

# Junko Kurokawa, Ph.D.

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## Employment

**University of Shizuoka, School of Pharmaceutical Sciences:** Professor (2016-present)

**Tokyo Medical and Dental University, Medical Research Institute:** Associate Professor (2006- 2016)

**Tokyo Medical and Dental University, Medical Research Institute:** Assistant Professor (2004- 2006)

**Columbia University:** Associate Research Scientist (2003- 2004)

## Education

Postdoctoral training, **Columbia University**, USA, 1999-2004

Postdoctoral training, **Georgetown University**, USA, 1998-1999

**Ph.D.** in Pharmaceutical Sciences, The University of Tokyo, Japan, 1998

**Master of Pharmaceutical Sciences**, The University of Tokyo, Japan, 1995

**Bachelor of Pharmaceutical Sciences**, The University of Tokyo, Japan, 1993

## Regular courses at the University of Shizuoka

School of Pharmaceutical Sciences:

Clinical Laboratory Medicine

Pharmacotherapy I II

Introduction to history of the Drugs

## Selected publications

1. Okata S, Yuasa S, Suzuki T, Ito S, Makita N, Yoshida T, Lin M, Kurokawa J, Seki T, Egashira T, Aizawa Y, Kodaira M, Motoda C, Yozu G, Shimojima Masaya, Hayashiji N, Hashimoto H, Kuroda Y, Tanaka A, Murata M, Aiba T, Shimizu W, Horie M, Kamiya K, Furukawa T, Fukuda K. (2016) Embryonic type Na<sup>+</sup> 1 channel  $\beta$ -subunit, SCN3B masks the disease phenotype of Brugada 2 syndrome. **Sci Rep**, 6, 34198.
2. López-Redondo F, Kurokawa J, Nomura F, Kaneko T, Hamada T, Furukawa T, Yasuda K. (2016) A distribution analysis of action potential parameters obtained from patch-clamped human stem cell-derived cardiomyocytes. **J Pharmacol Sci**, 131, 141-145. doi:10.1016/j.jphs.2016.04.015
3. Sugiyama K, Sasano T, Kurokawa J, Takahashi K, Okamura T, Kato N, Isobe M, Furukawa T. (2016) Oxidative stress induced ventricular arrhythmia and impairment of

cardiac function in *Nos1ap* deleted mice. *Int Heart J*, 2016,05:57.

4. Nagamori S, Wiriyasermkul P, Espino Guarch M, Okuyama H, Nakagomi S, Tadagaki K, Nishinaka Y, Bodoy S, Takafuji K, Okuda S, Kurokawa J, Ohgaki R, Nunes V, Palacín M, Kanai Y. (2016) Novel cystine transporter in renal proximal tubule identified as a “missing partner” of cystinuria-related SLC3A1 (rBAT). *Proc Natl Acad Sci U.S.A.*, 113, 775-780.
5. Takahashi K, Sasano T, Sugiyama K, Kurokawa J, Tamura N, Soejima Y, Sawabe M, Isobe M, Furukawa T. (2015) High-Fat Diet Increases Vulnerability to Atrial Arrhythmia by Conduction Disturbance via miR-27b. *J Mol Cell Cardiol*, 90, 38-46.  
DOI: <http://dx.doi.org/10.1016/j.yjmcc.2015.11.034>
6. Yamakawa H, Muraoka N, Miyamoto K, Sadahiro T, Isomi M, Haginiwa S, Kojima H, Umei T, Akiyama M, Kuishi Y, Kurokawa J, Furukawa T, Fukuda K, Ieda M. (2015) Fibroblast Growth Factors and Vascular Endothelial Growth Factor Promote Cardiac Reprogramming under Defined Conditions. *Stem Cell Rep*, 5, 1128-1142.  
DOI: <http://dx.doi.org/10.1016/j.stemcr.2015.10.019>
7. Saito Y, Nakamura K, Yoshida M, Sugiyama H, Ohe T, Kurokawa J, Furukawa T, Takano M, Nagase S, Morita H, Kusano KF, Ito H. (2015) Enhancement of Spontaneous Activity by HCN4 overexpression in Mouse Embryonic Stem Cell-derived Cardiomyocytes - a Possible Biological Pacemaker. *PLoS ONE*, 10, e0138193.
8. Okada J, Yoshinaga T, Kurokawa J, Washio T, Furukawa T, Sawada K, Sugiura S, Hisada T. (2015) Screening system for drug-induced arrhythmogenic risk combining patch clamp and a heart simulator. *Science Advances*, 1, e1400142. DOI: 10.1126/sciadv.1400142
9. Kurokawa J, Sasano T\*(\*contributed equally), Kodama M, Li M, Ebana Y, Harada N, Honda SI, Nakaya H, Furukawa T. (2015) Aromatase knockout mice reveal an impact of estrogen on drug-induced alternation of murine electrocardiography parameters. *J Toxicol Sci*, 40, 339-348. doi: 10.2131/jts.40.339.
10. Hayakawa T<sup>#</sup>, Kunihiro T, Ando T, Kobayashi S, Matsui E, Yada H, Kanda Y, Kurokawa J, Furukawa T<sup>#</sup>. (2014) Image-based evaluation of contraction-relaxation kinetics of human-induced pluripotent stem cell-derived cardiomyocytes: correlation and complementarity with extracellular electrophysiology. *J Mol Cell Cardiol*, 77, 178-191.
11. Asayama M, Kurokawa J, Shirakawa K, Okuyama H, Kagawa T, Okada J, Sugiura S, Hisada T, Furukawa T. (2013) Effects of a hERG activator, ICA-105574, on electrophysiological properties of canine hearts. *J Pharmacol Sci*, 121, 1-8.
12. Egashira T, Yuasa S, Suzuki T, Aizawa Y, Yamakawa H, Matsuhashi Tomohiro, Ohno Y, Tohyama S, Okata S, Seki T, Kuroda Y, Yae K, Hashimoto H, Tanaka T, Hattori F, Sato T, Miyoshi S, Takatsuki S, Murata M, Kurokawa J, Furukawa T, Makita N, Aiba T, Shimizu W, Horie M, Kamiya K, Kodama I, Ogawa S, Fukuda K. (2012) Disease characterization using LQTS-specific induced pluripotent stem cells. *Cardiovascular Research*, 95, 419-29.
13. Sugiyama H, Nakamura K, Morita H, Akagi S, Tani Y, Katayama Y, Nishii N, Miyoshi T, Nagase S, Kohno K, Kusano KF, Ohe T, Kurokawa J, Furukawa T, Ito H. (2011) Circulating KCNH2 Current-Activating Factor in Patients with Heart Failure and Ventricular Tachyarrhythmia. *PLoS One*, 6, e198897.
14. Yang PC, Kurokawa J, Furukawa T, Clancy CE. (2010) Acute effects of sex steroid hormones on susceptibility to cardiac arrhythmias: A Simulation Study. *PLoS Comput Biol* 6, 29, e1000658.

15. Kaihara A, Sunami A, Kurokawa J, Furukawa T. (2009) A genetically encoded bioluminescent indicator for the sodium channel activity in living cells. **J Am Chem Soc**, **131**, 41388-4189.
16. Kakusaka S, Asayama M, Kaihara A, Sasano T, Suzuki T, Kurokawa J, Furukawa T. (2009) A receptor-independent effect of estrone sulfate on the hERG channel. **J Pharmacol Sci**, **109**, 152-156.
17. Asada K, Kurokawa J, Furukawa T. (2009) Redox- and calmodulin-dependent S-nitrosylation of the KCNQ1 channel. **J Biol Chem**, **284**, 6014-6020.
18. Kurokawa J, Bankston JR, Kaihara A, Chen L, Furukawa T & Kass RS. (2009) KCNE variants reveal a critical role of the beta subunit carboxyl terminus in PKA-dependent regulation of the I<sub>Ks</sub> potassium channel. **Channels**, **3**, 16-24.
19. Kurokawa J, Tamagawa M, Harada N, Honda S, Bai CX, Nakaya H, Furukawa T. (2008) Acute effects of estrogen on the guinea pig and human I<sub>Kr</sub> channels and drug-induced prolongation of cardiac repolarization. **J Physiol (Lond.)**, **586**, 2961-2973.
20. Nakamura H, Kurokawa J, Bai CX, Asada K, Xu J, Oren RV, Zhu ZI, Clancy CE, Isobe M & Furukawa T. (2007) Progesterone regulates cardiac repolarization through a non-genomic pathway: An *in vitro* patch-clamp and computational modeling study. **Circulation**, **116**, 2913-2922.
21. Tani Y, Miura D, Kurokawa J, Nakamura K, Ouchida M, Shimizu K, Ohe T & Furukawa T. (2007) T75M-KCNJ2 mutation causing Andersen-Tawil syndrome enhances inward rectification by changing Mg<sup>2+</sup> sensitivity. **J Mol Cell Cardiol**, **43**, 187-196.
22. Asaoka H, Kurokawa J, Furukawa T & Shimokado K. (2007) High glucose concentrations impair the activation of K<sup>+</sup> channels and proteases in undifferentiated THP-1 monocytes. **J Med Dent Sci**, **54**, 97-102.
23. Furukawa T, Bai CX, Kaihara A, Ozaki E, Kawano T, Nakaya Y, Awais M, Sato M, Umezawa Y, Kurokawa J. (2006). Ginsenoside Re, a main phytosterol of Panax ginseng, activates cardiac potassium channels via a non-genomic pathway of sex hormones. **Mol Pharmacol**, **70**, 1916-1924.
24. Furukawa T, Kurokawa J. (2006) Potassium channel remodeling in cardiac hypertrophy. **J Mol Cell Cardiol**, **41**, 753-761.
25. Bai C-X, Kurokawa J, Tamagawa M, Nakaya H, Furukawa T (2005). Non-transcriptional regulation of cardiac repolarization currents by testosterone. **Circulation**, **112**, 1701-1710.
26. Chen L, Kurokawa J, Kass RS (2005). Phosphorylation of the AKAP Yotiao contributes to PKA regulation of a heart potassium channel. **J Biol Chem**, **280**, 31347-31352.
27. Shushi L, Keren B, Goldmit M, Peretz A, Attali B, Medina A, Towbin JA, Kurokawa J, Kass RS, Benhorin J (2005). Clinical, Genetic, and Electrophysiologic Characteristics of a New Pas-Domain HERG Mutation (M124R) Causing Long QT Syndrome. **Ann Noninvasive Electrocardiol**. **10**, 334-341.
28. Bai C-X, Namekata I, Kurokawa J, Tanaka H, Shigenobu K, Furukawa T (2005). Role of nitric oxide in Ca<sup>2+</sup>-sensitivity of the delayed rectifier K<sup>+</sup> current in cardiac myocytes. **Circ Res** **96**, 64-72
29. Kurokawa J, Motoike HK, Rao J & Kass RS (2004). Regulatory actions of the A kinase

- anchoring protein Yotiao on a heart potassium channel downstream of PKA phosphorylation. **Proc Natl Acad Sci U.S.A.**, **101**, 16374-16378.
30. Dilly KW\*, Kurokawa J>(\* **contributed equally**), Terrenoire C, Reiken S, Lederer WJ, Marks AR, Kass RS (2004). Overexpression of beta 2-adrenergic receptors PKA phosphorylates and modulates slow delayed rectifier potassium channels expressed in murine heart: Evidence for receptor/channel co-localization. **J Biol Chem**, **279**, 40778-40787.
  31. Tateyama M, Kurokawa J, Terrenoire C, Rivolta I, Kass RS (2003). Stimulation of protein kinase C inhibits bursting in disease-linked mutant human cardiac sodium channels. **Circulation**, **107**, 3216-3222.
  32. Kurokawa J, Chen L, Kass RS (2003). Requirement of subunit expression for cAMP-mediated regulation of a heart potassium channel. **Proc Natl Acad Sci U.S.A.**, **100**, 2122-2127.
  33. Tracy CC, Cabo C, Coromilas J, Kurokawa J, Kass RS, Wit AL (2003). Electrophysiological consequences of human I-Ks channel expression in adult murine heart. **Am J Physiol-Heart and Circulatory Physiology**, **284**, H168-H175.
  34. Marx SO\*, Kurokawa J\* (**\*contributed equally**), Reiken S, Motoike HK, D'Armiento JM, Marks AR, Kass RS (2002). Requirement of a macromolecular signaling complex for beta adrenergic receptor modulation of the KCNQ1-KCNE1 potassium channel. **Science**, **295**, 496-499.
  35. Kurokawa J, Motoike HK, Kass RS (2001). TEA<sup>+</sup>-sensitive KCNQ1 constructs reveal pore-independent access to KCNE1 in assembled I<sub>Ks</sub> channels. **J Gen Physiol**, **117**, 43-52.
  36. Kurokawa J, Adachi-Akahane S and Nagao T (1997). Effects of a novel, potent benzothiazepine Ca<sup>2+</sup> channel antagonist, DTZ323, on guinea-pig ventricular myocytes. **Eur J Pharmacol**, **325**, 229-236
  37. Kurokawa J, Adachi-Akahane S and Nagao T (1997). 1,5-benzothiazepine binding domain is located on the extracellular side of the cardiac L-type Ca<sup>2+</sup> channel. **Mol Pharmacol**, **51**, 262-268
  38. Kanda S, Kurokawa J, Adachi-Akahane S and Nagao T (1997). Diltiazem derivatives modulate the dihydropyridine-binding to intact rat ventricular myocytes. **Eur J Pharmacol**, **319**, 101-107

## Reviews

39. Kurokawa J, Kodama M, Clancy CE and Tetsushi Furukawa (2016). Sex hormonal regulation of cardiac ion channels in drug-induced QT syndromes. **Pharmacology & Therapeutics**, in press.
40. Kanda Y, Yamazaki D, Kurokawa J, Inutsuka T and Sekino Y (2016). Points to consider for a validation study of iPS cell-derived cardiomyocytes using a multi-electrode array system. **J Pharmacol Toxicol Methods**, in press.
41. Kurokawa J, Furukawa T. (2013) Non-genomic action of sex steroid hormones and cardiac repolarization. **Biol. Pharmaceut Bull**, **36**, 8-12.
42. Kurokawa J, Furukawa T. (2012) Region- and condition-dependence of the membrane and Ca<sup>2+</sup> clocks in the sinus node. **Circ J**, **76**, 293-294. Editorial Comments.

43. Kurokawa J, Abriel H. (2009) Neurohormonal Regulation of Cardiac Ion Channels in Chronic Heart Failure. *J Cardiovasc Pharmacol*, **54**, 98-105.
44. Kurokawa J, Suzuki T, Furukawa T. (2009) Acute effects of female hormones on cardiac ion channels and cardiac repolarization. *J Pharmacol Sci*, **109**, 334-340.
45. Furukawa T, Kurokawa J, CE Clancy. (2008) A combined approach using patch-clamp study and computer study for understanding long QT syndrome and TdP in women. *Curr Cardiol Rev*, **4**, 157-169.
46. Furukawa T, Kurokawa J. (2008) Non-genomic regulation of cardiac ion channels by sex hormones. *Cardiovasc Hematol Disord Drug Targets*, **8**, 245-251.
47. Kurokawa J. (2007) Compartmentalized Regulations of Ion Channels in the Heart. *Biological & Pharmaceutical Bulletin*, **30**, 2231-2237.
48. Furukawa T, Kurokawa J. (2007) Regulation of cardiac ion channels via non-genomic action of sex steroid hormones: Implication of gender-difference in cardiac arrhythmias. *Pharmacol Ther*, **115**, 106-115.
49. Kurokawa J, Furukawa T (2005). Protein modification of cardiac potassium channels and lethal arrhythmias. *Nippon Yakurigaku Zasshi*, **126**, 273-279. *In Japanese*.
50. Clancy CE, Kurokawa J, Tateyama M, Wehrens XHT, Kass RS (2003). K<sup>+</sup> channel structure-activity relationships and mechanisms of drug-induced QT prolongation. *Ann Rev Pharmacol Toxicol*, **43**, 441-461.
51. Kass RS, Kurokawa J, Marx SO, Marks AR (2003). Leucine/isoleucine zipper coordination of ion channel macromolecular signaling complexes in the heart: Roles in inherited arrhythmias. *Trends in Cardiovascular Medicine*, **13**, 52-56.
52. Kurokawa J, Abriel H, Kass RS (2001). Molecular basis of the delayed rectifier current I<sub>Ks</sub> in heart. *J Mol Cell Cardiol*, **33**, 873-882.

#### **Books (chapters):**

53. Sasano T, Kurokawa J (2013) Remodeling of potassium channels in cardiac hypertrophy In: *Molecular Mechanisms of Cardiac Remodeling*. Jugdutt BI, Dhalla NS (Eds): Springer, New York, p31-45.
54. Kurokawa J, Kodama M, Furukawa T, Clancy CE (2012) Sex and gender aspects in anti-arrhythmic therapy. In: *Sex and Gender Difference in Pharmacology*. Handbook of Experimental Pharmacology 214, Rigitz-Zagosek V (Ed): Springer-Verlag, Germany. p237-263. DOI 10.1007/978-3-642-30726-3\_12
55. Chen L, Carroll SJ, Kurokawa J, Kass RS (2009). Chapter 18: KCNQ1/KCNE1 macromolecular signaling complex: channel microdomains and human disease. In: *Cardiac Electrophysiology from Cell to Bedside*. Zipes DP, Jalife J (Eds): Saunders, Philadelphia, pp187-194.
56. Marx SO and Kurokawa J (2006). AKAPs as Antiarrhythmic Targets? In: *Handbook of Experimental Pharmacology*. Clancy CE, Kass RS (Eds): Springer-Verlag, Germany. pp221-234
57. Carroll SJ, Kurokawa J, Kass RS (2004). Chapter 17: KCNQ1/KCNE1 macromolecular signaling complex: channel microdomains and human disease. In: *Cardiac Electrophysiology from Cell to Bedside*. Zipes DP, Jalife J (Eds): Saunders, Philadelphia,

pp143-150.

## **Awards and honors**

- 1) Human Frontier Science Program Short Term Fellowship (1/99-3/99)
- 2) The Uehara Memorial Foundation Postdoctoral Fellowship (7/99-6/00)
- 3) Dan Charitable Trust Fund for Research in the Biological Sciences (4/00)
- 4) American Heart Association Postdoctoral Fellowship (7/01-6/03)
- 5) Japan Society Promotion of Sciences Postdoctoral Fellowships for Research Abroad (7/03-7/04)
- 6) Best presentation award of Japanese Pharmacological Society Annual Meeting (3/06)
- 7) Young Investigator Award of Nitric Oxide Society of Japan (5/06)
- 8) The Pharmaceutical Society of Japan Award for Young Scientists '07 (3/07)
- 9) American Heart Association The Mervin Marcus Award Finalist (11/07)
- 10) The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, The Young Scientists' Prize (04/09)

## **Editorial Service:**

Editorial Board member for Journal of *Pharmacological Sciences*

Editorial Board member for Journal of *Toxicological Sciences*