Developmental and Regenerative Biology

1. Staffs and Students (April, 2010)

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2. Purpose of Education

Our goal is to define the molecular basis for the mechanism of organ formation and regeneration using knockout mice and mutant fishes. To accomplish this goal, we have focused on defining signaling molecules and pathways that regulate liver formation and stress responses. Moreover, we are trying to establish a cell therapy for intractable diseases such as liver failures using self-bone marrow cells. Our study will provide new insights into understanding the precise molecular mechanisms that underlie organ failures found in human disease and will lead to he development of new rational therapy for the diseases.

3. Research Subjects

1) Studies on the stress-activated protein kinase (SAPK/JNK) signaling pathway
2) Studies on the Hippo signaling pathway
3) Studies on the cell differentiation of mouse ES cells
4) Studies on liver formation using a small fish, Medaka, Oryzias Latipes
5) Studies on liver regeneration using mice
6) Studies on circadian clock using zebrafish and mice

4. Publications

Original Article

1. Takahiro Negishi, Yoko Nagai, Yoichi Asaoka, Mami Ohno, Misako Namae, Hiroshi Mitani, Takashi Sasaki, Nobuyoshi Shimizu, Shuji Terai, Isao Sakaida, Hisato Kondoh, Toshiaki Katada, Makoto Furutani-Seiki*, and Hiroshi Nishina* (2010) Retinoic acid signaling positively regulates liver specification by inducing wnt2bb gene expression in medaka. ***Hepatology*** 51, 1037-1045. (*Corresponding authors) Press release
2. Kentaro Nakagawa[1], Misato Sugahara[1], Tokiwa Yamasaki[1], Hiroaki Kajiho, Shinya Takahashi, Jun Hirayama, Yasuhiro Minami, Yasutaka Ohta, Toshio Watanabe, Yutaka Hata, Toshiaki Katada and Hiroshi Nishina (2010) Filamin Associates with Stress Signaling Kinases MKK7 and MKK4 and Regulates JNK Activation. ***Biochem. J.*** 427, 237-245. ([1]Contributed equally)
3. Jinzhan Wu[1], Junko Kubota[1], Jun Hirayama[1], Yoko Nagai, Sachiko Nishina, Tadashi Yokoi, Yoichi Asaoka, Jungwon Seo, Nao Shimizu, Hiroaki Kajiho, Takashi Watanabe, Noriyuki Azuma, Toshiaki Katada, and Hiroshi Nishina (2010) p38 Mitogen-Activated Protein Kinase Controls a Switch between Cardiomyocyte and Neuronal Commitment of Murine Embryonic Stem Cells by Activating Myocyte Enhancer Factor 2C-Dependent Bone Morphogenetic Protein 2 Transcription. ***Stem Cells and Development*** 19, 1723-1734.
4. Jungwon Seo[1], Yoichi Asaoka[1]*, Yoko Nagai, Jun Hirayama, Tokiwa Yamasaki, Misako Namae, Shinya Ohata, Nao Shimizu, Takahiro Negishi, Daiju Kitagawa, Hisato Kondoh, Makoto Furutani-Seiki, Josef M. Penninger, Toshiaki Katada, and Hiroshi Nishina* (2010) Negative regulation of wnt11 by JNK signaling is required for convergent extension during vertebrate gastrulation. ***J. Cell. Biochem.*** 110, 1022-1037.
5. Yoko Nagai[1], Yoichi Asaoka[1], Misako Namae, Kota Saito, Haruka Momose, Hiroshi Mitani, Makoto Furutani-Seiki, Toshiaki Katada and Hiroshi Nishina (2010) The LIM protein Ajuba is required for ciliogenesis and left-right axis determination in medaka. ***Biochem. Biophys. Res. Commun.*** 396, 887-893.
6. G. Gregory Neely, Keiji Kuba, Anthony Cammarato, Kazuya Isobe, Sabine Amann, Liyong Zhang, Mitsushige Murata, Lisa Elmén, Vaijayanti Gupta, Suchir Arora, Rinku Sarangi, Debasis Dan, Susumu Fujisawa, Takako Usami, Cui-ping Xia, Alex C. Keene, Nakissa N. Alayari, Hiroyuki Yamakawa, Ulrich Elling, Christian Berger, Maria Novatchkova, Rubina Koglgruber, Keiichi Fukuda, Hiroshi Nishina, Mitsuaki Isobe, J. Andrew Pospisilik, Yumiko Imai, Arne Pfeufer, Andrew A. Hicks, Peter P. Pramstaller, Sai Subramaniam, Akinori Kimura, Karen Ocorr, Rolf Bodmer, Josef M. Penninger (2010) A Global In VivoDrosophila RNAi Screen Identifies NOT3 as a Conserved

Regulator of Heart Function. ***Cell*** 141, 142-153. Cover of the issue

7. Shigeomi Shimizu, Akimitsu Konishi, Yuya Nishida, Takeshi Mizuta, Hiroshi Nishina, Akitsugu Yamamoto, and Yoshihide Tsujimoto (2010) Involvement of JNK in the regulation of autophagic cell death. ***Oncogene*** 29, 2070-2082.
8. Ryuichi Mashima, Kazuho Honda, Yi Yang, Yohei Morita, Akane Inoue, Sumimasa Arimura, Hiroshi Nishina, Hideo Ema, Hiromitsu Nakauchi, Brian Seed, Hideaki Oda, and Yuji Yamanashi (2010) Mice lacking Dok-1, Dok-2, and Dok-3 succumb to aggressive histiocytic sarcoma. ***Laboratory Investigation*** 90, 1357-1364.
9. Toshihiko Matsumoto, Shuji Terai, Toshiyuki Oishi, Shinya Kuwashiro, Koichi Fujisawa, Naoki Yamamoto, Yusuke Fujita, Yoshihiko Hamamoto, Makoto Furutani-Seiki, Hiroshi Nishina and Isao Sakaida (2010) Medaka as a Novel and Accurate Model for Human Nonalcoholic Steatohepatitis. ***Disease Models & Mechanisms*** 3, 431-440. Press release, Cover of the issue, Faculty of 1000 Medicine Masahiko
10. Tanaka, Hideyuki Hara, Hiroshi Nishina, Kentaro Hanada, Kenichi Hagiwara, Tomohiko Maehama (2010) An improved method for cell-to-cell transmission of infectious prion. ***Biochem. Biophys. Res. Commun.*** 397, 505-508.

Review Articles

1. Yoichi Asaoka and Hiroshi Nishina (2010) [review] Diverse Physiological Functions of MKK4 and MKK7 during Early Embryogenesis. ***J. Biochem.*** 148: 393-401.
2. Yoshimi Uchida, Jun Hirayama, Hiroshi Nishina (2010) [review] A common origin: signaling similarities in the regulation of the circadian clock and DNA damage responses. ***Biol. Pharm. Bull.*** 33, 535-544. Cover of the issue
3. Shuhei Tanemura, Tokiwa Yamasaki, Toshiaki Katada and Hiroshi Nishina (2010) [review] Utility and limitations of SP600125, an inhibitor of stress- responsive c-Jun N-terminal kinase. ***Curr. Enzym. Inhib.*** 6, 26-33.