

Principal Researcher	Shigehisa HIROSE			Number of Researchers	3	
Research Institution · Department · Title	Professor, Department of Biological Sciences, Tokyo Institute of Technology		Location of Institution	Midori-ku, Yokohama		
Title of Project	Molecular characterization of chloride cells and their mechanism of differentiation					
Abstract of Research Project	<p>The chloride cells are mainly located in the gill and involved in osmoregulation of fish. Reflecting their extraordinary power of ion transport, chloride cells are rich in mitochondria and Na⁺,K⁺-ATPase and their surface areas are tremendously increased by extensive invaginations of the basolateral membrane. By exploiting these unique properties of chloride cells, we identified a K channel that is considered to be coupled with Na⁺,K⁺-ATPase, which has been a long-standing challenge for physiologists. We further identified a novel family of proteins that exhibit low sequence similarity but share the same membrane topology with the K channel and found that they are key regulators of the subcellular membrane trafficking. We are also characterizing the chloride cells of a fish species (the Osorezan dace) that lives and grows in a pH 3.5 lake. The molecular mechanism underlying the acid adaptation will be clarified by identifying molecules associated with gross morphological and functional changes of chloride cells seen when the Osorezan dace were exposed to acidic conditions.</p>					
References	<p>1) Mistry, A. C., Honda, S., Hirata, T., Kato, A., and Hirose, S. (2001) Eel urea transporter is localized to chloride cells and is salinity-dependent. <i>Am. J. Physiol.</i> 281, R1594--R1604.</p> <p>2) Nakamura, N., Suzuki, Y., Ikeda, Y., Notoya, M., and Hirose, S. (2000) Complex structure and regulation of expression of the rat gene for inward rectifier potassium channel Kir7.1. <i>J. Biol. Chem.</i> 275, 28276--28284.</p> <p>3) Ookata, K., Tojo, A., Suzuki, Y., Nakamura, N., Kimura, K., Wilson, C. B., and Hirose, S. (2000) Localization of inward rectifier potassium channel Kir7.1 in the basal membrane of distal nephron. <i>J. Am. Soc. Nephrol.</i> 11, 1987--1994.</p>					
Term of Project	Fiscal years 2002-2006 (5 years)					
Budget Allocation	FY2002	FY2003	FY2004	FY2005	FY2006	Total
(in thousand of yen)	20,100	17,200	17,200	17,200	15,500	87,200