

Name: BAEG Gyeong Hun. Ph.D.

Title: Associate Professor

Education Background:

Postdoctoral Fellow (Dept. of Genetics, Howard Hughes Medical Institute, Harvard Medical School, Boston, USA)

PhD (Biomedical Sciences, Graduate School of Medicine, Osaka University, JAPAN)

Employment History:

- Assistant Professor: New York Medical College, NY, USA; 2006 - 2011
- Assistant Professor: National University of Singapore, Singapore; 2012 - 2019
- Visiting Associate Professor: International Research Center for Medical Sciences, Kumamoto University, Japan; 2019 - present
- Associate Professor: Ciechanover Institute of Precision and Regenerative Medicine, Life and Health Sciences, Chinese University of Hong Kong (SZ), Shenzhen, China; Jan. 2020 -Oct. 2021
- Associate Professor: Faculty of Medicine, Macau University of Science and Technology, Macau SAR; Nov. 2021 – present.

Research Field:

Stem Cell and Cancer Biology, Nanotoxicology using the fruit fly *Drosophila* as an *in vivo* model organism

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Biography:

I have earned my PhD degree in Biomedical Sciences from the Graduate School of Medicine, Osaka University, Japan where I carried out cancer research. To expand my knowledge about cancer biology, I have joined Prof. Norbert Perrimon's laboratory at Harvard Medical School, Howard Hughes Medical Institute as a postdoctoral fellow, and I characterized molecules such as Wnt and Jak-Stat implicated in tumorigenesis and development, using the fruit fly *Drosophila* as an *in vivo* model system. In 2006, I joined the Department of Paediatrics at New York Medical College, NY as an Assistant Professor, and focused on the role of Jak-Stat signaling in paediatric cancer, in particular acute lymphoblastic leukaemia. Since then, I have worked as an Assistant Professor in the Department of Anatomy, National University of Singapore, during 2012 and 2019, and worked as an Associate Professor in the School of Life and Health Science, Chinese University of Hong Kong (Shenzhen), during 2020 and 2021. My research used the *Drosophila* genetics to study the Jak-Stat signal transduction pathway and redox signaling in stem cell behavior and cancer regulation, and to study the molecular mechanisms underlying nanomaterial-mediated cyto- and genotoxicity. Genetic, genomic, molecular and cell biological techniques were combined to achieve a systems-level understanding of these complex processes. I have served as an *ad hoc* reviewer to Scientific Journals and Grant Bodies, including Biomaterials, Cell Death and Differentiation, and Small. I have also been appointed as an academic editor/editorial board

member of numerous International Refereed Journals and Book Series. I am interested in teaching Human Gross Anatomy to Medical, Pharmacy and Life Sciences Students.

Academic Publications:

1. Viera M, Yip GW, Shen HM, **Baeg GH ***, Bay BH * (2021). Targeting CD82/KAI1 for Personalized Therapeutics in Surmounting Metastatic Potential in Breast Cancer. *Cancers*. 13(17):4486.
2. Shao F, Pang X, **Baeg GH*** (2020). Targeting the JAK/STAT Signaling Pathway for Breast Cancer. *Curr Med Chem*. doi: 10.2174/0929867328666201207202012. Online ahead of print.
3. Lan Y, Ng CT, Ong XS, Muniasamy U, **Baeg GH**, Ong CH, YU L. (2020). Urban PM2.5 Reduces Angiogenic Ability of Endothelial Cells in an Alveolar-Capillary Co-Culture Lung Model. *Ecotoxicol Environ Saf*. 1; 202:110932.
4. Kim BH, Yi EH, Jee JG, Sandoval C, Park IC, **Baeg GH***, Ye SK*. The Alangium alkaloid tubulosine is a potent Janus Kinase 3 inhibitor for the treatment of leukemia and lymphoma. *J Cell Mol Med*. 24(13):7427-38.
5. Ng CT, Yu L, Ong CN, Bay BH, **Baeg GH***. (2019). Toxicity Study of Nanoparticles in Cell Culture and *Drosophila melanogaster*. *JoVE*. (In press).
6. Ng CT, Yu L, Ong CN, Bay BH, **Baeg GH***. (2018). The use of *Drosophila melanogaster* as a model organism to study immune-nanotoxicity. *Nanotoxicology*. Nov 19:1-18.
7. Yang X, Ng WC, Wong BSE, **Baeg GH**, Wang CH, Ok YS. (2018). Characterization and ecotoxicological investigation of biochar produced via slow pyrolysis: effect of feedstock composition and pyrolysis conditions. *J Hazard Mater*. 365:178-185.
8. Chua PJ, Guo TT, Khanna P, Bay BH, **Baeg GH***. (2018). YB-1 plays a role in drug resistance by upregulating JAK/STAT signaling in breast cancer. *Int. J. Oncology*. 53(6):2579-2589.
9. Lin WY, Ng WC, Wong BSE, Teo SL, Sivananthan GD, **Baeg GH**, Ok YS, Wang CH. (2018). Evaluation of sewage sludge incineration ash as a potential land reclamation material. *J Hazard Mater*. 357:63-72.
10. Tan WS, **Baeg GH***. (2018). Maf-S regulates germline stem cell differentiation in the *Drosophila testis*. *Redox Biology*, 15:125-134.
11. Khanna P, Lee JS, Lee H, **Baeg GH*** (2018). GRAMD1B inhibits JAK/STAT-mediated cell migration in breast cancer. *Scientific Reports*, 8(1):9511.
12. Ng CT, Yu L, **Baeg GH**, Ong CN, Bay BH. (2018). Biomedical applications of nanomaterials as therapeutics: Biomedical applications of zinc oxide nanomaterials. *Current Medicinal Chemistry*. 25(12):1409-1419.
13. Khanna P, Chua PJ, Wong SE, Yin C, Thike AA, Wan WK, Tan PH, **Baeg GH***. (2017). GRAM domain-containing protein 1B (GRAMD1B), a novel component of the JAK/STAT signaling pathway functions in gastric carcinogenesis. *Oncotarget*, 8(70):115370-115383.
14. Hu Q, Khanna P, Wong SE, Charannya SS, Thanga LZ, Heng SL, Tan WS, **Baeg GH***. (2017). Reactive oxygen species induce loss of stemness and spontaneous neuronal differentiation in human embryonic carcinoma Ntera2 cells. *Oncotarget*, 9(3):4223-4238.
15. Hu Q*, **Baeg GH*** (2017). Role of Epigenome in Tumorigenesis and Drug Resistance. *Food and Chemical Toxicology*. S0278-6915(17)30394-0. [Epub ahead of print].

16. Lim JP, **Baeg GH**, Kumar SD, Dheen ST, Bay BH (2017). Potential Adverse Effects of Engineered Nanomaterials Commonly Used in Food on the miRNome. *Food and Chemical Toxicology*. S0278-6915(17)30402-7. [Epub ahead of print].
17. Wong SE, Hu Q, **Baeg GH*** (2017). Epigenetic modulations in nanoparticle-mediated toxicity. *Food and Chemical Toxicology*. S0278-6915(17)30373-3. [Epub ahead of print].
18. Tan WS, Lee QY, Wong SE, Cai Y, **Baeg GH***. (2017). Redox homeostasis plays important roles in the maintenance of the *Drosophila* testis germline stem cells. *Stem Cell Reports*. 9:342-354.
19. Ng CT, Yong LQ, Hande MP, Ong CN, Yu LE, Bay BH, **Baeg GH***. (2017). Zinc oxide nanoparticles exhibit cytotoxicity and genotoxicity through oxidative stress responses in human lung fibroblasts and *Drosophila melanogaster*. *International J Nanomedicine*. 12:1621-1637.
20. Zhen X, Rong L, Ong C, **Baeg GH**, Zhang W, Lee SN, Li SF, Dai Y, Tong YW, Neoh KG, Wang CH. Rapid toxicity screening of gasification ashes. (2016). *Waste Management*. 50:93-104.
21. Ong C, Yung LY, Bay BH, **Baeg GH***. (2016). Silver nanoparticles induce reproductive toxicity in the male *Drosophila melanogaster*. *Scientific Reports*, 6:20632.
22. Liu Z, Zhong G, Chai PC, Luo L, Liu S, Yang Y, **Baeg GH**, Cai Y.(2015). Coordinated niche-associated signals promote germline homeostasis in the *Drosophila* ovary. *Journal of Cell Biology*. 211(2):469-84.
23. Khanna P, Chua PJ, Bay BH, **Baeg GH***. (2015). The JAK/STAT signaling cascade in gastric carcinoma. *International Journal Oncology*. 47(5):1617-26.
24. Ren W, Zhang Y, Li M, Wu L, Wang G, **Baeg GH**, You J, Li Z, Lin X. (2015). Windpipe controls *Drosophila* intestinal homeostasis by regulating JAK/STAT pathway via promoting receptor endocytosis and lysosomal degradation. *PLoS Genetics*. 11(4):e1005180.
25. Shao F, Guo T, Chua PJ, Tang L, Thike AA, Tan PH, Bay BH, **Baeg GH***. (2015). Clinicopathological significance of ARID1B in breast invasive ductal carcinoma. *Histopathology*. 67(5):709-18.
26. Khanna P, Ong C, Bay BH, **Baeg GH***. (2015). Nanotoxicity: An Interplay of Oxidative Stress, Inflammation and Cell Death. *Nanomaterials*. 5(3): 1163-1180.
27. Scully OJ, Yu Y, Salim A, Thike AA, Yip GW, **Baeg GH**, Tan PH, Matsumoto K, Bay BH. (2015). Complement component 1, q subcomponent binding protein is a marker for proliferation in breast cancer. *Experimental Biology and Medicine*. 240(7):846-53.
28. Guo T, Yu Y, Yip GW, **Baeg GH**, Thike AA, Lim TK, Tan PH, Matsumoto K, Bay BH. (2015). Y-box binding protein 1 is correlated with lymph node metastasis in intestinal-type gastric cancer. *Histopathology*. 66(4):491-9.
29. Yin C, Sandoval C, **Baeg GH***. (2015). Identification of mutant alleles of JAK3 in pediatric patients with acute lymphoblastic leukemia. *Leukemia and Lymphoma*. 56(5):1502-6.
30. Ong C, Yung LY, Cai Y, Bay BH, **Baeg GH***. (2015). *Drosophila melanogaster* as a model organism to study nanotoxicity. *Nanotoxicology*. 9(3):396-403.

31. Kim BH, Min YS, Choi JS, **Baeg GH**, Kim YS, Shin JW, Kim TY, Ye SK. (2011). Benzoxathiol derivative BOT-4-one suppresses L540 lymphoma cell survival and proliferation via inhibition of JAK3/STAT3 signaling. *Experimental and Molecular Medicine*. 43(5):313-21.
32. Kim BH, Kim M, Yin CH, Jee JG, Sandoval C, Lee H, Bach EA, Hahm DH, **Baeg GH***. (2011). Inhibition of the signalling kinase JAK3 alleviates inflammation in monoarthritic rats. *British Journal of Pharmacology*. 164(1):106-18.
33. Yin CH, Bach EA, **Baeg GH***. (2011). Development of a high-throughput cell-based reporter assay for screening of JAK3 inhibitors. *Journal of Biomolecular Screen*. 16(4):443-9.
34. Kim BH, Jee JG, Yin CH, Sandoval C, Jayabose S, Kitamura D, Bach EA, **Baeg GH***. (2010). NSC114792, a novel small molecule identified through structure-based computational database screening, selectively inhibits JAK3. *Molecular Cancer*. 11:9:36.
35. Kim BH, Oh SR, Yin CH, Lee S, Kim EA, Kim MS, Sandoval C, Jayabose S, Bach EA, Lee HK, **Baeg GH***. (2010). MS-1020 is a novel small molecule that selectively inhibits JAK3 activity. *British Journal of Haematology*. 148(1):132-43.
36. Kim BH, Yin CH, Guo Q, Bach EA, Lee H, Sandoval C, Jayabose S, Ulaczyk-Lesanko A, Hall DG, **Baeg GH***. (2008). A small-molecule compound identified through a cell-based screening inhibits JAK/STAT pathway signaling in human cancer cells. *Molecular Cancer Therapeutics*. 7(9):2672-80.
37. Ayala-Camargo A, Ekas LA, Flaherty MS, **Baeg GH**, Bach EA. (2007). The JAK/STAT pathway regulates proximo-distal patterning in *Drosophila*. *Developmental Dynamics*. 236(10):2721-30.
38. Bach EA, Ekas LA, Ayala-Camargo A, Flaherty MS, Lee H, Perrimon N, **Baeg GH***. (2007). GFP reporters detect the activation of the *Drosophila* JAK/STAT pathway in vivo. *Gene Expression Patterns*. 7(3):323-31.
39. Ekas LA, **Baeg GH**, Flaherty MS, Ayala-Camargo A, Bach EA. (2006). JAK/STAT signaling promotes regional specification by negatively regulating wingless expression in *Drosophila*. *Development*. 133(23):4721-9.
40. **Baeg GH**, Zhou R, Perrimon N. (2005). Genome-wide RNAi analysis of JAK/STAT signaling components in *Drosophila*. *Genes & Development*. 19(16):1861-70.
41. **Baeg GH**, Selva EM, Goodman RM, Dasgupta R, Perrimon N. (2004). The Wingless morphogen gradient is established by the cooperative action of Frizzled and Heparan Sulfate Proteoglycan receptors. *Developmental Biology*. 276(1):89-100.
42. Liu C, Li Y, Semenov M, Han C, **Baeg GH**, Tan Y, Zhang Z, Lin X, He X. (2002). Control of beta-catenin phosphorylation/degradation by a dual-kinase mechanism. *Cell*. 108(6):837-47.
43. Selva EM, Hong K, **Baeg GH**, Beverley SM, Turco SJ, Perrimon N, Häcker U. (2002). Dual role of the fringe connection gene in both heparan sulphate and fringe-dependent signalling events. *Nature Cell Biology*. 3(9):809-15.
44. **Baeg GH**, Lin X, Khare N, Baumgartner S, Perrimon N. (2001). Heparan sulfate proteoglycans are critical for the organization of the extracellular distribution of Wingless. *Development*. 128(1):87-94.

45. **Baeg GH**, Perrimon N. (2000). Functional binding of secreted molecules to heparan sulfate proteoglycans in *Drosophila*. *Current Opinion in Cell Biology*. 12(5):575-80.
46. Adachi J, Kohno T, **Baeg G**, Akiyama T, Yokota J. (1997). Growth suppression of non-small cell lung carcinoma cells by the introduction of the p16 (INK4A) gene. *International Journal of Oncology*. 10(1):33-9.
47. Higuchi O, **Baeg GH**, Akiyama T, Mizuno K. (1996). Suppression of fibroblast cell growth by overexpression of LIM-kinase 1. *FEBS Letter*. 396(1):81-6.
48. Senda T, Miyashiro I, Matsumine A, **Baeg GH**, Monden T, Kobayashi S, Monden M, Toyoshima K, Akiyama T. (1996). The tumor suppressor protein APC colocalizes with beta-catenin in the colon epithelial cells. *Biochemical and Biophysical Research Communications*. 223(2):329-34.
49. Matsumine A, Ogai A, Senda T, Okumura N, Satoh K, **Baeg GH**, Kawahara T, Kobayashi S, Okada M, Toyoshima K, Akiyama T. (1996). Binding of APC to the human homolog of the *Drosophila* discs large tumor suppressor protein. *Science*. 272(5264):1020-3.
50. Matsumine A, Senda T, **Baeg GH**, Roy BC, Nakamura Y, Noda M, Toyoshima K, Akiyama T. (1996). MCC, a cytoplasmic protein that blocks cell cycle progression from the G0/G1 to S phase. *Journal of Biological Chemistry*. 271(17):10341-6.
51. **Baeg GH**, Matsumine A, Kuroda T, Bhattacharjee RN, Miyashiro I, Toyoshima K, Akiyama T. (1995). The tumour suppressor gene product APC blocks cell cycle progression from G0/G1 to S phase. *EMBO J*. 14(22):5618-25.
52. Miyashiro I, Senda T, Matsumine A, **Baeg GH**, Kuroda T, Shimano T, Miura S, Noda T, Kobayashi S, Monden M, et al. (1995). Subcellular localization of the APC protein: immunoelectron microscopic study of the association of the APC protein with catenin. *Oncogene*. 11(1):89-96.
53. **Baeg GH**, Sakurai Y. and Shimazaki K. (1993). Maturation processes in female *Loligo Bleekeri* Keferstein (Mollusca: Cephalopoda). *The Veliger*. 36; 228-235.
54. **Baeg GH**, Sakurai Y. and Shimazaki K. (1992). Embryonic stages of *Loligo Bleekeri* Keferstein (Mollusca: Cephalopoda). *The Veliger*. 35; 234-241.

Book Chapters

1. Tan WS, Cai Y, **Baeg GH***. (2017). Regulation of germline stem cells and their neighbouring somatic cells in the fruit fly *Drosophila melanogaster*. *InTechOpen Publishers, Inc.* "Germ Cells". Chapter 2.
2. Wong SE, Khanna P, Ng CT, **Baeg GH***. (2017). Mechanism of Nanotoxicity on Cells, Animals and Human Health. *Nanotoxicology: Toxicity Evaluation, Risk Assessment and Management. Taylor & Francis Group.* Chapter 11.
3. Ong C, Yung LY, Bay BH, **Baeg GH***. (2016). Is the fruit fly *Drosophila* a useful genetic model to study gold nanoparticle-induced toxicity? "New Developments in Gold Nanomaterials Research" *Nova Science Publishers, Inc.* Chapter 5.