

## References

1. Davidovitch Z, Nicolay OF, Ngan PW, Shanfeld JL. Neurotransmitters, cytokines, and the control of alveolar bone remodeling in orthodontics. *Dent Clin North Am* 1988;32(3):411-35.
2. Vandevska-Radunovic V. Neural modulation of inflammatory reactions in dental tissues incident to orthodontic tooth movement. *Eur J Orthod* 1999;21:231-247.
3. Kvinnslund I, Kvinnslund S. Changes in CGRP-immunoreactive nerve fibres during experimental tooth movement in rats. *Eur J Orthod* 1990;12:320-329.
4. Kurihara H, Shinohara H, Yoshino H, Takeda K, Shiba H. Neurotrophins in cultured cells from periodontal tissues. *J Periodontol* 2003;74(1):76-84.
5. O'Hara A. An immunohistochemical investigation into the expression of nerve growth factor and its receptors in the rat dento-alveolar complex subjected to orthodontic forces. Thesis. University of Adelaide, Adelaide; 2005.
6. Davidovitch Z. Cell biology associated with orthodontic tooth movement. 2nd ed. London: Mosby-Wolfe; 1995.
7. Mitsiadis TA, Dicou E, Joffre A, Magloire H. Immunohistochemical localization of nerve growth factor (NGF) and NGF receptor (NGF-R) in the developing first molar tooth of the rat. *Differentiation* 1992;49(1):47-61.
8. Ren K, Thomas DA, Dubner R. Nerve growth factor alleviates a painful peripheral neuropathy in rats. *Brain Res* 1995;699(2):286-92.
9. Hassell TM. Tissues and cells of the periodontium. *Periodontol* 2000 1993;3:9-38.
10. Freeman E. Development, Structure and Function. In: Ten Cate AR, editor. *Oral Histology*. St Louis: C.V. Mosby; 1998. p. 253-288.
11. Bosshardt D, Selvig K. Dental cementum: the dynamic tissue covering the root. *Periodontol* 2000 1997;13:41-75.
12. Goldman HM, Gianelly AA. Histology of tooth movement. *Dent Clin North Am* 1972;16(3):439-448.
13. Storey E. The nature of orthodontic tooth movement. *Am J Orthod* 1973;63:292-314.

14. Proffit WR. Contemporary Orthodontics. 3rd ed. St. Louis: Mosby; 1999.
15. Schroeder H, Page R. The normal periodontium. In: Schluger S, Yuodelis R, Page R, Johnson R, editors. Periodontal diseases. Philadelphia: Lea and Febiger; 1990. p. 11.
16. Mariotti A, Cochran DL. Characterization of fibroblasts derived from human periodontal ligament and gingiva. *J Periodontol* 1990;61(2):103-11.
17. Berkovitz B, Moxham B, Newman H. The periodontal ligament in health and disease. 2 ed. London: Mosby-Wolfe; 1995.
18. Yamasaki A, Rose G, Pinero G, Mahan C. Ultrastructure and morphometric analyses of human cementoblasts and periodontal fibroblasts. *J Periodontol* 1987b;58:192-201.
19. Brudvik P, Rygh P. Non-clast cells start orthodontic root resorption in the periphery of hyalinized zones. *Eur J Orthod* 1993;15(6):467-480.
20. Valderhaug JP. Epithelial cells in the periodontal membrane of teeth with and without periapical inflammation. *International Journal of Oral Surgery* 1974;3:7-16.
21. Wesselink PR, Beersteen W. The prevalence and distribution of rests of Malassez in the mouse molar and their possible role in repair and maintenance of the periodontal ligament. *Arch Oral Biol* 1993;38:399-403.
22. Kvinnslund S, Heyeraas K, Ofjord ES. Effect of experimental tooth movement on periodontal and pulpal blood flow. *Eur J Orthod* 1989;11(3):200-5.
23. Brice GL, Sampson WJ, Sims MR. An ultrastructural evaluation of the relationship between epithelial rests of Malassez and orthodontic root resorption and repair in man. *Australian Orthodontic Journal* 1991;12:90-94.
24. Fristad I. Dental innervation: functions and plasticity after peripheral injury. *Acta Odontol Scand* 1997;55(4):236-54.
25. Linden RWM, B J; Scott, B J J. The Innervation of the periodontal ligament. In: Berkovitz BKBM, B J; Newman, H N, editor. *The Periodontal Ligament in health and disease*. 2nd ed. London: Mosbey-Wolfe; 1995. p. 259-278.

26. Byers MR. Sensory innervation of periodontal ligament of rat molars consists of unencapsulated Ruffini-like mechanoreceptors and free nerve endings. *J Comp Neurol* 1985;231(4):500-18.
27. Griffin CJ, Spain H. Organization and vasculature of human periodontal ligament mechanoreceptors. *Arch Oral Biol* 1972;17(6):913-21.
28. Linden RW, Scott BJ. Distribution of mesencephalic nucleus and trigeminal ganglion mechanoreceptors in the periodontal ligament of the cat. *J Physiol* 1989;410:35-44.
29. Lewin GR, Mendell LM. Nerve growth factor and nociception. *Trends Neurosci* 1993;16(9):353-9.
30. Miles T. Common Sensation and Local Anaesthesia. In: Lecture Notes in Physiology. Sydney: The Royal Australasian College of Dental Surgeons Incorporated; 2000. p. 8-13.
31. Linden RWA, Millar BJ, Scott BJJ. The Innervation of the Periodontal Ligament. In: Berkovitz BKB, Moxham BJ, Newman HN, editors. *The Periodontal Ligament in Health and Disease*. Second ed. Philadelphia: Mosby-Wolfe; 1995. p. 133-160.
32. Sims MR. Electron-microscopic affiliations of oxytalan fibres, nerves and the microvascular bed in the mouse periodontal ligament. *Arch Oral Biol* 1983;28(11):1017-24.
33. Freezer SR, Sims MR. A transmission electron-microscope stereological study of the blood vessels, oxytalan fibres and nerves of mouse-molar periodontal ligament. *Arch Oral Biol* 1987;32(6):407-12.
34. Reitan K. The Effects of External Forces on The Periodontal Ligament. In: Berkovitz BKB, Moxham BJ, Newman HN, editors. *The Periodontal Ligament in Health and Disease*. 2nd ed. London: Moseby-Wolfe; 1995. p. 227-228.
35. Collett T. Biology of tooth movement. In: Fricker J, editor. *Otrthodontics and dentofacial orthopaedics*. Canberra: Tidbinbillia Pty Ltd; 1998.
36. Waldo CM, Rothblatt JM. Histological response to tooth movement in the laboratory rat. *J Dent Res* 1954;33(4):481-486.
37. Reitan K. The initial tissue reaction incident to orthodontic tooth movement as related to the influence of function. *Acta Odontol Scand* 1951;9(6):1-240.
38. Rygh P. Ultrastructural changes of the periodontal fibres and their attachment in rat molar periodontium incident to orthodontic tooth movement. *Scand J Dent Res* 1973;81(6):467-80.

39. Rygh P. Ultrastructural changes in tension zones of rat molar periodontium incident to orthodontic tooth movement. *Am J Orthod* 1976;70(3):269-81.
40. Rygh P, Brudvik P. The histological responses of the periodontal ligament to horizontal orthodontic loads. In: Berkovitz B, Moxham B, Newman H, editors. *The Periodontal Ligament in health and disease*. 2nd ed. London: Mosbey-Wolfe; 1995. p. 227-228.
41. Rygh P, Bowling K, Hovlandsdal L, William S. Activation of the vascular system: a main mediator of periodontal fibre remodelling in orthodontic tooth movement. *Am J Orthod* 1986;89:453-468.
42. Davidovitch Z. Cell biology associated with orthodontic tooth movement. In: Berkovitz B, Moxham B, Newman H, editors. *The periodontal ligament in health and disease*. Second ed. Philadelphia: Mosby-Wolfe; 1995. p. 259-278.
43. Bien SM. Fluid dynamic mechanisms which regulate tooth movement. *Adv Oral Biol* 1966;2:173-201.
44. Lucht U. Osteoclasts: ultrastructure and function. In: Carr I, Daems W, editors. *The reticuloendothelial system. A comprehensive treatise*. New York: Plenum Press; 1980. p. 705-734.
45. Lucht U. Osteoclasts and their relationship to bone as studied by electron microscopy. *Zeitschrift fur Zellforschung und Mikroskopische Anatomie* 1972;135:211-228.
46. Yee JA. Response of Periodontal Ligament Cells to Orthodontic Force: Ultrastructural Identification of Proliferating Fibroblasts. *Anat Rec* 1979;194:603-614.
47. Rygh P. Ultrastructural cellular reactions in pressure zones of rat molar periodontium incident to orthodontic tooth movement. *Acta Odontol Scand* 1972;30(5):575-93.
48. Rygh P, Reitan K. Ultrastructural changes in the periodontal ligament incident to orthodontic tooth movement. *Trans Eur Orthod Soc* 1972:393-405.
49. Rygh P. Ultrastructural vascular changes in pressure zones of rat molar periodontium incident to orthodontic movement. *Scand J Dent Res* 1972;80(4):307-21.
50. Rygh P. Ultrastructural changes in pressure zones of human periodontium incident to orthodontic tooth movement. *Acta Odontol Scand* 1973;31(2):109-22.

51. Rygh P. Elimination of hyalinized periodontal tissues associated with orthodontic tooth movement. *Scand J Dent Res* 1974;82(1):57-73.
52. Proffit WR. *Contemporary Orthodontics*. 3rd ed: Mosby; 1999.
53. Roberts WE. Bone Physiology, Metabolism, and Biomechanics in Orthodontic Practice. In: Graber TMV, R L J, editor. *Orthodontics: Current Principles and Techniques*. St Louis: Mosby; 2000. p. 231-237.
54. Miyoshi K, Igarashi K, Saeki S, Shinoda H, Mitani H. Tooth movement and changes in periodontal tissue in response to orthodontic force in rats vary depending on the time of day the force is applied. *Eur J Orthod* 2001;23(4):329-38.
55. Rody WJJ, King GJ, Gu G. Osteoclast recruitment to sites of compression in orthodontic tooth movement. *American Journal of Orthodontics and Dentofacial Orthopedics* 2001;120:477-489.
56. Rana MW, Pothisiri V, Killiany DM, Xu XM. Detection of apoptosis during orthodontic tooth movement in rats. *Am J Orthod Dentofacial Orthop* 2001;119(5):516-21.
57. Noxon SJ, King GJ, Gu G, Huang G. Osteoclast clearance from periodontal tissues during orthodontic tooth movement. *Am J Orthod Dentofac Orthop* 2001;120(5):466-476.
58. Reitan K. Behavior of Malassez' epithelial rests during orthodontic tooth movement. *Acta Odontol Scand* 1961;19:443-68.
59. Gilhuus-Moe O, Kvam E. Behaviour of the epithelial remnants of malassez following experimental movement of rat molars. *Acta Odontol Scand* 1972;30(2):139-49.
60. Kittel PW, Sampson WJ. RME-induced root resorption and repair: a computerised 3-D reconstruction. *Aust Orthod J* 1994;13(3):144-51.
61. Lambrechts I, Creemers J, Van Steenberghe D. Periodontal neural endings intimately relate to epithelial rests of Malassez in humans. A light and electron microscope study. *J Anat* 1993;182 (Pt 2):153-62.
62. Kvinnslund IH, Tadokoro O, Heyeraas KJ, Kozawa Y, Vandevska-Radunovic V. Neuroendocrine cells in Malassez epithelium and gingiva of the cat. *Acta Odontol Scand* 2000;58(3):107-12.
63. Yamasaki A, Pinero GJ. An ultrastructural study of human epithelial rests of Malassez maintained in a differentiated state in vitro. *Arch Oral Biol* 1989;34(6):443-51.

64. Dolce C, Malone S, Wheeler T, T. Current concepts in the biology of orthodontic tooth movement. *Seminars Orthod* 2002;8(1):6-12.
65. Davidovitch Z. Tooth movement. *Crit Rev Oral Biol Med* 1991;2(4):411-50.
66. Hayashi K, Igarashi K, Miyoshi K, Shinoda H, Mitani H. Involvement of nitric oxide in orthodontic tooth movement in rats. *Am J Orthod* 2002;122:306-309.
67. Wang L, Hilliges M, Jernberg T, Wieglob-Edstrom D, Johansson O. Protein gene product 9.5-immunoreactive nerve fibres and cells in human skin. *Cell Tissue Res* 1990;261(1):25-33.
68. Amara SG, Jonas V, Rosenfeld MG, Ong ES, Evans RM. Alternative RNA processing in calcitonin gene expression generates mRNAs encoding different polypeptide products. *Nature* 1982;298(5871):240-4.
69. Hokfelt T, Kellerth JO, Nilsson G, Pernow B. Experimental immunohistochemical studies on the localization and distribution of substance P in cat primary sensory neurons. *Brain Res* 1975;100(2):235-52.
70. Vandevska-Radunovic V, Kvinnslund S, Kvinnslund IH. Effect of experimental tooth movement on nerve fibres immunoreactive to calcitonin gene-related peptide, protein gene product 9.5, and blood vessel density and distribution in rats. *Eur J Orthod* 1997;19(5):517-29.
71. Saito I, Ishii K, Hanada K, Sato O, Maeda T. Responses of calcitonin gene-related peptide-immunopositive nerve fibres in the periodontal ligament of rat molars to experimental tooth movement. *Arch Oral Biol* 1991;36(9):689-92.
72. Derringer KA, Linden RW. Enhanced angiogenesis induced by diffusible angiogenic growth factors released from human dental pulp explants of orthodontically moved teeth. *Eur J Orthod* 1998;20(4):357-67.
73. Lo Bianco F, Borea G, Barbolini G, Lo Bianco L. Pulpal neuropeptidergic fibers. *Bull Group Int Rech Sci Stomatol Odontol* 1993;36(1-2):23-7.
74. Norevall LI, Forsgren S, Matsson L. Expression of neuropeptides (CGRP, substance P) during and after orthodontic tooth movement in the rat. *Eur J Orthod* 1995;17(4):311-25.
75. Norevall LI, Matsson L, Forsgren S. Main sensory neuropeptides, but not VIP and NPY, are involved in bone remodeling during orthodontic tooth movement in the rat. *Ann N Y Acad Sci* 1998;865:353-9.

76. Norevall LI, Matsson L, Forsgren S. 5-Hydroxytryptamine immunoreactivity is detectable in sympathetic nerve fibres in rat oral tissues. *Histochem J* 1996;28(7):485-93.
77. Vandevska-Radunovic V, Kvinnslund IH, Kvinnslund S. Effect of inferior alveolar nerve axotomy on periodontal and pulpal blood flow subsequent to experimental tooth movement in rats. *Acta Odontol Scand* 1998;56(1):57-64.
78. Yamashiro T, Fujiyama K, Fujiyoshi Y, Inaguma N, Takano-Yamamoto T. Inferior alveolar nerve transection inhibits increase in osteoclast appearance during experimental tooth movement. *Bone* 2000;26(6):663-9.
79. Vandevska-Radunovic V, Kvinnslund S, Jonsson R. Delayed recruitment of immunocompetent cells in denervated rat periodontal ligament following experimental tooth movement. *J Dent Res* 1999;78(6):1214-20.
80. Bjurholm A, Kreicbergs A, Brodin E, Schultzberg M. Substance P- and CGRP-immunoreactive nerves in bone. *Peptides* 1988;9(1):165-71.
81. Thoenen H, Bandtlow C, Heumann R, Lindholm D, Meyer M, Rohrer H. Nerve growth factor: cellular localization and regulation of synthesis. *Cell Mol Neurobiol* 1988;8(1):35-40.
82. Meakin SO, Shooter EM. The nerve growth factor family of receptors. *Trends Neurosci* 1992;15(9):323-31.
83. Barde YA. Trophic factors and neuronal survival. *Neuron* 1989;2(6):1525-34.
84. Chao MV, Hempstead BL. p75 and Trk: a two-receptor system. *Trends Neurosci* 1995;18(7):321-6.
85. Verge VM, Richardson PM, Wiesenfeld-Hallin Z, Hokfelt T. Differential influence of nerve growth factor on neuropeptide expression in vivo: a novel role in peptide suppression in adult sensory neurons. *J Neurosci* 1995;15(3 Pt 1):2081-96.
86. Wheeler EF, Naftel JP, Pan M, von Bartheld CS, Byers MR. Neurotrophin receptor expression is induced in a subpopulation of trigeminal neurons that label by retrograde transport of NGF or fluorogold following tooth injury. *Brain Res Mol Brain Res* 1998;61(1-2):23-38.
87. Streppel M, Azzolin N, Dohm S, Guntinas-Lichius O, Haas C, Grothe C, et al. Focal application of neutralizing antibodies to soluble

- neurotrophic factors reduces collateral axonal branching after peripheral nerve lesion. *Eur J Neurosci* 2002;15(8):1327-42.
88. Zampieri N, Chao MV. Structural biology. The p75 NGF receptor exposed. *Science* 2004;304(5672):833-4.
  89. Barbacid M. Nerve growth factor: a tale of two receptors. *Oncogene* 1993;8(8):2033-42.
  90. Saito I, Hanada K, Maeda T. Alteration of nerve growth factor-receptor expression in the periodontal ligament of the rat during experimental tooth movement. *Arch Oral Biol* 1993;38(11):923-9.
  91. Bothwell M. Neurotrophin Receptors. In: Moccetti I, editor. *Neurobiology of the neurotrophins*. Mountain Home: FP Graham Publishing Co.; 2001. p. 29-45.
  92. Christensen LR, Mollgard K, Kjaer I, Janas MS. Immunocytochemical demonstration of nerve growth factor receptor (NGF-R) in developing human fetal teeth. *Anat Embryol (Berl)* 1993;188(3):247-55.
  93. Luukko K, Moshnyakov M, Sainio K, Saarma M, Sariola H, Thesleff I. Expression of neurotrophin receptors during rat tooth development is developmentally regulated, independent of innervation, and suggests functions in the regulation of morphogenesis and innervation. *Dev Dyn* 1996;206(1):87-99.
  94. Majdan M, Miller FD. Neuronal life and death decisions functional antagonism between the Trk and p75 neurotrophin receptors. *Int J Dev Neurosci* 1999;17(3):153-61.
  95. Byers MR. Segregation of NGF receptor in sensory receptors, nerves and local cells of teeth and periodontium demonstrated by EM immunocytochemistry. *J Neurocytol* 1990;19(5):765-75.
  96. Yamashiro T, Fujiyama K, Fukunaga T, Wang Y, Takano-Yamamoto T. Epithelial rests of Malassez express immunoreactivity of TrkB and its distribution is regulated by sensory nerve innervation. *J Histochem Cytochem* 2000;48(7):979-84.
  97. Ochi K, Saito I, Hanada K, Maeda T. Expression of TrkB-like immunoreactivity in non-neural cells of rat periodontal ligament. *Arch Oral Biol* 1997;42(6):455-64.
  98. Woodnutt DA, Byers MR. Morphological variation in the tyrosine receptor kinase A-immunoreactive periodontal ligament epithelium of developing and mature rats. *Arch Oral Biol* 2001;46(2):163-71.

99. Goldberg A, Barka T. Acid phosphatase activity in human blood cells. *Nature* 1962;195:297.
100. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986;1(8476):307-10.
101. Schour I, Massler M. The teeth. In: Farris EJ, Griffith JJ, editors. *The rat in laboratory investigation*. New York: Hafner Publishing Co.; 1971.
102. Lane P. A histomorphometric investigation into the effects of osteoprotegerin on tooth movement in rats. Thesis. University of Adelaide, Adelaide; 2005.
103. Brudvik P, Rygh P. The initial phase of orthodontic root resorption incident to local compression of the periodontal ligament. *Eur J Orthod* 1993;15(4):249-263.
104. Brudvik P, Rygh P. Multi-nucleated cells remove the main hyalinized tissue and start resorption of adjacent root surfaces. *Eur J Orthod* 1994;16(4):265-273.
105. Brudvik P, Rygh P. Root resorption beneath the main hyalinized zone. *Eur J Orthod* 1994;16(4):249-263.
106. Brudvik P, Rygh P. Transition and determinants of orthodontic root resorption-repair sequence. *Eur J Orthod* 1995;17(3):177-188.
107. Brudvik P, Rygh P. The repair of orthodontic root resorption: an ultrastructural study. *Eur J Orthod* 1995;17(3):189-198.
108. Ren Y, Maltha JC, Kuijpers-Jagtman AM. The rat as a model for orthodontic tooth movement--a critical review and a proposed solution. *Eur J Orthod* 2004;26(5):483-90.
109. Ong CK, Walsh LJ, Harbrow D, Taverne AA, Symons AL. Orthodontic tooth movement in the prednisolone-treated rat. *Angle Orthod* 2000;70(2):118-25.
110. Fraser A. The elimination of susceptibility bias in orthodontic clinical research. Honour thesis: University of Adelaide; 1993.
111. Madan MS, Liu ZJ, Gu GM, King GJ. Effects of human relaxin on orthodontic tooth movement and periodontal ligaments in rats. *Am J Orthod Dentofacial Orthop* 2007;131(1):8 e1-10.
112. Andersson GN, Lindunger A, Ek-Rylander B. Isolation and characterization of skeletal acid ATPase: a new osteoclast marker? *Connective Tissue Research* 1989;20:151-158.

113. Hammarstrom L, Hanker JS, Toverud SU. Cellular differences on acid phosphatase isoenzymes in bone and teeth. *Clinical Orthopedics and Related Research* 1971;78:151-167.
114. Reinholt FP, Widholm SM, Ek-Rylander B, Andersson GN. Ultrastructural localization of tartrate-resistant acid ATPase in bone. *Journal of Bone and Mineral Research* 1990;5:1055-1061.
115. Baron R, Neff L, Brown W, Courtoy PJ, Louvard D, Faquhar MG. Kinetic and cytochemical identification of osteoclast precursors and their differentiation into multinucleated osteoclasts. *American Journal of Pathology* 1986;122:363-378.
116. Kawamoto K, Matsuda H. Nerve growth factor and wound healing. *Prog Brain Res* 2004;146:369-84.
117. Rygh P, Brudvik P. in *The Periodontal Ligament in health and disease*. (eds. Berkovitz, B., Moxham, B. & Newman, H.). 1995:227-228 (Mosbey-Wolfe, London, 1995).
118. Rygh P, Bowling K, Hovlandsdal L, William S. Activation of the vascular system: a main mediator of periodontal fibre remodelling in orthodontic tooth movement. *Am J Orthod* 1986;89:453-468.
119. Asaumi K, Nakanishi T, Asahara H, Inoue H, Takigawa M. Expression of neurotrophins and their receptors (TRK) during fracture healing. *Bone* 2000;26(6):625-33.
120. Grills BL, Schuijers JA. Immunohistochemical localization of nerve growth factor in fractured and unfractured rat bone. *Acta Orthop Scand* 1998;69(4):415-9.
121. Hill EL, Turner R, Elde R. Effects of neonatal sympathectomy and capsaicin treatment on bone remodeling in rats. *Neuroscience* 1991;44(3):747-55.