# BIOGRAPHICAL SKETCH

| NAME | POSITION TITLE |
|---|---|
| Hoffman, P. Matthew | Senior Investigator |
| eRA COMMONS USER NAME (credential, e.g., agency login) | |

EDUCATION/TRAINING

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | MM/YY | FIELD OF STUDY |
|---|---|---|---|
| University of Otago School of Dentistry Dunedin, New Zealand | B.D.S. | 12/1986 | Dentistry |
| University of Rochester School of Medicine and Dentistry, Rochester, NY | Ph.D. | 06/1994 | Microbiology and Immunology |
| NIDCR, NIH | Postdoctoral | 06/1997 | Cell and Developmental Biology |

**A. Personal statement**

The overall objective of the laboratory is to investigate the diverse regulatory inputs that drive salivary gland development from the earliest stages of cell commitment, progenitor cell maintenance, and differentiation to growth and morphogenesis, culminating in the formation of a functional salivary gland. We analyze interactions among the various cell types and their stem/progenitor cells, including the epithelial, neuronal, and mesenchymal cells, and their extracellular matrix (ECM) microenvironment, or niche. Elucidating how progenitor cells are directed along a series of cell fate decisions to form a functional gland is critical to understanding organogenesis, and provides a template for future regenerative therapy. We are using the knowledge we gain from studying organogenesis to develop ways to protect glands from radiation damage and repair damaged glands using a cell-based regenerative therapy.

**B. Positions and Honors**

**Positions and Employment**

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|---|---|
| 1987-88 | Dental House Surgeon (1st and 2nd Year) Wellington Hospital Board, Wellington, NZ |
| 1989 | Research Assistant, Dental Research Unit, NZ Medical Research Council, Wellington, NZ |
| 1997-2000 | Visiting Associate, Cell Biology Section, Craniofacial Developmental Biology and Regeneration Branch, NIDCR, NIH |
| 2000-2003 | Staff Scientist, Cell Biology Section, Craniofacial Developmental Biology and Regeneration Branch, NIDCR, NIH |
| 2004-2011 | Investigator, Matrix and Morphogenesis Unit, LCDB, NIDCR, NIH |
| 2011-present | Senior Investigator, Matrix and Morphogenesis Section LCDB, NIDCR, NIH |

**Awards, Honors And Professional Activities**

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| 2013 | Elected AAAS Fellow |
| 2012-13 | Serves on selection committee for the Medical Research Scholars Program at NIH. |
| 2012 | Served on the Earl Stadtman Search Committee for the Stem Cells/IPS Cell Group. |
| 2011&12 | NIDCR Individual Award for Exceptional Performance |
| 2009 | International Association of Dental Research, Salivary Research Group, Salivary Researcher of the Year Award |
| 2007 | Elected Vice Chair (2009) and Chair (2011) of Gordon Research Conference on Salivary Glands and Exocrine Secretions |
| 2005-06 | Past President of the Salivary Research Group of IADR |
| 2005 | Organized Symposium on Salivary Development and Regeneration, IADR, Baltimore MD |
| 2004-05 | President of the Salivary Research Group of IADR |
| 2003-04 | Vice President of the Salivary Research Group of IADR |
| 2002 | NIDCR, NIH Award for Excellence in Mentoring |
| 2002 | NIDCR Travel Award |
| 1999 | NIDCR, NIH Award for Research Initiative |

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| 1998 | NIDCR, NIH Award for Research Excellence |
| 1996-1997 | NASA award to fund the project "Salivary gland cell differentiation in the RWV Bioreactor." 2 years |
| 1996 | NIDR, NIH Award for Research Excellence |
| 1996 | Poster Award at the 3rd Pan Pacific Connective Tissue Societies Symposium |
| 1995 | NIDR, NIH Award for Innovative Research |
| 1990 | NZDA. Award for Research, New Zealand Dental Association |
| 1989-1993 | Fulbright Travel Scholarship, NZ/US Fulbright Commission |
| 1986 | Dental Research Foundation Prize, New Zealand Dental Research Foundation |
| 1986 | Leask Memorial Medal for Clinical Dentistry, University of Otago |
| 1983 | J. Lee-Jones Prize in Preclinical Dentistry, University of Otago |
| 1984 | O.V. Davies Memorial Prize in Basic Dental Surgery, University of Otago |

**Professional Societies**

American Association for the Advancement of Science
American Society for Matrix Biology
Society for Developmental Biology
International Association for Dental Researc
International Society for Stem Cell Research

## C. Selected Peer-reviewed Publications

2014 Nedvetsky, P.I., Emmerson E., Ettinger, A., Cruz-Pacheco, N., Prochazka, J., Haddox, C.L. Finley, J., Northrup, E., Hodges, C., Mostov, K.E. Hoffman, M. P., and Knox, S.M. Parasympathetic innervation regulates tubulogenesis in the developing salivary gland. Dev Cell Aug 25;30(4):449-62. doi: 10.1016/j.devcel.2014.06.012.

2014 Patel V.N., Lombaert I.M., Cowherd S.N., Shworak N.W., Xu, Y., Liu, J., and Hoffman M.P. Hs3st3-modified heparan sulfate controls KIT+ progenitor expansion by regulating 3-O-sulfotransferases. Dev Cell June 23;29(6):662-73. doi: 10.1016/j.devcel.2014.04.024.

2014 Patel V. N, Hoffman M.P. Salivary gland development: A template for regeneration. Semin Cell Dev Biol. Dec 11. pii: S1084-9521(13)00130-4. doi: 10.1016/j.semcdb.2013.12.001.

2013 Lombaert, I.M.A. Abrams, S.R. Li, L. Eswarakumar, V.P. Sethi, A.J. Witt, R.L. and Hoffman, M.P. Combined KIT and FGFR2b signaling regulates epithelial progenitor expansion during organogenesis. Stem Cell Reports. Dec 12;1(6):604-19. doi: 10.1016/j.stemcr.2013.10.013.

2013 Holmberg, K.V. and Hoffman, M.P. Anatomy, biogenesis, and regeneration of salivary glands. Monographs in Oral Science: Saliva. Eds. Ligtenberg and Verrman. 2013. (In Press)

2013 Ferreira, J.N., and Hoffman, MP. Interactions between developing nerves and salivary glands. Organogenesis 9:3, 1–7; July/August/September

2013 Knox, S.M., Lombaert, I.M.A., Haddox, C.L., Abrams, S.R., Cotrim, A., Wilson, A.J., and Hoffman, MP. Parasympathetic stimulation improves epithelial organ regeneration. Nature Commun, February 19, 4:1494. doi: 10.1038/ncomms2493

2013 Lombaert, I.M.A. and Hoffman, M.P. Stem cells in salivary gland development and regeneration. Huang, G. and Thesleff, I. (Eds) Stem cells in craniofacial development, regeneration and repair". Wiley Blackwell, 14:271-284.

2012 Tian, E, Hoffman, M.P., and Ten Hagen, K.G. O-glycosylation modulates integrin and FGF signaling by influencing the secretion of basement membrane components. Nature Commun, May 29;3:869. doi: 10.1038/ncomms1874

2012 Rebustini, I.T., Hayashi, T., Reynolds, A.D., Dillard, M.L., Carpenter, E.M., and Hoffman, M.P. miR-200c regulates FGFR-dependent epithelial proliferation via VLDLR during submandibular gland branching morphogenesis Development. Jan;139(1):191-202.

2012 Knosp, W.M., Knox, S.M., and Hoffman, M.P. Salivary gland organogenesis. WIREs Dev Biol, 1:69–82. doi: 10.1002/wdev.4

2011 Hsu, J.C., Di Pasquale, G., Harunaga, J.S., Onodera, T., Hoffman, M.P., Chiorini, J.A., Yamada, K.M. Viral Gene Transfer to Developing Mouse Salivary Glands. J Dent Res. 2011 Nov 17, PMID: 22095070

2011 Tsau, C., Ito, M., Gromova, A., Hoffman, M.P., Meech, R. and Makarenkova H. Barx2 and FGF10 regulate ocular gland branching morphogenesis by controlling extracellular matrix remodeling.

Development. 138(15):3307-17
2011 Lombaert, I.M.A, Knox, S.M., and Hoffman, M.P. Salivary gland progenitor cell biology provides a rationale for therapeutic salivary gland regeneration. Oral Diseases. 17(5):445-9. doi: 10.1111/j.1601-0825.2010.01783.
2010 Knox, S. M., Lombaert, I. M. A., Reed, X., Gutkind, J. S, Vitale-Cross, L. and M. P. Hoffman. Parasympathetic innervation maintains epithelial progenitor cells during salivary organogenesis. Science, 329:1645-472.
2010 Lombaert, I.M. A., and Hoffman, M.P. Epithelial Stem/Progenitor Cells in the Embryonic Mouse Submandibular Gland. Tucker AS, Miletich I (eds): Salivary Glands: Development, Adaptations and Disease. Front Oral Biol. Basel, Karger, 14: 90–106.
2009 Rebustini, I.T., Myers, C., Lassiter, K.S., Surmak, A., Szabova, L., Holmbeck, K., Pedchenko, V., Hudson, B.G., and Hoffman, M.P. MT2-MMP-dependent release of collagen IV NC1 domains regulates submandibular gland branching morphogenesis. Dev Cell, Oct;17(4):482-93.
2009 Suzuki, N., Yoshimura, T., Urushibata, S., Gumerson, J.D., Michele, D.E., Hoffman, M. P., Kikkawa, Y., Hozumi, K., Yamada, Y., and Nomizu, M. Identification of α-Dystroglycan Binding Sequences in the Laminin α2 Chain LG4-5 Module. Matrix Biol, 29(2):143-51.
2009 Makarenkova, H.P., Hoffman, M.P., Beenken, A., Eliseenkova, A.V., Meech, R., Tsau, C., Patel, V.N., Lang, R.A., Mohammadi, M. A molecular basis for FGF gradient formation and during branching morphogenesis. Science Signaling, 2 (88), ra55. DOI:10.1126/Scisignal.2000304
2009 Rebustini, I.T., and Hoffman, M.P. ECM and FGF-dependent Assay of Embryonic SMG epithelial morphogenesis. Chapter in Extracellular Matrix Protocols, 2nd Edition, Humana Press. Editors S Evan-Ram and V Artym.
2008 Knox, S.M., and Hoffman, M.P. Salivary gland development. Chapter in Saliva Diagnostics. Blackwell Publications. Editor D.T. Wong. Chpt 1: pp3-13. .
2008 Walker, J.L., Menko S.A., Khalil, S., Rebustini, I.T., Hoffman, M.P., Kreidberg, J.A. and M.A. Kukuruzinska. Diverse roles of E-cadherin in the morphogenesis of the mouse submandibular gland: Insights into the formation of acinar and ductal structures. Dev Dyn Nov;237(11):3128-41.
2008 Patel, V.N., Likar, K.M., Zisman-Rozen, S., Cowherd, S.N., Lassiter, K.S., Sher, I., Yates, E.A., Turnbull, J.E., Ron, D., and Hoffman, M.P. (2008). Specific Heparan Sulfate Structures Modulate FGF10-mediated Submandibular Gland Epithelial Morphogenesis and Differentiation. J Biol Chem 283, 9308-9317.
2007 Patel, V.N., Knox, S.M., Likar, K.M., Lathrop, C.A., Hossain, R., Eftekhari, S., Whitelock, J.M., Elkin, M., Vlodavsky, I., and Hoffman, M.P. (2007). Heparanase cleavage of perlecan heparan sulfate modulates FGF10 activity during ex vivo submandibular gland branching morphogenesis. Development 134, 4177-4186.
2007 Freitas, V.M., Vilas-Boas, V.F., Pimenta, D.C., Loureiro, V., Juliano, M.A., Carvalho, M.R., Pinheiro, J.J., Camargo, A.C., Moriscot, A.S., Hoffman, M.P., et al. (2007). SIKVAV, a laminin alpha1-derived peptide, interacts with integrins and increases protease activity of a human salivary gland adenoid cystic carcinoma cell line through the ERK 1/2 signaling pathway. Am J Pathol 171, 124-138.
2007 Rebustini, I.T., Patel, V.N., Stewart, J.S., Layvey, A., Georges-Labouesse, E., Miner, J.H., and Hoffman, M.P. (2007). Laminin alpha5 is necessary for submandibular gland epithelial morphogenesis and influences FGFR expression through beta1 integrin signaling. Dev Biol 308, 15-29.
2007 Wei, C., Larsen, M., Hoffman, M.P., and Yamada, K.M. (2007). Self-organization and branching morphogenesis of primary salivary epithelial cells. Tissue Eng 13, 721-735.
2006 Cid, M.C., Hoffman, M.P., Hernandez-Rodriguez, J., Segarra, M., Elkin, M., Sanchez, M., Vilardell, C., Garcia-Martinez, A., Pla-Campo, M., Grau, J.M., et al. (2006). Association between increased CCL2 (MCP-1) expression in lesions and persistence of disease activity in giant-cell arteritis. Rheumatology (Oxford) 45, 1356-1363.
2006 Fukumoto, S., Miner, J.H., Ida, H., Fukumoto, E., Yuasa, K., Miyazaki, H., Hoffman, M.P., and Yamada, Y. (2006). Laminin alpha5 is required for dental epithelium growth and polarity and the development of tooth bud and shape. J Biol Chem 281, 5008-5016.
2006 Patel, V.N., Rebustini, I.T., and Hoffman, M.P. (2006). Salivary gland branching morphogenesis. Differentiation 74, 349-364.

2006 Philp, D., Scheremeta, B., Sibliss, K., Zhou, M., Fine, E.L., Nguyen, M., Wahl, L., Hoffman, M.P., and Kleinman, H.K. (2006). Thymosin beta4 promotes matrix metalloproteinase expression during wound repair. J Cell Physiol 208, 195-200.

2005 Hibino, S., Shibuya, M., Hoffman, M.P., Engbring, J.A., Hossain, R., Mochizuki, M., Kudoh, S., Nomizu, M., and Kleinman, H.K. (2005). Laminin alpha5 chain metastasis- and angiogenesis-inhibiting peptide blocks fibroblast growth factor 2 activity by binding to the heparan sulfate chains of CD44. Cancer Res 65, 10494-10501.

2005 Steinberg, Z., Myers, C., Heim, V.M., Lathrop, C.A., Rebustini, I.T., Stewart, J.S., Larsen, M., and Hoffman, M.P. (2005). FGFR2b signaling regulates ex vivo submandibular gland epithelial cell proliferation and branching morphogenesis. Development 132, 1223-1234.

2004 Corey, D.P., Garcia-Anoveros, J., Holt, J.R., Kwan, K.Y., Lin, S.Y., Vollrath, M.A., Amalfitano, A., Cheung, E.L., Derfler, B.H., Duggan, A., Géléoc, G.S.G., Gray, P.A., Hoffman, M.P., Rehm, H.L., Tamasauskas, D. and.Zhang, D.S. (2004). TRPA1 is a candidate for the mechanosensitive transduction channel of vertebrate hair cells. Nature 432, 723-730.

2004 Freitas, V.M., Scheremeta, B., Hoffman, M.P., and Jaeger, R.G. (2004). Laminin-1 and SIKVAV a laminin-1-derived peptide, regulate the morphology and protease activity of a human salivary gland adenoid cystic carcinoma cell line. Oral Oncol 40, 483-489.

2003 Kleinman, H.K., Philp, D., and Hoffman, M.P. Role of the extracellular matrix in morphogenesis. Curr Opin Biotechnol 14, 526-532.

2003 Larsen, M., Hoffman, M.P., Sakai, T., Neibaur, J.C., Mitchell, J.M., and Yamada, K.M. (2003). Role of PI 3-kinase and PIP3 in submandibular gland branching morphogenesis. Dev Biol 255, 178-191.

2003 Laurent, M., Martinerie, C., Thibout, H., Hoffman, M.P., Verrecchia, F., Le Bouc, Y., Mauviel, A., and Kleinman, H.K. (2003). NOVH increases MMP3 expression and cell migration in glioblastoma cells via a PDGFR-alpha-dependent mechanism. Faseb J 17, 1919-1921.

2003 Suzuki, N., Ichikawa, N., Kasai, S., Yamada, M., Nishi, N., Morioka, H., Yamashita, H., Kitagawa, Y., Utani, A., Hoffman, M.P., et al. (2003). Syndecan binding sites in the laminin alpha1 chain G domain. Biochemistry 42, 12625-12633.

2002 Engbring, J.A., Hoffman, M.P., Karmand, A.J., and Kleinman, H.K. (2002). The B16F10 cell receptor for a metastasis-promoting site on laminin-1 is a heparan sulfate/chondroitin sulfate-containing proteoglycan. Cancer Res 62, 3549-3554.

2002 Hecht, D., Jung, D., Prabhu, V.V., Munson, P.J., Hoffman, M.P., and Kleinman, H.K. (2002). Metallothionein promotes laminin-1-induced acinar differentiation in vitro and reduces tumor growth in vivo. Cancer Res 62, 5370-5374.

2002 Hoffman, M.P., Kidder, B.L., Steinberg, Z.L., Lakhani, S., Ho, S., Kleinman, H.K., and Larsen, M. (2002). Gene expression profiles of mouse submandibular gland development: FGFR1 regulates branching morphogenesis in vitro through BMP- and FGF-dependent mechanisms. Development 129, 5767-5778.

2001 Hoffman, M.P., Engbring, J.A., Nielsen, P.K., Vargas, J., Steinberg, Z., Karmand, A.J., Nomizu, M., Yamada, Y., and Kleinman, H.K. (2001). Cell type-specific differences in glycosaminoglycans modulate the biological activity of a heparin-binding peptide (RKRLQVQLSIRT) from the G domain of the laminin alpha1 chain. J Biol Chem 276, 22077-22085.

2000 Jung, D.W., Hecht, D., Ho, S.W., O'Connell, B.C., Kleinman, H.K., and Hoffman, M.P. (2000). PKC and ERK1/2 regulate amylase promoter activity during differentiation of a salivary gland cell line. J Cell Physiol 185, 215-225.

2000 Nielsen, P.K., Gho, Y.S., Hoffman, M.P., Watanabe, H., Makino, M., Nomizu, M., and Yamada, Y. (2000). Identification of a major heparin and cell binding site in the LG4 module of the laminin alpha 5 chain. J Biol Chem 275, 14517-14523.

1998 Hoffman, M.P., Nomizu, M., Roque, E., Lee, S., Jung, D.W., Yamada, Y., and Kleinman, H.K. (1998). Laminin-1 and laminin-2 G-domain synthetic peptides bind syndecan-1 and are involved in acinar formation of a human submandibular gland cell line. J Biol Chem 273, 28633-28641.

1996 Hoffman, M.P., Kibbey, M.C., Letterio, J.J., and Kleinman, H.K. Role of laminin-1 and TGF-beta 3 in acinar differentiation of a human submandibular gland cell line (HSG). J Cell Sci 109 ( Pt 8), 2013-2021.

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