regenerative Medicine* 17(5): 671-682, 2020 Oct. (**SCI**) DOI:10.1007/s13770-020-00274-4
16. Cheng CI*, Chang HR, Tai MH, Chou MH, Chen GT, Chen PH, **Kao YH***. Hepatoma-derived growth factor enhances osteoblastic transformation of rat aortic

smooth muscle cells in vitro. *Life Sciences* 256:117964, 2020 Sep. (**SCI**) DOI: 10.1016/j.lfs.2020.117964

17. Tsai MS#, Lee HM#, Huang SC, Sun CK, Chiu YC, Chen PH, Lin YC, Hung TM, Lee PH*, **Kao YH***. Nerve growth factor-induced farnesoid X receptor upregulation modulates autophagy flux and protects hepatocytes in cholestatic livers. *Archives of Biochemistry and Biophysics* 682:108281, 2020 March. (**SCI**) DOI: 10.1016/j.abb.2020.108281
18. Chiu WC, Fang PT, Lee YC, Wang YY, Su YH, Hu SCS, Chen YK, Tsui YT, **Kao YH**, Huang MY*, Yuan SSF*. DNA repair protein Rab51 induces tumor growth and metastasis in esophageal squamous cell carcinoma via a p38/Akt dependent pathway. *Annals of Surgical Oncology* 27(6):2090-2101, 2020 Jun. (**SCI**) DOI: 10.1245/s10434-019-08043-x
19. Fang LW, **Kao YH**, Chuang YT, Huang HL, Tai TS. Ets-1 enhances tumor migration through regulation of CCR7 expression. *Biochemistry and Molecular Biology Reports* 52(9):548-553, 2019 Sep. (**SCI**) DOI:10.5483/BMBRep.2019.52.9.232