

Curriculum Vitae
HIROYUKI KOIDE, Ph.D.

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PRESENT STATUS:

Assistant Professor
Department of Medical Biochemistry
School of Pharmaceutical Sciences
University of Shizuoka

EDUCATION

Bachelor of Science in Biochemistry, 2002-2006

Josai University, Saitama-ken, Japan
Title: Synthesis of *N*-guanidino-1,7-diaminoheptane (GC7) analogs
Thesis advisor: Prof. Akia Shirahata

Master of Sciences in Biochemistry, 2006-2008

University of Shizuoka, Shizuoka-ken, Japan
Title: Elucidation of accelerated blood clearance phenomenon caused by repeat injection of PEGylated nanocarriers
Thesis advisor: Prof. Naoto Oku

Ph. D. in Pharmaceutical Sciences, 2008-2011

University of Shizuoka, Shizuoka-ken, Japan
Title: Cancer RNA interference therapy targeting to mammalian target of rapamycin
Thesis advisor: Prof. Naoto Oku

Post doc in Chemistry, 2011-2013

University of California, Irvine
Title: Design of a novel plastic antibody to capture and inhibition of angiogenesis-related growth factors for cancer therapy
Advisor: Prof. Kenneth J. Shea

QUALIFICATION:

Pharmacist (Japanese): registered in JAPAN 6/2006

PUBLICATION

(a) ARTICLES

- 1) **Koide H***, Okishima A, Hoshino Y, Kamon Y, Yoshimatsu K, Saito K, Yamauchi I, Ariizumi S, Zhou Y, Xiao T, Goda K, Oku N, Asai T, Shea K.J., Synthetic hydrogel nanoparticles for sepsis therapy., ***Nature Communications***, 12, 5552, 2021. *Corresponding Author
- 2) Yasuno G, **Koide H***, Oku N, Asai T., Influence of Purification Process on the Function of Synthetic Polymer Nanoparticles. ***Chem Pharm Bull.*** 69, 773-780, 2021.
- 3) **Koide H***, Yamauchi I, Hoshino Y, Yasuno G, Okamoto T, Akashi S, Saito K, Oku N, Asai T., Design of abiotic polymer ligand-decorated lipid nanoparticles for effective neutralization of target toxins in the blood., ***Biomater Sci.*** 9, 5588-5598, 2021.

- 4) **Koide H***, Hayashi N, Yasuno G, Okishima A, Hoshino Y, Egami H, Hamashima Y, Oku N, Asai T., Design of synthetic polymer nanoparticles that inhibit glucose absorption from the intestine. *Biochem Biophys Res Commun.* **561**, 1-6, 2021.
- 5) **Koide H***, Suzuki H, Ochiai H, Egami H, Hamashima Y, Oku N, Asai T., Enhancement of target toxin neutralization effect in vivo by PEGylation of multifunctionalized lipid nanoparticles. *Biochem Biophys Res Commun.* **555**, 32-39, 2021.
- 6) **Koide H***, Hirano S, Ide T, Saito K, Suzuki H, Yasuno G, Hamashima Y, Yonezawa Y, Oku N, Asai T., Engineering of Lipid Nanoparticles by the Multifunctionalization of the Surface with Amino Acid Derivatives for the Neutralization of a Target Toxic Peptide. *Adv Funct Mater.*, 2005641, 2020.
- 7) Hirai Y, Saeki R, Song F, **Koide H**, Fukata N, Tomita K, Maeda N, Oku N, Asai T., Charge-reversible lipid derivative: A novel type of pH-responsive lipid for nanoparticle-mediated siRNA delivery. *Int J Pharm.* **585**, 119479, 2020.
- 8) Kikuchi T, Fukuta T, Agato Y, Yanagida Y, Ishii T, **Koide H**, Shimizu K, Oku N, Asai T., Suppression of cerebral ischemia/reperfusion injury by efficient release of encapsulated ifenprodil from liposomes under weakly acidic pH conditions. *J Pharm Sci.* **108**, 3823-3830, 2019.
- 9) **Koide H**, Fukuta T, Okishima A, Ariizumi S, Kiyokawa C, Tsuchida H, Nakamoto M, Yoshimatsu K, Ando H, Dewa T, Asai T, Oku N, Hoshino Y, Shea KJ., Engineering the Binding Kinetics of Synthetic Polymer Nanoparticles for siRNA Delivery. *Biomacromolecules.* **20**, 3648-3657, 2019.
- 10) Zang L, Shimada Y, Nakayama H, Chen W, Okamoto A, **Koide H**, Oku N, Dewa T, Shiota M, Nishimura N., Therapeutic Silencing of Centromere Protein X Ameliorates Hyperglycemia in Zebrafish and Mouse Models of Type 2 Diabetes Mellitus. *Front Genet.* **10**, 693, 2019.
- 11) Sako M, Song F, Okamoto A, **Koide H**, Dewa T, Oku N, Asai T., Key determinants of siRNA delivery mediated by unique pH-responsive lipid-based liposomes. *Int J Pharm.* **569**, 118606, 2019
- 12) Song F, Sakurai N, Okamoto A, **Koide H**, Oku N, Dewa T, Asai T., Design of a Novel PEGylated Liposomal Vector for Systemic Delivery of siRNA to Solid Tumors. *Biol Pharm Bull.* **42**, 996-1003, 2019.
- 13) Okishima A, **Koide H***, Hoshino Y, Egami H, Hamashima Y, Oku N, Asai T., Design of Synthetic Polymer Nanoparticles Specifically Capturing Indole, a Small Toxic Molecule. *Biomacromolecules.* **4**, 1644-1654, 2019. *Correspond Author
- 14) Okamoto A, **Koide H**, Morita N, Hirai Y, Kawato Y, Egami H, Hamashima Y, Asai T, Dewa T, Oku N., Rigorous control of vesicle-forming lipid pKa by fluorine-conjugated bioisosteres for gene-silencing with siRNA. *J. Control Release.* **295**, 87-92. 2019.
- 15) **Koide H**, Yoshimatsu K, Hoshino Y, Ariizumi S, Okishima A, Ide T, Egami H, Hamashima Y, Nishimura Y, Kanazawa H, Miura Y, Asai T, Oku N, Shea KJ., Sequestering and inhibiting a vascular endothelial growth factor in vivo by systemic administration of a synthetic polymer nanoparticle., *J. Control Release.* **295**, 13-20. 2019.
- 16) Okamoto A, Asai T, Hirai Y, Shimizu K, **Koide H**, Minamino T, Oku N., Systemic Administration of siRNA with Anti-HB-EGF Antibody-Modified Lipid Nanoparticles for the Treatment of Triple-Negative Breast Cancer., *Mol Pharm.*, **4**, 1495-1504, 2018.

- 17) **Koide H**, Tsuchida H, Nakamoto M, Okishima A, Ariizumi S, Kiyokawa C, Asai T, Hoshino Y, Oku N, Rational designing of an antidote nanoparticle decorated with abiotic polymer ligands for capturing and neutralizing target toxins, *J Control Release*, **268**, 335-342, 2017.
- 18) **Koide H**, Yoshimatsu K, Hoshino Yu, Lee S, Okajima A, Ariizumi S, Narita Y, Yonamine Y, Weisman A C, Nishimura Y, Oku N, Miura Y, and Shea KJ, A Polymer Nanoparticle with Engineered Affinity for a Vascular Endothelial Growth Factor (VEGF₁₆₅), *Nature Chemistry*, **9**, 715–722, 2017.
- 19) Fukuta T, Asai T, Yanagida Y, Namba M, **Koide H**, Shimizu K and Oku N, Combination therapy with liposomal neuroprotectants and tissue plasminogen activator for treatment of ischemic stroke, *FASEB J.*, **5**, 1879-1890, 2017.
- 20) Fukuta T, Asai T, Ishii T, **Koide H**, Kiyokawa C, Hashimoto M, Kikuchi T, Shimizu K, Harada N, Tsukada H, Oku N, Non-invasive evaluation of neuroprotective drug candidates for cerebral infarction by PET imaging of mitochondrial complex-I activity, *Sci Rep.*, **6**, 30127, 2016.
- 21) Fukuta T, Asai T, Sato A, Namba M, Yanagida Y, Kikuchi T, **Koide H**, Shimizu K, Oku N, Neuroprotection against cerebral ischemia/reperfusion injury by intravenous administration of liposomal fasudil. *Int J Pharm.*, **506**, 129-137. 2016.
- 22) **Koide H**, Okamoto A, Tsuchida H, Ando H, Ariizumi S, Kiyokawa C, Hashimoto M, Asai T, Dewa T, Oku N, One-step encapsulation of siRNA between lipid-layers of multi-layer polycation liposomes by lipoplex freeze-thawing, *J Control Release*, **228**, 1-8, 2016.
- 23) Waki N, Kuwabara Y, Yoshikawa Y, Suganuma H, **Koide H**, Oku N, Ohashi N, Amelioration of *Citrobacter rodentium* proliferation in early stage of infection in mice by pretreatment with *Lactobacillus brevis* KB290 and verification using in vivo bioluminescence imaging, *FEMS Microbiol Lett.*, **364**, 6, 2017.
- 24) Yoshimatsu K, **Koide H**, Hoshino Y, Shea KJ, Preparation of abiotic polymer nanoparticles for sequestration and neutralization of a target peptide toxin, *Nature Protocols*, **4**, 595-604, 2015.
- 25) **Koide H**, Asai T, Kato H, Yonenaga N, Yokota M, Ando H, Dewa T, Nango M, Maeda N, Oku N, Susceptibility of PTEN-positive metastatic tumors to small interfering RNA targeting the mammalian target of rapamycin, *Nanomedicine*, **1**, 185-194, 2015.
- 26) Ando H, Asai T, **Koide H**, Okamoto A, Maeda N, Tomita K, Dewa T, Minamino T, Oku N., Advanced cancer therapy by integrative antitumor actions via systemic administration of miR-499, *J Control Release*, **181**, 32-39, 2014.
- 27) Siripong P, Yahuafai J, Piyaviriyakul S, Kanokmedhakul K, **Koide H**, Ishii T, Shimizu K, Ruchirawat S, Oku N, Inhibitory effect of liposomal rhinacanthin-N isolated from *Rhinacanthus nasutus* on pulmonary metastasis in mice, *Biol Pharm Bull.*, **35**, 1197-1200, 2012.
- 28) **Koide H**, Asai T, Kato H, Ando H, Shiraishi K, Yokoyama M, Oku N, Size-dependent induction of accelerated blood clearance phenomenon by repeated injections of polymeric micelles, *Int J Pharm.*, **432**, 75-79, 2012.
- 29) Hoshino Y, **Koide H**, Furuya K, Haberaecker W W., Lee S, Kodama T, Kanawaza H, Oku N, and Shea K J, The rational design of a plastic antidote: synthetic polymer nanoparticles that neutralize toxic peptides in vivo, *Proc Natl Acad Sci USA*, **109**, 33-38, 2012.

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- 31) **Koide H** Asai T, Furuya K, Tsuzuku T, Kato H, Dewa T, Nango M, Maeda N, and Oku N, Inhibition of Akt (ser473) phosphorylation and rapamycin-resistant cell growth by mammalian target of rapamycin knockdown with siRNA in VEGFR-1 targeting vector, *Biol. Pharm. Bull.*, **34**, 602-608. 2011.
- 32) Asakawa T, Hiza A, Nakayama M, Inai M, Oyama D, **Koide H**, Shimizu K, Wakimoto T, Harada N, Tsukada H, Oku N and Kan T, PET imaging of nobiletin based on a practical total synthesis, *Chem. Commun. (Camb)*. **47**. 2868-2870. 2011.
- 33) **Koide H**, Asai T, Hatanaka K, Akai S, Ishii T, Kenjo E, Ishida T, Kiwada H, Tsukada H and Oku N, T cell-independent B cell response is responsible for ABC phenomenon induced by repeated injection of PEGylated liposomes, *Int. J. Pharm.*, **392**, 218-223. 2010.
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- 35) Hatanaka K, Asai T, **Koide H**, Kenjo E, Tsuzuku T, Harada N, Tsukada H and Oku N, Development of double-stranded siRNA labeling method using positron emitter and its in vivo trafficking analyzed by positron emission tomography, *Bioconjug. Chem.*, **21**, 756- 763, 2010.
- 36) Hoshino Y, Urakami T, Kodama T, **Koide H**, Oku N, Okahata Y and Shea KJ, Design of synthetic polymer nanoparticles that capture and neutralize a toxic peptide, *Small.*, **5**, 1562-1568, 2009.
- 37) Urakami T, Kawaguchi A, Akai S, Hatanaka K, **Koide H**, Shimizu K, Asai T, Fukumoto D, Harada N, Tsukada H and Oku N, In vivo trafficking of liposome-encapsulated hemoglobin determined by positron emission tomography, *Artificial Organs*, **33**, 164-168, 2009.
- 38) **Koide H**, Asai T, Hatanaka K, Urakami T, Ishii T, Kenjo E, Nishihara M, Yokoyama M, Ishida T, Kiwada H and Oku N, Particle size-dependent triggering of accelerated blood clearance phenomenon, *Int. J. Pharm.*, **362**, 197-200, 2008.
- 39) Imanaka H, **Koide H**, Shimizu K, Asai T, Shimizu K N, Ishikado A, Makino T and Oku N, Chemoprevention of tumor metastasis by liposomal beta-sitosterol intake, *Biol. Pharm. Bull.*, **31**, 400-404, 2008.
- 40) Hashimoto M, Takashige K, Furuyashiki M, Yoshidome K, Sano R, Kawamura Y, Ijichi S, Morioka H, **Koide H**, Oku N, Moriya Y, Kusumoto S and Suda Y., Enhancement of antitumor activity of OK-432 (Picibanil) by Triton X-114 phase partitioning, *Int. Immunopharmacology.*, **8**, 12-19, 2008.

b) REVIEWS

- 1) **Koide H**, Design of synthetic polymer nanoparticles that capture and neutralize target molecules, *Yakugaku Zasshi*, 141, 1079-1086. 2021.
- 2) **Koide H**, Yonezawa S, Asai T., siRNA Vehicles for High Endosomal Escapability. *Methods Mol Biol.* **2282**, 171-179, 2021.

- 3) **Koide H***, Design of Functional Nanoparticles for Intractable Disease Therapy. ***Biol Pharm Bull.*** 44, 1-6, 2021.
- 4) Yonezawa S, **Koide H**, Asai T., Recent advances in siRNA delivery mediated by lipid-based nanoparticles. ***Adv Drug Deliv Rev.*** 154, 64-78, 2020.
- 5) **Koide H**, Asai T, Shimizu K and Oku N, Drug carrier systems for anticancer agents, ***CRC press.*** Medicinal and Pharmaceutical Applications, **Volume 2**, 153–170, 2013.
- 6) Ando H, Yonenaga N, Asai T, Hatanaka K, **Koide H**, Tsuzuku T, Harada N, Tsukada H, Oku N, In vivo imaging of liposomal small interfering RNA (siRNA) trafficking by positron emission tomography, ***YAKUGAKU ZASSHI***, Review, **12**, 1373-1381, 2012.
- 7) **Koide H**, Asai T, Hatanaka K, Shimizu K, Yokoyama M, Ishida T, Kiwada H, and Oku N, Elucidation of accelerated blood clearance phenomenon caused by repeat injection of PEGylated nanocarriers, ***YAKUGAKU ZASSHI***, Review, **129**, 1445-1451, 2009.