



Yoshinori Ohsumi

Honorary Professor

Tokyo Institute of Technology



Biography

- 2016-present** Professor, Institute of Innovative Research, Tokyo Institute of Technology
- 2014-present** Honorary Professor, Tokyo Institute of Technology
- 2010-2016** Professor, Frontier Research Center, Tokyo Institute of Technology
- 2009-2010** Professor, Advanced Research Organization, Integrated Research Institute, Tokyo Institute of Technology
- 2004-2009** Professor, The Graduate University for Advanced Studies [SOKENDAI]
- 1996-2009** Professor, Department of Cell Biology, National Institute for Basic Biology
- 1988-1996** Associate Professor, Department of Biology, College of Arts and Sciences, The University of Tokyo
- 1986-1988** Lecturer, Department of Biology, Faculty of Science, The University of Tokyo
- 1977-1986** Research Associate, Department of Biology, Faculty of Science, The University of Tokyo, with Prof. Yasuhiro Anraku
- 1974-1977** Postdoctoral Fellow, Rockefeller University with Prof. Gerald M. Edelman
- 1972-1974** Research Fellow, Department of Agricultural Chemistry, Faculty of Agriculture, The University of Tokyo
- 1967-1972** Graduate Student, Department of Biochemistry, College of Arts and Sciences, The University of Tokyo, with Prof. Kazutomo Imahori
- 1963-1967** Undergraduate Student, Department of Basic Science, College of Arts and Sciences, The University of Tokyo Awards



Honors and Awards

- 2016** Paul Janssen Award
Wiley Prize
Rosenstiel Award
- 2015** The Person of Cultural Merit
The Keio Medical Science Prize, Keio University Medical Science Fund
International Prize for Biology, The Japan Society
Canada Gairdner International Award, The Gairdner Foundation
- 2013** Thomson Reuters Citation Laureates
- 2012** Kyoto Prize, The Inamori Foundation
- 2008** Asahi Prize, The Asahi Shimbun
- 2007** Science Award of the Botanical Society of Japan
- 2006** Japan Academy Prize, The Japan Academy
- 2005** Fujiwara Award, The Fujiwara Foundation of Science





Subject: Molecular Mechanisms and Physiological Significance of Autophagy

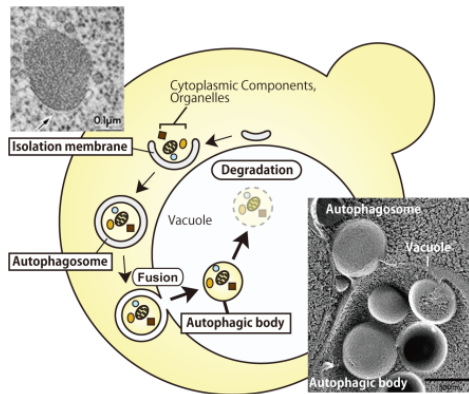
Aims of Research

“Elucidating the Molecular Mechanisms and Physiological Significance of Autophagy, a Cellular Adaptive System to Environment”

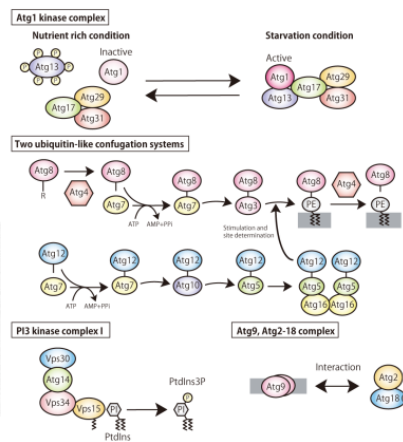
Prof. OHSUMI has achieved world-leading results in his genetic study of autophagy in yeast, a cellular process that degrades proteins in order to adapt to the nutritional environment and other factors.

He has made groundbreaking contributions toward elucidating of the molecular mechanisms of autophagy and its physiological significance.

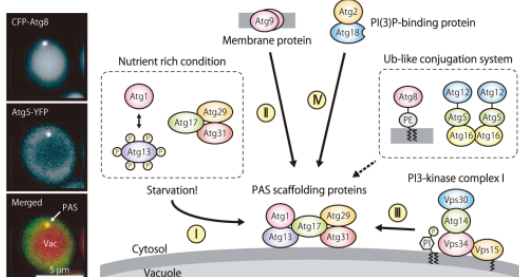
• Autophagy in yeast



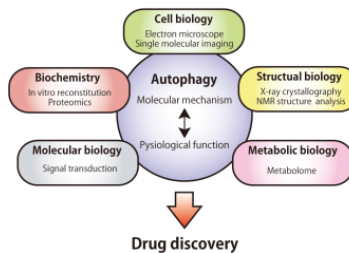
• 18 Atg proteins required for autophagy



• Hierarchy of Atg proteins in PAS organization



• For autophagy research





List of Publications

Main publications by Professor Yoshinori Ohsumi

Journal Articles

1. Tsugawa, A., Ohsumi, Y., and Kato, I. Inhibitory effect of diphtheria toxin on amino acid incorporation in *Escherichia coli* cell-free system. *J. Bacteriol.*, **104**, 152-157 (1970)
2. Ohsumi, Y., and Maeda, A. Inactivation of ribosomes by a factor induced by colicin E3. *J. Biochem. (Tokyo)*, **71**, 911-914 (1972)
3. Ohsumi, Y., and Imahori, K. Studies on a factor enhancing colicin E3 activity *in vitro*. *Proc. Natl. Acad. Sci. USA*, **71**, 4062-4066 (1974)
4. Gall, W. E., and Ohsumi, Y. Decondensation of sperm nuclei *in vitro*. *Exp. Cell Res.*, **102**, 349-358 (1976)
5. Ohsumi, Y., and Anraku, Y. Active transport of basic amino acids driven by a proton motive force in vacuolar membrane vesicles of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **256**, 2079-2082 (1981)
6. Kakinuma, Y., Ohsumi, Y., and Anraku, Y. Properties of H⁺-translocating adenosine triphosphatase in vacuolar membranes of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **256**, 10859-10863 (1981)
7. Ohsumi, Y., and Anraku, Y. Calcium transport driven by a proton motive force in vacuolar membrane vesicles of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **258**, 5614-5617 (1983)
8. Ohya, Y., Ohsumi, Y., and Anraku, Y. Genetic study of the role of calcium ions in the cell division cycle of *Saccharomyces cerevisiae*: a calcium-dependent mutant and its trifluoperazine-dependent pseudorevertants. *Mol. Gen. Genet.*, **193**, 389-394 (1984)
9. Sato, T., Ohsumi, Y., and Anraku, Y. Substrate specificities of active transport systems for amino acids in vacuolar-membrane vesicles of *Saccharomyces cerevisiae*. Evidence of seven independent proton/amino acid antiport systems. *J. Biol. Chem.*, **259**, 11505-11508 (1984)
10. Sato, T., Ohsumi, Y., and Anraku, Y. An arginine/histidine exchange transport system in vacuolar-membrane vesicles of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **259**, 11509-11511 (1984)
11. Uchida, E., Ohsumi, Y., and Anraku, Y. Purification and properties of H⁺-translocating, Mg²⁺-adenosine triphosphatase from vacuolar membranes of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **260**, 1090-1095 (1985)
12. Ohsumi, Y., and Anraku, Y. Specific induction of Ca²⁺ transport activity in *MATa* cells of *Saccharomyces cerevisiae* by a mating pheromone, α -factor. *J. Biol. Chem.*, **260**, 10482-10486 (1985)
13. Ohya, Y., Ohsumi, Y., and Anraku, Y. Isolation and characterization of Ca²⁺-sensitive mutants of *Saccharomyces cerevisiae*. *J. Gen. Microbiol.*, **132**, 979-988 (1986)
14. Ohya, Y., Miyamoto, S., Ohsumi, Y., and Anraku, Y. Calcium-sensitive *cls4* mutant of *Saccharomyces cerevisiae* with a defect in bud formation. *J. Bacteriol.*, **165**, 28-33 (1986)
15. Miyamoto, S., Ohya, Y., Ohsumi, Y., and Anraku, Y. Nucleotide sequence of the *CLS4* (*CDC24*) gene of *Saccharomyces cerevisiae*. *Gene*, **54**, 125-132 (1987)
16. Wada, Y., Ohsumi, Y., Tanifuji, M., Kasai, M., and Anraku, Y. Vacuolar ion channel of the yeast, *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **262**, 17260-17263 (1987)
17. Uchida, E., Ohsumi, Y., and Anraku, Y. Characterization and function of catalytic subunit α of H⁺-translocating adenosine triphosphatase from vacuolar membranes of *Saccharomyces cerevisiae*. A study with 7-chloro-4-nitrobenzo-2-oxa-1,3-diazole. *J. Biol. Chem.*, **263**, 45-51 (1988)
18. Yoshihisa, T., Ohsumi, Y., and Anraku, Y. Solubilization and purification of α -mannosidase, a marker enzyme of vacuolar membranes in *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **263**, 5158-5163 (1988)
19. Ohsumi, Y., Kitamoyo, K., and Anraku, Y. Changes induced in the permeability barrier of the yeast plasma membrane by cupric ion. *J. Bacteriol.*, **170**, 2676-2682 (1988)
20. Kitamoto, K., Yoshizawa, K., Ohsumi, Y., and Anraku, Y. Dynamic aspects of vacuolar and cytosolic amino acid pools of *Saccharomyces cerevisiae*. *J. Bacteriol.*, **170**, 2683-2686 (1988)



21. Kitamoto, K., Yoshizawa, K., Ohsumi, Y., and Anraku, Y. Mutants of *Saccharomyces cerevisiae* with defective vacuolar function. *J. Bacteriol.*, **170**, 2687-2691 (1988)
22. Hirata, R., Ohsumi, Y., and Anraku, Y. Functional molecular masses of vacuolar membrane H⁺-ATPase from *Saccharomyces cerevisiae* as studied by radiation inactivation analysis. *FEBS Lett.*, **244**, 397-401 (1989)
23. Baba, M., Baba, N., Ohsumi, Y., Kanaya, K., and Osumi, M. Three-dimensional analysis of morphogenesis induced by mating pheromone, a factor in *Saccharomyces cerevisiae*. *J. Cell Sci.*, **94**, 207-216 (1989)
24. Hirata, R., Ohsumi, Y., Nakano, A., Kawasaki, H., Suzuki, K., and Anraku, Y. Molecular structure of a gene, *VMA1*, encoding the catalytic subunit of H⁺-translocating adenosine triphosphatase from vacuolar membranes of *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **265**, 6726-6733 (1990)
25. Nishikawa, S., Umemoto, N., Ohsumi, Y., Nakano, A., and Anraku, Y. Biogenesis of vacuolar membrane glycoproteins of yeast *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **265**, 7440-7448 (1990)
26. Konishi, J., Denda, K., Oshima, T., Wakagi, T., Uchida, E., Ohsumi, Y., Anraku, Y., Matsumoto, T., Wakabayashi, T., Mukohata, Y., Inatori, K., Kato, K., Ohta, T., Allison, W., and Yoshida, M. Archaeobacterial ATPase: relationship to other ion-translocating ATPase families examined in terms of immunological cross-reactivity. *J. Biochem.*, **108**, 554-559 (1990)
27. Sato, MH., Maeshima, M., Ohsumi, Y., and Yoshida, M. Dimeric structure of H⁺-translocating pyrophosphatase from pumpkin vacuolar membranes. *FEBS Lett.*, **290**, 177-180 (1991)
28. Wada, Y., Ohsumi, Y., and Anraku, Y. Chloride transport of yeast vacuolar membrane vesicles: a study of *in vitro* vacuolar acidification. *Biochim. Biophys. Acta.*, **1101**, 296-302 (1992)
29. Wada, Y., Ohsumi, Y., and Anraku, Y. Genes for directing vacuolar morphogenesis in *Saccharomyces cerevisiae*. I. Isolation and characterization of two classes of *vam* mutants. *J. Biol. Chem.*, **267**, 18665-18670 (1992)
30. Takeshige, K., Babe, M., Tsuboi, S., Noda, T., and Ohsumi, Y. Autophagy in yeast demonstrated with proteins-deficient mutants and its conditions for induction. *J. Cell Biol.*, **119**, 301-311 (1992)
31. Ohsumi, M., Uchiyama, K., and Ohsumi, Y. Density fluctuation during the cell cycle in the defective vacuolar morphology mutants. of *Saccharomyces cerevisiae*. *J. Bacteriol.*, **175**, 5714-5716 (1993)
32. Tsukada, M., and Ohsumi, Y. Isolation and characterization of autophagy-defective mutants of *Saccharomyces cerevisiae*. *FEBS Lett.*, **333**, 169-174 (1993)
33. Baba, M., Takeshige, K., Baba, N., and Ohsumi, Y. Ultrastructural analysis of the autophagic process in yeast: detection of autophagosomes and their characterization. *J. Cell Biol.*, **124**, 903-913 (1994)
34. Yorihuri, T., and Ohsumi, Y. *Saccharomyces cerevisiae MATa* mutant cells defective in pointed projection formation in response to α -factor at high concentrations. *Yeast*, **10**, 579-594 (1994)
35. Noda, T., Matsuura, A., Wada, Y., and Ohsumi, Y. Novel system for monitoring autophagy in the yeast *Saccharomyces cerevisiae*. *Biochem. Biophys. Res. Commun.*, **210**, 126-132 (1995)
36. Baba, M., Osumi, M., and Ohsumi, Y. Analysis of the membrane structure involved in autophagy in yeast by freeze-replica method. *Cell Struct. Funct.*, **20**, 465-471 (1995)
37. Kakinuma, Y., Maruyama, T., Nozaki, T., Wada, Y., Ohsumi, Y., and Igarashi, K. Cloning of the gene encoding a putative serine/threonine protein kinase which enhances spermine uptake in *Saccharomyces cerevisiae*. *Biochem. Biophys. Res. Commun.*, **216**, 985-992 (1995)
38. Moriyasu, Y., and Ohsumi, Y. Autophagy in Tobacco suspension-cultured cells in response to sucrose starvation. *Plant Physiol.*, **111**, 1233-1241 (1996)
39. Wada, Y., Ohsumi, Y., Kawai, E., and Ohsumi, M. Mutational analysis of Vam4/Ypt7p function in the vacuolar biogenesis and morphogenesis in the yeast, *Saccharomyces cerevisiae*. *Protoplasma*, **191**, 126-135 (1996)
40. Shirahama, K., Yazaki, Y., Sakano, K., Wada, Y., and Ohsumi, Y. Vacuolar function in the phosphate homeostasis of the yeast *Saccharomyces cerevisiae*. *Plant Cell Physiol.*, **37**, 1090-1093 (1996)
41. Scott, S. V., Hefner-Gravink, A., Morano, K. A., Noda, Y., Ohsumi, Y. and Klionsky, D. J. Cytoplasm-to-vacuole targeting and autophagy employ the same machinery to deliver proteins to the yeast vacuole. *Proc. Natl. Acad. Sci. USA*, **93**, 12304-12308 (1996)
42. Kametaka, S., Matsuura, A., Wada, Y., and Ohsumi, Y. Structural and functional analyses of *APG5*, a gene involved in autophagy in yeast. *Gene*, **178**, 139-143 (1996)
43. Nakamura, N., Matsuura, A., Wada, Y., and Ohsumi, Y. Acidification of vacuoles is required for autophagic degradation in the yeast, *Saccharomyces cerevisiae*. *J. Biochem. (Tokyo)*, **121**, 338-344 (1997)

44. Funakoshi, T., Matsuura, A., Noda, T., and Ohsumi, Y. Analyses of *APG13* gene involved in autophagy in yeast, *Saccharomyces cerevisiae*. *Gene*, **192**, 207-213 (1997)
45. Matsuura, A., Tsukada, M., Wada, Y., and Ohsumi, Y. Apg1p, a novel protein kinase required for the autophagic process in *Saccharomyces cerevisiae*. *Gene*, **192**, 245-250 (1997)
46. Scott, S. V., Baba, M., Ohsumi, Y., and Klionsky, D. J. Aminopeptidase I is targeted to the vacuole by a nonclassical vesicular mechanism. *J. Cell Biol.*, **138**, 37-44 (1977)
47. Nakamura, N., Hirata, A., Ohsumi, Y., and Wada, Y. Vam2/Vps41p and Vam6/Vps39p are components of a protein complex on the vacuolar membranes and involved in the vacuolar assembly in the yeast *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **272**, 11344-11349 (1997)
48. Wada, Y., Nakamura, N., Ohsumi, Y., and Hirata, A. Vam3p, a new member of syntaxin related protein, is required for vacuolar assembly in the yeast *Saccharomyces cerevisiae*. *J. Cell Sci.*, **110**, 1299-1306 (1997)
49. Baba, M., Ohsumi, M., Scott, S. V., Klionsky, D. J., and Ohsumi, Y. Two distinct pathways for targeting proteins from the cytoplasm to the vacuole/lysosome. *J. Cell Biol.*, **139**, 1687-1695 (1997)
50. Shirahama, K., Noda, T., and Ohsumi, Y., Mutational analysis of Csc1/Vps4p: involvement of endosome in regulation of the autophagy in yeast. *Cell Struct. Funct.*, **22**, 501-509 (1997)
51. Noda, T., and Ohsumi, Y. Tor, a phosphatidylinositol kinase homologue, controls autophagy in yeast. *J. Biol. Chem.*, **273**, 3963-3966 (1998)
52. Kametaka, S., Okano, T., Ohsumi, M., and Ohsumi, Y. Apg14p and Apg6/Vps30p form a protein complex essential for autophagy in the yeast, *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **273**, 22284-22291 (1998)
53. Mizushima, N., Noda, T., Yoshimori, T., Tanaka, T., Ishii, T., George, M. D. Klionsky, D. J., Ohsumi, M., and Ohsumi, Y. A protein conjugation system essential for autophagy. *Nature*, **395**, 395-398 (1998)
54. Mizushima, N., Sugita, H., Yoshimori, T., and Ohsumi, Y. A new protein conjugation system in human. The counterpart of the yeast Apg12p conjugation system essential for autophagy. *J. Biol. Chem.*, **273**, 33889-33892 (1998)
55. Tanida, I., Mizushima, N., Kiyooka, M., Ohsumi, M., Ueno, T., Ohsumi, Y., and Kominami, E. Apg7p/Cvt2p: A novel protein-activating enzyme essential for autophagy. *Mol. Cell Biol.*, **10**, 1367-1379 (1999)
56. Mizushima, N., Noda, T., and Ohsumi, Y. Apg16p is required for the function of the Apg12p-Apg5p conjugate in the yeast autophagic pathway. *EMBO J.*, **18**, 3888-3896 (1999)
57. Shintani, T., Mizushima, N., Ogawa, Y., Matsuura, A., Noda, T., and Ohsumi, Y. Apg10p, a novel protein-conjugating enzyme essential for autophagy in yeast. *EMBO J.*, **18**, 5234-5241 (1999)
58. Kirisako, T., Baba, M., Ishihara, N., Miyazawa, K., Ohsumi, M., Yoshimori, T., Noda, T., and Ohsumi, Y. Formation process of autophagosome is traced with Apg8/Aut7p in yeast. *J. Cell Biol.*, **147**, 435-446 (1999)
59. Yabe, I., Horiuchi, K., Nakahara, K., Hiyama, T., Yamanaka, T., Wang, P. C., Toda, K., Hirata, A., Ohsumi, Y., Hirata, R., Anraku, Y., and Kusaka, I. Patch clamp studies on V-type ATPase of vacuolar membrane of haploid *Saccharomyces cerevisiae*. Preparation and utilization of giant cell containing a giant vacuole. *J. Biol. Chem.*, **274**, 34903-34910 (1999)
60. Yoshimori, T., Yamagata, F., Yamamoto, A., Mizushima, N., Kabeya, Y., Nara, A., Ishido, M., Ohashi, M., Ohsumi, M., and Ohsumi, Y. The mouse SKD1, a homologue of yeast Vps4p, is required for normal endosomal trafficking and morphology in mammalian cells. *Mol. Biol. Cell*, **11**, 747-763 (2000)
61. George, M. D., Baba, M., Scott, S. V., Mizushima, N., Garrison, B. S., Ohsumi, Y. and Klionsky, D. J. Apg5p functions in the sequestration step in the cytoplasm-to-vacuole targeting and macroautophagy pathways. *Mol. Biol. Cell*. **11**, 969-982 (2000)
62. Noda, T., Kim, J., Huang, W-P., Baba, M., Tokunaga, C., Ohsumi, Y., and Klionsky, D. J. Apg9p/Cvt7p is an integral membrane protein required for transport vesicle formation in the Cvt and autophagy pathways. *J. Cell Biol.*, **148**, 465-480 (2000)
63. Furukawa, K., Mizushima, N., Noda, T. and Ohsumi, Y. A protein conjugation system in yeast with homology to biosynthetic enzyme reaction of prokaryotes. *J. Biol. Chem.*, **275**, 7462-7465 (2000)
64. Scott, S. V., Nice, III, D. C., Nau, J. J., Weisman, L. S., Kamada, Y., Keizer-Gunnink, I., Funakoshi, T., Veenhuis, M., Ohsumi, Y., and Klionsky, D. J. Apg13p and Vac8p are part of a complex of phosphoproteins that are required for cytoplasm to vacuole targeting. *J. Biol. Chem.*, **275**, 25840-25849 (2000)
65. Kamada, Y., Funakoshi, T., Shintani, T., Nagano, K., Ohsumi, M., and Ohsumi, Y. Tor-mediated induction of autophagy via an Apg1 protein kinase complex. *J. Cell Biol.*, **150**, 1507-1513 (2000)
66. Kirisako, T., Ichimura, Y., Okada, H., Kabeya, Y., Mizushima, N., Yoshimori, T., Ohsumi, M., Noda, T., and Ohsumi, Y. The reversible modification regulates the membrane-binding state of Apg8/Aut7 essential for autophagy and the cytoplasm to vacuole targeting pathway. *J. Cell Biol.*, **151**, 263-276 (2000)

67. Kabeya, Y., Mizushima, N., Ueno, T., Yamamoto, A., Kirisako, T., Noda, T., Kominami, E., Ohsumi, Y., and Yoshimori, T. LC3, a mammalian homologue of yeast Apg8p is localized in autophagosome membranes after processing. *EMBO J.*, **19**, 5720-5728, (2000)
68. Grote, E., Baba, M., Ohsumi, Y., and Novick, P. J. Geranylgeranylated SNAREs are dominant inhibitors of membrane fusion. *J. Cell Biol.*, **151**, 453-466 (2000).
69. Ichimura, Y., Kirisako, T., Takao, T., Satomi, Y., Shimonishi, Y., Ishihara, N., Mizushima, N., Tanida, I., Kominami, E., Ohsumi, M., Noda, T., and Ohsumi, Y. A ubiquitin-like system mediates protein lipidation. *Nature*, **408**, 488-492 (2000)
70. Kihara, A., Noda, T., Ishihara, N., and Ohsumi, Y. Two distinct Vps34 phosphatidylinositol 3-kinase complexes function in autophagy and carboxypeptidase Y sorting in *Saccharomyces cerevisiae*. *J. Cell Biol.*, **152**, 519-530 (2001)
71. Kihara, A., Kabeya, Y., Ohsumi, Y., and Yoshimori, T. Beclin-phosphatidylinositol 3-kinase complex functions at the trans-Golgi network. *EMBO rep.*, **2**, 330-335 (2001)
72. Mizushima, N., Yamamoto, A., Hatano, M., Kobayashi, Y., Kabeya, Y., Suzuki, K., Tokuhisa, T., Ohsumi, Y., and Yoshimori, T. Dissection of autophagosome formation using Apg5-deficient mouse embryonic stem cells. *J. Cell Biol.*, **152**, 657-668 (2001)
73. Komatsu, M., Tanida, I., Ueno, T., Ohsumi, M., Ohsumi, Y., and Kominami, E. The C-terminal region of an Apg7p/Cvt2p is required for homodimerization and is essential for its E1 activity and E1-E2 complex formation. *J. Biol. Chem.*, **276**, 9846-9854 (2001)
74. Kim, J., Kamada, Y., Stromhaug, P.E., Guan, J., Hefner-Gravink, A., Baba, M., Scott, S. V., Ohsumi, Y., Dunn, Jr., W. A., and Klionsky, D. J. Cvt9/Gsa9 functions in sequestering selective cytosolic cargo destined for the vacuole. *J. Cell Biol.*, **153**, 381-396 (2001)
75. Shintani, T., Suzuki, K., Kamada, Y., Noda, T., and Ohsumi, Y. Apg2p functions in autophagosome formation on the perivacuolar structure. *J. Biol. Chem.*, **276**, 30452-30460 (2001)
76. Ishihara, N., Hamasaki, M., Yokota, S., Suzuki, K., Kamada, Y., Kihara, A., Yoshimori, T., Noda, T., and Ohsumi, Y. Autophagosome requires specific early Sec proteins for its formation and NSF/SNARE for vacuolar fusion. *Mol. Biol. Cell*, **12**, 3690-3702 (2001)
77. Suzuki, K., Kirisako, T., Kamada, Y., Mizushima, N., Noda, T. and Ohsumi, Y. The pre-autophagosomal structure organized by concerted functions of APG genes is essential for autophagosome formation. *EMBO J.*, **20**, 5971-5981 (2001)
78. Nara, A., Mizushima, N., Yamamoto, A., Kabeya, Y., Ohsumi, Y. and Yoshimori, T. SKD1 AAA ATPase-dependent endosomal transport is involved in autolysosome formation. *Cell Struct. Funct.*, **27**, 29-37 (2002)
79. Kuma, A., Mizushima, N., Ishihara, N., and Ohsumi, Y. Formation of the approximately 350-kDa Apg12-Apg5, Apg16 multimeric complex, mediated by Apg16 oligomerization, is essential for autophagy in yeast. *J. Biol. Chem.*, **277**, 18619-18625 (2002)
80. Hanaoka, H., Noda, T., Shirano, Y., Kato, T., Hayashi, H., Shibata, D., Tabata, S., and Ohsumi, Y. Leaf senescence and starvation-induced chlorosis are accelerated by the disruption of an Arabidopsis autophagy gene. *Plant Physiol.*, **129**, 1181-1193 (2002)
81. Suzuki, T., Nakagawa, M., Yoshikawa, A., Sasagawa, N., Yoshimori, T., Ohsumi, Y., Nishino, I., Ishiura, S., and Nonaka, I. The first molecular evidence that autophagy relates rimmed vacuole formation in chloroquine myopathy. *J. Biochem. (Tokyo)*, **131**, 647-651 (2002)
82. Mizushima, N., Yoshimori, T., and Ohsumi, Y. Mouse Apg10 as an Apg12-conjugating enzyme: analysis by the conjugation-mediated yeast two-hybrid method. *FEBS lett.*, **532**, 450-454 (2002)
83. Suzuki, K., Kamada, Y., and Ohsumi, Y. Studies of cargo delivery to the vacuole mediated by autophagosomes in *Saccharomyces cerevisiae*. *Dev. Cell*, **3**, 815-824 (2002)
84. Hamasaki, M., Noda, T., and Ohsumi, Y. The early secretory pathway contributes to autophagy in yeast. *Cell Struct. Funct.*, **28**, 49-54 (2003)
85. Mizushima, N., Kuma, A., Kobayashi, Y., Yamamoto, A., Matsubae, M., Takao, T., Natsume, T., Ohsumi, Y., and Yoshimori, T. Mouse Apg16L, a novel WD-repeat protein, targets to the autophagic isolation membrane with the Apg12-Apg5 conjugate. *J. Cell Sci.*, **116**, 1679-1688 (2003)
86. Klionsky D. J., Cregg, J. M., Dunn, W. A. Jr., Emr, S. D., Sakai, Y., Sandoval, I. V., Sibirny, A., Subramani, S., Thumm, M., Veenhuis, M., and Ohsumi, Y. A unified nomenclature for yeast autophagy-related genes. *Dev. Cell*, **5**, 539-545, (2003)
87. Qu, X., Yu, J., Bhagat, G., Furuya, N., Hibshoosh, H., Troxel, A., Rosen, J., Eskelinen, E. L., Mizushima, N., Ohsumi, Y., Cattoretti, G., and Levine, B. Promotion of tumorigenesis by heterozygous disruption of the beclin 1 autophagy gene. *J. Clin. Invest.*, **112**, 1809-1820 (2003)
88. Sugawara, K., Suzuki, N. N., Fujioka, Y., Mizushima, N., Ohsumi, Y., and Inagaki, F. Crystallization and preliminary X-ray analyses of LC3-I. *Acta Cryst. D.*, **59**, 1464- 1465 (2003)
89. Mukaiyama, H., Baba, M., Osumi, M., Aoyagi, S., Kato, N., Ohsumi, Y., and Sakai, Y. Modification of a ubiquitin-like protein Paz2 conducted micropexophagy through formation of a novel membrane structure. *Mol. Biol. Cell*, **15**, 58-70 (2004)
90. Mizushima, N., Yamamoto, A., Matsui, M., Yoshimori, T., and Ohsumi, Y. In vivo analysis of autophagy in response to nutrient starvation using transgenic mice expressing a fluorescent autophagosome marker. *Mol. Biol. Cell*, **15**, 1101-1111 (2004)

91. Kabeya, Y., Mizushima, N., Yamamoto, A., Ohshita-Okamoto, S., Ohsumi, Y., and Yoshimori, T. LC3, GABARAP and GATE16 localize to autophagosomal membrane depending on form-II formation. *J. Cell Sci.*, **117**, 2805-2812 (2004)
92. Onodera, J., and Ohsumi, Y. Ald6p is a preferred target for autophagy in the yeast, *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **279**, 16071-16076 (2004)
93. Sugawara, K., Suzuki, N. N., Fujioka, Y., Mizushima, N., Ohsumi, Y., and Inagaki, F. The crystal structure of microtubule-associated protein light chain 3, a mammalian homologue of *Saccharomyces cerevisiae* Atg8. *Genes Cells*, **9**, 611-618 (2004)
94. Okazaki, H., Ono, B., Ohsumi, Y., and Ohsumi, M. *apg15-1*, a UGA mutant allele in the *Saccharomyces cerevisiae* *APG16* gene, and its suppression by a cytoplasmic factor. *Biosci. Biotechnol. Biochem.*, **68**, 1541-1548 (2004)
95. Suzuki, K., Noda, T., and Ohsumi, Y. Interrelationships among Atg proteins during autophagy in *Saccharomyces cerevisiae*. *Yeast*, **21**, 1057-1065. (2004)
96. Ichimura, Y., Imamura, Y., Emoto, K., Umeda, M., Noda, T., and Ohsumi, Y. In vivo and in vitro reconstitution of Atg8 conjugation essential for autophagy. *J. Biol. Chem.*, **279**, 40584-40592 (2004)
97. Yoshimoto, K., Hanaoka, H., Sato, S., Kato, T., Tabata, S., Noda, T., and Ohsumi, Y. Processing of *ATG8*s, ubiquitin-like proteins, and their deconjugation by *ATG4*s are essential for plant autophagy. *Plant Cell*, **16**, 2967-2983 (2004)
98. Kuma, A., Hatano, M., Matsui, M., Yamamoto, A., Nakaya, H., Yoshimori, T., Ohsumi, Y., Tokuhisa, T., and Mizushima, N. The role of autophagy during the early neonatal starvation period. *Nature*, **432**, 1032-1036 (2004)
99. Hamasaki, M., Noda, T., Baba, M., and Ohsumi, Y. Starvation triggers the delivery of the endoplasmic reticulum to the vacuole via autophagy in yeast. *Traffic*, **6**, 56-65 (2005)
100. Ano, Y., Hattori, T., Oku, M., Mukaiyama, H., Baba, M., Ohsumi, Y., Kato, N., and Sakai, Y. A sorting nexin PpAtg24 regulates vacuolar membrane dynamics during pexophagy via binding to phosphatidylinositol-3-phosphate. *Mol. Biol. Cell*, **16**, 446-457 (2005)
101. Shimazu, M., Sekito, T., Akiyama, K., Ohsumi, Y., and Kakinuma, Y. A family of basic amino acid transporters of the vacuolar membrane from *Saccharomyces cerevisiae*. *J. Biol. Chem.*, **280**, 4851-4857 (2005)
102. Kabeya, Y., Kamada, Y., Baba, M., Takikawa, H., Sasaki, M., and Ohsumi, Y. Atg17 functions in cooperation with Atg1 and Atg13 in yeast autophagy. *Mol. Biol. Cell*, **16**, 2544-2553 (2005)
103. Komatsu, M., Waguri, S., Ueno, T., Iwata, J., Murata, S., Tanida, I., Ezaki, J., Mizushima, N., Ohsumi, Y., Uchiyama, Y., Kominami, E., Tanaka, K., and Chiba, T. Impairment of starvation-induced and constitutive autophagy in Atg7-deficient mice. *J. Cell Biol.*, **169**, 425-434 (2005)
104. Hanada, T., and Ohsumi, Y. Structure-function relationship of Atg12, a ubiquitin-like modifier essential for autophagy. *Autophagy*, **1**, 110-118 (2005)
105. Suzuki, N. N., Yoshimoto, K., Fujioka, Y., Ohsumi, Y., and Inagaki, F. The crystal structure of plant ATG12 and its biological implication in autophagy. *Autophagy*, **1**, 119-126 (2005)
106. Pyo, J. O., Jang, M. H., Kwon, Y. K., Lee, H. J., Jun, J. I., Woo, H. N., Cho, D. H., Choi, B., Lee, H., Kim, J. H., Mizushima, N., Ohsumi, Y., and Jung, Y. K. Essential roles of Atg5 and FADD in autophagic cell death: dissection of autophagic cell death into vacuole formation and cell death. *J. Biol. Chem.*, **280**, 20722-20729 (2005)
107. Kamada, Y., Fujioka, Y., Suzuki, N. N., Inagaki, F., Wullschlegel, S., Loewith, R., Hall, M. N., and Ohsumi, Y. Tor2 directly phosphorylates the AGC kinase Ypk2 to regulate actin polarization. *Mol. Cell Biol.*, **25**, 7239-7248 (2005)
108. Onodera, J., and Ohsumi, Y. Autophagy is required for maintenance of amino acids levels and protein synthesis under nitrogen starvation. *J. Biol. Chem.*, **280**, 31582-31586 (2005)
109. Kawamata, T., Kamada, Y., Suzuki, K., Kuboshima, N., Akimatsu, H., Ota, S., Ohsumi, M., and Ohsumi, Y. Characterization of a novel autophagy-specific gene, *ATG29*. *Biochem. Biophys. Res. Commun.*, **338**, 1884-1889 (2005)
110. Matsui, M., Yamamoto, A., Kuma, A., Ohsumi, Y., and Mizushima, N. Organelle degradation during the lens and erythroid differentiation is independent of autophagy. *Biochem. Biophys. Res. Commun.*, **339**, 485-489 (2006)
111. Obara, K., Sekito, T., and Ohsumi, Y. Assortment of phosphatidylinositol 3-kinase complexes --Atg14p directs association of complex I to the pre-autophagosomal structure in *Saccharomyces cerevisiae*. *Mol. Biol. Cell*, **17**, 1527-1539 (2006)
112. Amar, N., Lustig, G., Ichimura, Y., Ohsumi, Y., and Elazar, Z. Two newly identified sites in the ubiquitin-like protein Atg8 are essential for autophagy. *EMBO rep.*, **7**, 635-642 (2006)
113. Matsushita, M., Suzuki, N. N., Fujioka, Y., Ohsumi, Y., and Inagaki, F. Expression, purification and crystallization of the Atg5-Atg16 complex essential for autophagy. *Acta Crystallograph. Sect. F. Struct. Biol. Cryst. Commun.*, **62**, 1021-1023 (2006)

114. Yamada, Y., Suzuki, N. N., Fujioka, Y., Ichimura, Y., Ohsumi, Y., and Inagaki, F. Crystallization and preliminary X-ray analysis of Atg3. *Acta Crystallograph, Sect. F. Struct. Biol. Cryst. Commun.*, **62**, 1016-1017 (2006)
115. Inoue, Y., Suzuki, T., Hattori, M., Yoshimoto, K., Ohsumi, Y., and Moriyasu, Y. AtATG genes, homologs of yeast autophagy genes, are involved in constitutive autophagy in Arabidopsis root tip cells. *Plant Cell Physiol.*, **47**, 1641-1652 (2006)
116. Kabeya, Y., Kawamata, T., Suzuki, K., and Ohsumi, Y. Cis1/Atg31 is required for autophagosome formation in *Saccharomyces cerevisiae*. *Biochem. Biophys. Res. Commun.*, **356**, 405-410 (2007)
117. Fujiki, Y., Yoshimoto, K., and Ohsumi, Y. An Arabidopsis homolog of Yeast *ATG6/VPS30* is essential for pollen germination. *Plant Physiol.*, **143**, 1132-1139 (2007)
118. Yamada, Y., Suzuki, N. N., Hanada, T., Ichimura, Y., Kumeta, H., Fujioka, Y., Ohsumi, Y., and Inagaki, F. The crystal structure of *ATG3*, an autophagy-related ubiquitin carrier protein (E2) enzyme that mediates Atg8 lipidation. *J. Biol. Chem.*, **282**, 8036-8043 (2007)
119. Satoo, K., Suzuki, N. N., Fujioka, Y., Mizushima, N., Ohsumi, Y., and Inagaki, F. Crystallization and preliminary crystallographic analysis of human Atg4B-LC3 complex. *Acta Crystallograph, Sect. F. Struct. Biol. Cryst. Commun.*, **63**, 99-102 (2007)
120. Adachi, W., Suzuki, N. N., Fujioka, Y., Suzuki, K., Ohsumi, Y., and Inagaki, F. Crystallization of *Saccharomyces cerevisiae* aminopeptidase I, the major cargo protein of the Cvt pathway. *Acta Crystallograph, Sect. F. Struct. Biol. Cryst. Commun.*, **63**, 200-203 (2007)
121. Matsushita, M., Suzuki, N. N., Obara, K., Fujioka, Y., Ohsumi, Y., and Inagaki, F. Structure of Atg5-Atg16, a complex essential for autophagy. *J. Biol. Chem.*, **282**, 6763-6772 (2007)
122. Suzuki, K., Kubota, Y., Sekito, T., and Ohsumi, Y. Hierarchy of Atg proteins in pre-autophagosomal structure organization. *Genes Cells*, **12**, 209-218 (2007).
123. Yamaguchi, M., Suzuki, N. N., Fujioka, Y., Ohsumi, Y., and Inagaki, F. Crystallization and preliminary X-ray analysis of Atg10. *Acta Crystallograph, Sect. F. Struct. Biol. Cryst. Commun.*, **63**, 443-445 (2007)
124. Nakatogawa, H., Ichimura, Y., and Ohsumi, Y. Atg8, a ubiquitin-like protein required for autophagosome formation, mediates membrane tethering and hemifusion. *Cell*, **130**, 165-178 (2007)
125. Hanada, T., Noda, N. N., Satomi, Y., Ichimura, Y., Fujioka, Y., Takao, T., Inagaki, F., and Ohsumi, Y., The Atg12-Atg5 conjugate has a novel E3-like activity for protein lipidation in autophagy. *J. Biol. Chem.*, 37298-37302 (2007)
126. Fujioka, Y., Noda, N. N., Fujii, K., Yoshimoto, K., Ohsumi, Y., and Inagaki, F. In vitro reconstitution of plant ATG8 and ATG12 conjugation systems essential for autophagy. *J. Biol. Chem.*, 2008, **283**, 1921-1928 (2008)
127. Hu, G., Hacham, M., Waterman, S. R., Panepinto, J., Shin, S., Liu, X., Gibbons, J., Valyi-Nagy, T., Obara, K., Jaffe, H. A., Ohsumi, Y., and Williamson, P. R. PI3K signaling of autophagy is required for starvation tolerance and virulence of *Cryptococcus neoformans*. *J. Clin. Invest.*, **118**, 1186-1197 (2008)
128. Noda, N. N., Fujioka, Y., Ohsumi, Y., and Inagaki, F. Crystallization of the Atg12-Atg5 conjugate bound to Atg16 by the free-interface diffusion method. *J. Synchrotron Radiat.*, **15**, 266-268 (2008)
129. Kawamata, T., Kamada, Y., Kabeya, Y., Sekito, T., and Ohsumi, Y. Organization of the pre-autophagosomal structure responsible for autophagosome formation. *Mol. Biol. Cell*, **19**, 2039-2050 (2008)
130. Obara, K., Noda, T., Niimi, K., and Ohsumi, Y. Transport of phosphatidylinositol 3-phosphate into the vacuole via autophagic membranes in *S. cerevisiae*. *Genes Cells*, **13**, 537-547 (2008)
131. Nakashima, A., Maruki, Y., Imamura, Y., Kondo, C., Kawamata, T., Kawanishi, I., Takata, H., Matsuura, A., Lee, K. S., Kikkawa, U., Ohsumi, Y., Yonezawa, K., and Kamada, Y. The yeast Tor signaling pathway is involved in G2/M transition via Polo-kinase. *PLoS ONE*, **3**, e2223 (2008).
132. Oh-oka, K., Nakatogawa, H., and Ohsumi, Y., Physiological pH and acidic phospholipids contribute to substrate specificity in lipidation of Atg8. *J. Biol. Chem.*, **283**, 21847-21852 (2008)
133. Obara, K., Sekito, T., Niimi, K., and Ohsumi, Y. The Atg18-Atg2 complex is recruited to autophagic membranes via PtdIns(3)P and exerts an essential function. *J. Biol. Chem.*, **283**, 23972-23980 (2008)
134. Ishida, H., Yoshimoto, K., Izumi, M., Reisen, D., Yano, Y., Makino, A., Ohsumi, Y., Hanson, MR., and Mae, T. Mobilization of Rubisco and stromal-localized fluorescent proteins of chloroplasts to the vacuole by an *ATG* gene-dependent autophagic process. *Plant Physiol.*, 2008, **148**, 142-155 (2008)
135. Fujioka, Y., Noda, N. N., Matsushita, M., Ohsumi, Y., and Inagaki, F. Crystallization of the coiled-coil domain of Atg16 essential for autophagy. *Acta Crystallogr. Sect. F. Struct. Biol. Cryst. Commun.*, **64**, 1046-1048 (2008)
136. Noda, N. N., Kumeta, H., Nakatogawa, H., Satoo, K., Adachi, W., Ishii, J., Fujioka, Y., Ohsumi, Y., Inagaki, F. Structural basis of target recognition by Atg8/LC3 during selective autophagy. *Genes Cells*, **12**, 1211-1218 (2008)

137. Kageyama, T., Suzuki, K., and Ohsumi, Y. Lap3 is a selective target of autophagy in yeast, *Saccharomyces cerevisiae*. *Biochem. Biophys. Res. Commun.*, **378**, 551-557 (2009)
138. Wada, S., Ishida, H., Izumi, M., Yoshimoto, K., Ohsumi, Y., Mae, T., and Makino, A. Autophagy plays a role in chloroplast degradation during senescence in individually darkened leaves. *Plant Physiol.*, **149**, 885-893 (2009)
139. Sekito, T., Kawamata, T., Ichikawa, R., Suzuki, K., and Ohsumi, Y. Atg17 recruits Atg9 to organize the pre-autophagosomal structure. *Genes Cells*, **14**, 525-538 (2009)
140. Shin, J. H., Yoshimoto, K., Ohsumi, Y., Jeon, J. S., and An, G. OsATG10b, an autophagosome component, is needed for cell survival against oxidative stresses in rice. *Mol. Cell*, **27**, 67-74 (2009)
141. Hanada, T., Satomi, Y., Takao, T., Ohsumi, Y. The amino-terminal region of Atg3 is essential for association with phosphatidylethanolamine in Atg8 lipidation. *FEBS Lett.*, **583**, 1078-1083 (2009)
142. Satoo, K., Noda, N. N., Kumeta, H., Fujioka, Y., Mizushima, N., Ohsumi, Y., and Inagaki F. The structure of Atg4B-LC3 complex reveals the mechanism of LC3-processing and delipidation during autophagy. *EMBO J.*, **28**, 1341-1350 (2009)
143. Watanabe, Y., Noda, N. N., Honbou, K., Suzuki, K., Sakai, Y., Ohsumi, Y., and Inagaki, F. Crystallization of *Saccharomyces cerevisiae* α -mannosidase, a cargo protein of the Cvt pathway. *Acta Crystallogr. Sect. F. Struct. Biol. Cryst. Commun.*, **65**, 571-573 (2009)
144. Okamoto, K., Kondo-Okamoto, N., and Ohsumi, Y. Mitochondria-anchored receptor Atg32 mediates degradation of mitochondria via selective autophagy. *Dev. Cell*, **17**, 87-97 (2009)
145. Yoshimoto, K., Jikumaru, Y., Kamiya, Y., Kusano, M., Consonni, C., Panstruga, R., Ohsumi, Y., and Shirasu, K. Autophagy negatively regulates cell death by controlling NPR1-dependent salicylic acid signaling during senescence and the innate immune response in *Arabidopsis*. *Plant Cell*, **21**, 2914-2927 (2009).
146. Kabeya, Y., Noda, N. N., Fujioka, Y., Suzuki, K., Inagaki F, and Ohsumi Y. Characterization of the Atg17-Atg29-Atg31 complex specifically required for starvation-induced autophagy in *Saccharomyces cerevisiae*. *Biochem. Biophys. Res. Commun*, **389**, 612-615 (2009)
147. Fujioka, Y., Noda, N. N., Nakatogawa, H., Ohsumi, Y., and Inagaki F. The dimeric coiled-coil structure of *Saccharomyces cerevisiae* Atg16 and its functional significance in autophagy. *J. Biol. Chem.*, **285**, 1508-1515 (2009)
148. Kamada, Y., Yoshino, K., Kondo, C., Kawamata, T., Oshiro, N., Yonezawa, K., and Ohsumi, Y. Tor directly controls the Atg1 kinase complex to regulate autophagy. *Mol. Cell Biol.*, **30**, 1049-1058(2010)
149. Kumeta, H., Watanabe, M., Nakatogawa, H., Yamaguchi, M., Ogura, K., Adachi, W., Fujioka, Y., Noda, N. N., Ohsumi, Y., and Inagaki F. The NMR structure of the autophagy-related protein Atg8. *J. Biomol. NMR*, **47**, 237-241(2010)
150. Yamaguchi, M., Noda, N. N., Nakatogawa, H., Kumeta, H., Ohsumi, Y., and Inagaki F. Autophagy-related protein (Atg) 8-family interacting motif in Atg3 mediates the Atg3-Atg8 interaction and is crucial for the cytoplasm-to-vacuole targeting pathway. *J. Biol. Chem.*, **285**, 29599-29607 (2010)
151. Suzuki, K., Kondo, C., Morimoto, M., and Ohsumi, Y. Selective transport of α -mannosidase by autophagic pathways: identification of a novel receptor, Atg34. *J. Biol. Chem.*, **285**, 30019-30025 (2010)
152. Watanabe, Y., Noda, N. N., Kumeta, H., Suzuki, K., Ohsumi, Y., and Inagaki, F. Selective transport of α -mannosidase by autophagic pathways: structural basis for cargo recognition by Atg19 and Atg34. *J. Biol. Chem.*, **285**, 30026-30033 (2010)
153. Fujioka, Y., Noda, N. N., Nakatogawa, H., Ohsumi, Y., and Inagaki, F. The dimeric coiled-coil structure of *Saccharomyces cerevisiae* Atg16 and its functional significance in autophagy. *J. Biol. Chem.*, **285**, 1508-1515 (2010)
154. Suzuki, S. W., Onodera, J., and Ohsumi, Y. Starvation induced cell death in autophagy-defective yeast mutants is caused by mitochondria dysfunction. *PLoS ONE*, **6**, e17412 (2011)
155. Suzuki, K., Morimoto, M., Kondo, C., and Ohsumi, Y., Selective autophagy regulates insertional mutagenesis by the Ty1 retrotransposon in *Saccharomyces cerevisiae*. *Dev. Cell*, **21**, 358-365 (2011)
156. Noda, N. N., Satoo, K., Fujioka, Y., Kumeta, H., Ogura, K., Nakatogawa, H., Ohsumi, Y., and Inagaki, F. Structural basis of Atg8 activation by a homodimeric E1, Atg7. *Mol. Cell*, **44**, 462-475, (2011)
157. Nakatogawa, H., Ishii, J., Asai, E., and Ohsumi, Y. Atg4 recycles inappropriately lipidated Atg8 to promote autophagosome biogenesis. *Autophagy*, **8**, 177-186 (2012)
158. Kondo-Okamoto, N., Noda, N. N., Suzuki, S. W., Nakatogawa, H., Takahashi, I., Matsunami, M., Hashimoto, A., Inagaki, F., Ohsumi, Y., and Okamoto, K. Autophagy-related protein 32 as autophagic degron and directly initiates mitophagy. *J. Biol. Chem.*, **287**, 10631-10638 (2012)
159. Noda, N. N., Kobayashi, T, Adachi, W., Fujioka, Y., Ohsumi, Y., and Inagaki, F. Structure of the novel C-terminal domain of vacuolar protein sorting 30/autophagy-related protein 6 and its specific role in autophagy. *J. Biol. Chem.*, **287**, 16256-16266 (2012)

160. Yamaguchi, M., Noda, N. N., Yamamoto, H., Shima, T., Kumeta, H., Kobasigawa, Y., Akada, R., Ohsumi, Y. and Inagaki, F. Structural insights into Atg10-mediated formation of the autophagy-essential Atg12-Atg5 conjugate. *Structure*, **20**, 1244-1254 (2012)
161. Kobayashi, T., Suzuki, K. and Ohsumi, Y. Autophagosome formation can be achieved in the absence of Atg18 by expressing engineered PAS-targeted Atg2. *FEBS Lett.*, **586**, 2473-2478 (2012)
162. Yamamoto, H., Kakuta, S., Watanabe, T.M., Kitamura, A., Sekito, T., Kondo-Kakura, C., Ichikawa, R. Kinjo, M., and Ohsumi, Y. Atg9 vesicles are an important membrane source during early steps of autophagosome formation. *J. Cell Biol.*, **198**, 219-233. (2012)
163. Nakatogawa, H., Ohbayashi, S., Sakoh-Nakatogawa, M., Kakuta, S., Suzuki, S. W., Kirisako, H., Kondo-Kakuta, C., Noda, N. N., Yamamoto, H., and Ohsumi Y. The autophagy-related protein kinase Atg1 interacts with the ubiquitin-like protein Atg8 via the Atg8 family interacting motif to facilitate autophagosome formation. *J. Biol. Chem.*, **287**, 28503-28507 (2012)
164. Watanabe Y., Kobayashi, T., Yamamoto, H., Hoshida, H., Akada, R., Inagaki, F., Ohsumi, Y., and Noda, N. N., Structure-based analyses reveal distinct binding sites for Atg2 and phosphoinositides in Atg18. *J. Biol. Chem.*, **287**, 31681-31690 (2012)
165. Kakuta, S., Yamamoto, H., Negishi, L., Kondo-Kakuta, C., Hayasi, N., and Ohsumi, Y. Atg9 vesicles recruit vesicle-tethering proteins, Trs85 and Ypt1, to the autophagosome formation site. *J. Biol. Chem.*, **287**, 44261-44269 (2012)
166. Yamaguchi, M., Matoba, K., Sawada, R., Fujioka, Y. Nakatogawa, H., Yamamoto, H. Kobashigawa, Y., Hoshida, H., Akada, R., Ohsumi, Y., Noda, N. N., and Inagaki, F. Noncanonical recognition and UBL loading of distinct E2s by autophagy-essential Atg7. *Nat. Struct. Mol. Biol.*, doi: 10.1038/nsmb.2451 (2012)
167. Noda, N. N., Fujioka, Y., Hanada, T., Ohsumi, Y., and Inagaki, F. Structure of the Atg12-Atg5 conjugate reveals a platform for stimulating Atg8-PE conjugation recognition. *EMBO rep.*, **14**, 206-211 (2013)
168. Sakoh-Nakatogawa, M., Matoba, K., Asai, E., Kirisako, H., Ishii, J., Noda, N. N., Inagaki, F., Nakatogawa, H., and Ohsumi, Y. Atg12-Atg5 conjugate enhances E2 activity of Atg3 by rearranging its catalytic site. *Nat. Struct. Mol. Biol.*, **20**, 433-439 (2013)
169. Suzuki, K., Akioka, M., Kondo-Kakuta, C., Yamamoto, H., and Ohsumi, Y. Fine mapping of autophagy-related proteins during autophagosome formation in *Saccharomyces cerevisiae*. *J. Cell Sci.*, **1**, 2534-44 (2013)
170. Tsuganezawa K, Shinohara Y, Ogawa N, Tsuboi S, Okada N, Mori M, Yokoyama S, Noda NN, Inagaki F, Ohsumi Y, Tanaka A. Two-Colored Fluorescence Correlation Spectroscopy Screening for LC3-P62 Interaction Inhibitors. *J Biomol Screen.*, **18**, 1103-1109 (2013)
171. Araki, Y., Ku WC., Akioka, M., May, A.I., Hayashi, Y., Arisaka, F., Ishihama, Y. and Ohsumi Y. Atg38 is required for autophagy-specific phosphatidylinositol 3-kinase complex integrity. *J. Cell Biol.*, **203**, 299-313 (2013)
172. Shibata M, Oikawa K, Yoshimoto K, Kondo M, Mano S, Yamada K, Hayashi M, Sakamoto W, Ohsumi Y, Nishimura M. Highly oxidized peroxisomes are selectively degraded via autophagy in Arabidopsis. *Plant Cell*, **25**, 4967-4983 (2013)
173. Fujita N, Morita E, Itoh T, Tanaka A, Nakaoka M, Osada Y, Umemoto T, Saitoh T, Nakatogawa H, Kobayashi S, Haraguchi T, Guan JL, Iwai K, Tokunaga F, Saito K, Ishibashi K, Akira S, Fukuda M, Noda T, Yoshimori T. Recruitment of the autophagic machinery to endosomes during infection is mediated by ubiquitin. *J. Cell Biol.*, **203**, 115-128 (2013)
174. Yoshimoto K, Shibata M, Kondo M, Oikawa K, Sato M, Toyooka K, Shirasu K, Nishimura M, Ohsumi Y. Organ-specific quality control of plant peroxisomes is mediated by autophagy. *J. Cell Sci.*, **127**, 1161-1168 (2014)
175. Cheng J, Fujita A, Yamamoto H, Tatematsu T, Kakuta S, Obara K, Ohsumi Y, Fujimoto T. Yeast and mammalian autophagosomes exhibit distinct phosphatidylinositol 3-phosphate asymmetries. *Nat. Commun.*, **5**, 3207 (2014)
176. Suzuki K, Nakamura S, Morimoto M, Fujii K, Noda NN, Inagaki F, Ohsumi Y. Proteomic profiling of autophagosome cargo in *Saccharomyces cerevisiae*. *PLoS One*, **9**, e91651(2014)
177. Fujioka Y, Suzuki SW, Yamamoto H, Kondo-Kakuta C, Kimura Y, Hirano H, Akada R, Inagaki F, Ohsumi Y, Noda NN. Structural basis of starvation-induced assembly of the autophagy initiation complex. *Nat. Struct. Mol. Biol.* **21**, 513-21 (2014)
178. Tanaka C, Tan LJ, Mochida K, Kirisako H, Koizumi M, Asai E, Sakoh-Nakatogawa M, Ohsumi Y, and Nakatogawa H, Hrr25 triggers selective autophagy-related pathways by phosphorylating receptor proteins. *J. Cell Biol.*, in press (2014)
179. Mochida K, Ohsumi Y, Nakatogawa H. Hrr25 phosphorylates the autophagic receptor Atg34 to promote vacuolar transport of α -mannosidase under nitrogen starvation conditions. *FEBS Lett.*, in press (2014)
180. Huang, H., Kawamata, T., Horie, T., Tsugawa, H., Nakayama, Y., Ohsumi, Y., and Fukusaki, E. Bulk RNA degradation by nitrogen starvation-induced autophagy in yeast. *EMBO J.*, **34**, 154-168 (2015)
181. Sakoh-Nakatogawa, M., Kirisako, H., Nakatogawa, H., and Ohsumi, Y. Localization of Atg3 to autophagy-related membranes and its enhancement by the Atg8-family interacting motif to promote expansion of the membranes. *FEBS Lett.*, **589**, Issue 6, 744-749 (2015)
182. Suzuki, S. W., Yamamoto, H., Oikawa, Y., Kondo-Kakuta, C., Kimura, Y., Hirano, H., and Ohsumi, Y. Atg13 HORMA domain recruits Atg9 vesicles during autophagosome formation. *Proc. Natl. Acad. Sci. USA*, doi: 10.1073/1421092112 (2015)

183. Keisuke Mochida, Yu Oikawa, Yayoi Kimura, Hiromi Kirisako, Hisashi Hirano, Yoshinori Ohsumi & Hitoshi Nakatogawa. Receptor-mediated selective autophagy degrades the endoplasmic reticulum and the nucleus *Nature*, doi:10.1038/nature14506 (2015)
184. Fei-Fei Yu, Imamura Y, Ueno M, Suzuki SW, Ohsumi Y, Yukawa M, Tsuchiya E. The yeast chromatin remodeler Rsc1-RSC complex is required for transcriptional activation of autophagy-related genes and inhibition of the TORC1 pathway in response to nitrogen starvation. *BBRC.*, **07**.114 (2015)
185. Murakawa T, Yamaguchi O, Hashimoto A, Hikoso S, Takeda T, Oka T, Yasui , Ueda H, Akazawa Y, Nakayama H, Taneike M, MisakaT, Omiya S, Ajay Shah, Yamamoto A, Nishida K, Ohsumi Y, Okamoto K, Sakata Y, Otsu K. Bcl-2-like protein 13 is a mammalian Atg32 homologue that mediates mitophagy and mitochondrial fragmentation. *Nat. Commun.*, **6**, 7527 (2015)
186. Sakakibara K, Eiyama A, Suzuki SW, Sakoh - Nakatogawa M, Okumura N, Tani M, Hashimoto A, Nagumo S, Kondo - Okamoto N, Kondo - Kakuta C, Asai E, Kirisako H, Nakatogawa H, Kuge O, Takao T, Ohsumi Y, Okamoto K. Phospholipid methylation controls Atg32 - mediated mitophagy and Atg8 recycling *EMBO J.*, DOI 10.15252/embj.201591440.(2015)
187. Yamamoto H, Shima T, Yamaguchi M, Mochizuki Y, Hoshida H, Kakuta S, Kondo-Kakuta C, Noda NN, Inagaki F, Itoh T, Akada R, Ohsumi Y. The Thermotolerant Yeast *Kluyveromyces marxianus* Is a Useful Organism for Structural and Biochemical Studies of Autophagy. *J. Biol. Chem.*, 10.1074/jbc.M115.684233 (2015)
188. Yamamoto H, Fujioka Y, Suzuki SW, Noshiro D, Suzuki H, Kondo-Kakuta C, Kimura Y, Hirano H, Ando T, Noda NN & Ohsumi Y, The intrinsically disordered protein Atg13 mediates supramolecular assembly of autophagy initiation complexes. *Dev. Cell.*, 10.1016/j.devcel.2016.06.015

Books

1. Ohsumi, Y., Uchida, E., and Anraku, Y. The H⁺-Translocating ATPase in vacuolar membranes of *Saccharomyces cerevisiae*. **Biochemistry and function of vacuolar adenosine-triphosphatase in fungi and plants** (ed. B. P. Marin), Springer., pp.141-150, Berlin (1985)
2. Anraku, Y., Uchida, E., and Ohsumi, Y. A Novel H⁺-Translocating adenosine-triphosphatase from the vacuolar membrane of *Saccharomyces cerevisiae*. **Perspectives of biological energy transduction** (eds. Y. Mukohata, S. Fleiscer and M. Nakao), Academic Press, New York and Tokyo, pp.309-313 (1987)
3. Yoshihisa, T., Ohsumi, Y., and Anraku, Y. Purification and properties of mannosidase from vacuolar membranes of yeast *Saccharomyces cerevisiae*. **Plant Vacuoles** (ed. B. Marin) Plenum Publishing Corp., pp.121-125 (1987)
4. Anraku, Y., Uchida, E., and Ohsumi, Y. Structure and function of the subunits of the vacuolar membrane H⁺-ATPase of *Saccharomyces cerevisiae*. **Plant Vacuoles** (ed. B. Marin) Plenum Publishing Corp., pp.173-178 (1987)
5. Uchida, E., Ohsumi, Y., and Anraku, Y. Purification of yeast vacuolar membrane H⁺-ATPase and enzymological discrimination of three ATP-driven proton pumps in *Saccharomyces cerevisiae*. **Methods in Enzymology, Biomembrane, Part M: Biological transport, ATP-driven pumps and related transport.** (ed. S. Fleischer) Academic Press, New York and London, pp.544-561 (1988)
6. Ohsumi, Y. Ion and solute transport across the vacuolar membrane of yeast. **Plant Water Relations and growth under stress** (ed. M. Tazawa), **The XXII Yamada Conference, MYU, Tokyo**, pp.31-34 (1989)
7. Ohsumi, Y. Physiological functions of vacuoles in yeast, mechanism sequestration of metabolites and proteins into Vacuole. **Molecular Biology and its Application to Medical Mycology**, Springer Verlag, pp.39-45 (1992)
8. Ohsumi, Y. Molecular mechanism of autophagy in yeast, *Saccharomyces cerevisiae*. **Phil. Trans. R. Soc. Lond. B.**, 354, pp.1577-1581 (1999)
9. Klionsky, D. J., and Ohsumi, Y. Vacuolar import of proteins and organelles from the cytoplasm. **Annu. Rev. Cell Dev. Biol.**, 15, pp.1-32 (1999)
10. Noda, T., Ohsumi, Y., and D. Klionsky. The yeast vacuole: A paradigm for Plant cell Biologist. **Ann. Plant Reviews**, 5, 1-19 (2000)
11. Ohsumi, Y. Molecular dissection of autophagy: two ubiquitin-like systems. **Nature Rev., Mol. Cell Biol.**, 2, pp.211-216 (2001)
12. Noda, T., Suzuki, K., and Ohsumi, Y. Yeast autophagosomes: de novo formation of membrane structure. **Trends Cell Biol.**, 12, pp.231-235 (2002)
13. Mizushima, N., Yoshimori, T., and Ohsumi, Y. Role of the Apg12 conjugation system in mammalian autophagy. **Int. J. Biochem. Cell Biol.**, 35, pp.553-561 (2003)
14. Ohsumi, Y., and Mizushima, N. Two ubiquitin-like conjugation systems essential for autophagy. **Semin. Cell Dev. Biol.**, 15, pp.231-236 (2004)
15. Ohsumi, Y. Cellular recycling system-molecular mechanism of autophagy. In **Cell Growth**, (Hall, MN, Raff, M., Thomas G. eds) Cold Spring Harbor Press, pp.412-429 (2004)
16. Ohsumi, Y. Lytic function of vacuole, molecular dissection of autophagy in yeast. In **Handbook of ATPase** (Futai, M., Wada, Y., and Kaplan, JH eds) Wiley-VCH., pp.443-45 (2004)
17. Kamada, Y., Sekito, T., and Ohsumi, Y. Autophagy in yeast: a TOR-mediated response to nutrient starvation. **Curr. Top. Microbiol. Immunol.**, 279, pp.73-84. (2004)
18. Bassham, D. C., Laporte, M., Marty, F., Moriyasu, Y., Ohsumi, Y., Olsen, L. J., and Yoshimoto, K. Autophagy in development and stress responses of plants. **Autophagy**, 2, pp.2-11 (2006)
19. Ohsumi, Y. Protein turnover. **IUBMB Life**, 58, pp.363-369 (2006)
20. Suzuki, K., and Ohsumi, Y. Molecular machinery of autophagosome formation in yeast, *Saccharomyces cerevisiae*. **FEBS Lett.** 581, pp.2156-2161 (2007)
21. Nakatogawa, H., Oh-oka, K., and Ohsumi, Y. Lipidation of Atg8. **Autophagy**, 4, 7, pp.911-913 (2008)
22. Obara, K., and Ohsumi, Y. Dynamics and function of PtdIns(3) P in Autophagy. **Autophagy**, 4, 7, pp.952-954 (2008)
23. Noda, N. N., Ohsumi, Y., and Inagaki, F. ATG systems from the protein structural point of view. **Chem. Rev.**, 109, pp.1587-1598 (2009)
24. Nakatogawa, H., Suzuki, K., Kamada, Y., and Ohsumi, Y. Dynamics and diversity in autophagy mechanisms: lessons from yeast **Nat. Rev. Mol. Cell Biol.**, 10, pp.458-467 (2009)
25. Okamoto, K., Kondo-Okamoto, N., and Ohsumi, Y. A landmark protein essential for mitophagy. **Autophagy**, 5, pp.1203-1206 (2009)

26. Kamada, Y., and Ohsumi, Y. The TOR-mediated regulation of autophagy in the yeast, *Saccharomyces cerevisiae*. *The Enzymes*, 28, pp.143-165 (2010)
27. Suzuki, K., and Ohsumi, Y. Current knowledge of the pre-autophagosomal structure (PAS). *FEBS lett.*, 584, pp.1280-1286 (2010)
28. Noda, N. N., Ohsumi, Y., and Inagaki, F. Atg8-family interacting motif crucial for selective autophagy. *FEBS lett.*, 2010, 584, pp.1379-1385 (2010)
29. Mizushima, N., Yoshimori, T., and Ohsumi, Y. The role of Atg proteins in autophagosome formation. *Annu. Rev. Cell Dev. Biol.*, 27, pp.107-132 (2011)
30. Obara, K., and Ohsumi, Y. Atg14, a key player in orchestrating autophagy. *Int. J. Cell Biol.*, 713435 (2011)
31. Obara, K., and Ohsumi, Y. PtdIns 3-kinase orchestrates autophagosome formation in yeast. *J. Lipids*, 498768 (2011)
32. Nakatogawa, H., and Ohsumi, Y. SDS-PAGE techniques to study ubiquitin-like conjugation systems in yeast autophagy. *Methods Mol. Biol.*, 832, pp.519-529 (2012)
33. Nakatogawa H, Ohsumi Y. Atg4 proteases in autophagy. *Handbook of Proteolytic Enzymes*, 3rd Edn., 2138-2142 (2012)
34. Ohsumi Y. Historical landmarks of autophagy research. *Cell Res.*, 24,9-23 (2014)
35. Fujimoto T, Yamamoto H, Ohsumi Y. Different phosphatidylinositol 3-phosphate asymmetries in yeast and mammalian autophagosomes revealed by a new electron microscopy technique. *Autophagy*; 10, 933-935 (2014)
36. Nakatogawa H, Ohsumi Y. Autophagy: close contact keeps out the uninvited. *Curr. Biol.*, 24, R560-562 (2014)
37. Shibata M, Oikawa K, Yoshimoto K, Goto-Yamada S, Mano S, Yamada K, Kondo M, Hayashi M, Sakamoto W, Ohsumi Y, Nishimura M. Plant autophagy is responsible for peroxisomal transition and plays an important role in the maintenance of peroxisomal quality. *Autophagy*; 10, 936-937 (2014)