

# Straumann® Emdogain® in oral wound healing

## Scientific and clinical evidence

### 2017

This list results from a PubMed search using the search terms (“Emdogain OR enamel matrix derivative”) and “wound healing”. Most abstracts are available via [www.pubmed.com](http://www.pubmed.com) or [dx.doi.org](http://dx.doi.org)

**The literature was hand selected into the following sub-categories, and listed by author in alphabetical order:**

- General literature, preclinical literature in vitro (page 1-3)
- General literature, preclinical literature in vivo (page 3-5)
- Clinical literature specific to soft tissue wound healing (page 5-6)
- Clinical literature reporting wound healing in the context of periodontal wound healing (page 6-10)

### General literature, preclinical in vitro

**Amin HD, Olsen I, Knowles J, Dard M, Donos N.** A tyrosine-rich amelogenin peptide promotes neovasculogenesis in vitro and ex vivo. *Acta Biomater.* 2014 May;10(5):1930-9. doi: 10.1016/j.actbio.2013.11.027.

**Amin HD, Olsen I, Knowles JC, Donos N.** Differential effect of amelogenin peptides on osteogenic differentiation in vitro: identification of possible new drugs for bone repair and regeneration. *Tissue Eng Part A.* 2012 Jun;18(11-12):1193-202. doi: 10.1089/ten.TEA.2011.0375.

**Bertl K, An N, Bruckmann C, Dard M, Andrukhov O, Matejka M, Rausch-Fan X.** Effects of enamel matrix derivative on proliferation/viability, migration, and expression of angiogenic factor and adhesion molecules in endothelial cells in vitro. *J Periodontol.* 2009 Oct;80(10):1622-30. doi: 10.1902/jop.2009.090157.

**Chano L, Tenenbaum HC, Lekic PC, Sodek J, McCulloch CA.** Emdogain regulation of cellular differentiation in wounded rat periodontium. *J Periodontal Res.* 2003 Apr;38(2):164-74.

**Craig RG, Kallur SP, Inoue M, Rosenberg PA, LeGeros RZ.** Effect of enamel matrix proteins on the periodontal connective tissue-material interface after wound healing. *J Biomed Mater Res A.* 2004 Apr 1;69(1):180-7. doi: 10.1002/jbm.a.20140.

**Gassmann G, Schwenk B, Entschladen F, Grimm WD.** Influence of enamel matrix derivative on primary CD4+ T-helper lymphocyte migration, CD25 activation, and apoptosis. *J Periodontol.* 2009 Sep;80(9):1524-33. doi: 10.1902/jop.2009.080612.

**Goda S, Kaneshita Y, Inoue H, Domae E, Ikeo T, Iida J, Domae N.** Enamel matrix derivative protein stimulated wound healing via phosphoinositide 3-kinase. *J Periodontol.* 2009 Oct;80(10):1631-7. doi: 10.1902/jop.2009.090127.

**Grayson RE, Yamakoshi Y, Wood EJ, Agren MS.** The effect of the amelogenin fraction of enamel matrix proteins on fibroblast-mediated collagen matrix reorganization. *Biomaterials.* 2006 May;27(15):2926-33. doi: 10.1016/j.biomaterials.2005.12.026.

**Haase HR, Bartold PM.** Enamel matrix derivative induces matrix synthesis by cultured human periodontal fibroblast cells. *J Periodontol.* 2001 Mar;72(3):341-8. doi: 10.1902/jop.2001.72.3.341.

**Hoang AM, Oates TW, Cochran DL.** In vitro wound healing responses to enamel matrix derivative. *J Periodontol.* 2000 Aug;71(8):1270-7. doi: 10.1902/jop.2000.71.8.1270.

**Jonke E, Gemperli AC, Zhang T, Özdemir B, Dard M, Rausch-Fan X, Andrukhov O.** Effect of tyrosine-rich amelogenin peptide on behavior and differentiation of endothelial cells. *Clin Oral Investig.* 2016 Feb 12. doi: 10.1007/s00784-016-1726-2.

- Kapferer I, Schmidt S, Gstir R, Durstberger G, Huber LA, Vietor I.** Gene-expression profiles of epithelial cells treated with EMD in vitro: analysis using complementary DNA arrays. *J Periodontal Res.* 2011 Feb;46(1):118-25. doi: 10.1111/j.1600-0765.2010.01321.x.
- Karima MM, Van Dyke TE.** Enamel matrix derivative promotes superoxide production and chemotaxis but reduces matrix metalloproteinase-8 expression by polymorphonuclear leukocytes. *J Periodontol.* 2012 Jun;83(6):780-6. doi: 10.1902/jop.2011.110397.
- Kasaj A, Meister J, Lehmann K, Stratul SI, Schlee M, Stein JM, Willershausen B, Schmidt M.** The influence of enamel matrix derivative on the angiogenic activity of primary endothelial cells. *J Periodontal Res.* 2012 Aug;47(4):479-87. doi: 10.1111/j.1600-0765.2011.01456.x.
- Kauvar AS, Thoma DS, Carnes DL, Cochran DL.** In vivo angiogenic activity of enamel matrix derivative. *J Periodontol.* 2010 Aug;81(8):1196-201. doi: 10.1902/jop.2010.090441.
- Kémoun P, Gronthos S, Snead ML, Rue J, Courtois B, Vaysse F, Salles JP, Brunel G.** The role of cell surface markers and enamel matrix derivatives on human periodontal ligament mesenchymal progenitor responses in vitro. *Biomaterials.* 2011 Oct;32(30):7375-88. doi: 10.1016/j.biomaterials.2011.06.043.
- Khedmat S, Hadjati J, Iravani A, Nourizadeh M.** Effects of enamel matrix derivative on the viability, cytokine secretion, and phagocytic activity of human monocytes. *J Endod.* 2010 Jun;36(6):1000-3. doi: 10.1016/j.joen.2010.02.032.
- Kuroda S, Wazen R, Sellin K, Tanaka E, Moffatt P, Nanci A.** Ameloblastin is not implicated in bone remodelling and repair. *Eur Cell Mater.* 2011 Jul 15;22:56-66; discussion 66-7.
- Miron RJ, Bosshardt DD, Gemperli AC, Dard M, Buser D, Gruber R, Sculean A.** In vitro characterization of a synthetic calcium phosphate bone graft on periodontal ligament cell and osteoblast behavior and its combination with an enamel matrix derivative. *Clin Oral Investig.* 2014;18(2):443-51. doi: 10.1007/s00784-013-0977-4.
- Miron RJ, Bosshardt DD, Hedbom E, Zhang Y, Haenni B, Buser D, Sculean A.** Adsorption of enamel matrix proteins to a bovine-derived bone grafting material and its regulation of cell adhesion, proliferation, and differentiation. *J Periodontol.* 2012 Jul;83(7):936-47. doi: 10.1902/jop.2011.110480.
- Miron RJ, Bosshardt DD, Laugisch O, Dard M, Gemperli AC, Buser D, Gruber R, Sculean A.** In vitro evaluation of demineralized freeze-dried bone allograft in combination with enamel matrix derivative. *J Periodontol.* 2013 Nov;84(11):1646-54. doi: 10.1902/jop.2013.120574.
- Narani N, Owen GR, Häkkinen L, Putnins E, Larjava H.** Enamel matrix proteins bind to wound matrix proteins and regulate their cell-adhesive properties. *Eur J Oral Sci.* 2007 Aug;115(4):288-95. doi: 10.1111/j.1600-0722.2007.00467.x.
- Nokhbehshaim M, Keser S, Nogueira AV, Cirelli JA, Jepsen S, Jäger A, Eick S, Deschner J.** Beneficial effects of adiponectin on periodontal ligament cells under normal and regenerative conditions. *J Diabetes Res.* 2014;2014:796565. doi: 10.1155/2014/796565.
- Nokhbehshaim M, Winter J, Rath B, Jäger A, Jepsen S, Deschner J.** Effects of enamel matrix derivative on periodontal wound healing in an inflammatory environment in vitro. *J Clin Periodontol.* 2011 May;38(5):479-90. doi: 10.1111/j.1600-051X.2010.01696.x.
- Parkar MH, Tonetti M.** Gene expression profiles of periodontal ligament cells treated with enamel matrix proteins in vitro: analysis using cDNA arrays. *J Periodontol.* 2004 Nov;75(11):1539-46. doi: 10.1902/jop.2004.75.11.1539.
- Rincon JC, Haase HR, Bartold PM.** Effect of Emdogain on human periodontal fibroblasts in an in vitro wound-healing model. *J Periodontal Res.* 2003 Jun;38(3):290-5.
- Rodrigues TL, Marchesan JT, Coletta RD, Novaes AB Jr, Grisi MF, Souza SL, Taba M Jr, Palioto DB.** Effects of enamel matrix derivative and transforming growth factor-beta1 on human periodontal ligament fibroblasts. *J Clin Periodontol.* 2007 Jun;34(6):514-22. doi: 10.1111/j.1600-051X.2007.01090.x.
- Sakoda K, Nakajima Y, Noguchi K.** Enamel matrix derivative induces production of vascular endothelial cell growth factor in human gingival fibroblasts. *Eur J Oral Sci.* 2012 Dec;120(6):513-9. doi: 10.1111/j.1600-0722.2012.00999.x.
- Sanders JE, Chuang A, Swiec GD, Bisch FC, Herold RW, Buxton TB, McPherson JC 3rd.** The effects of enamel matrix derivative and cyclic mechanical strain on human gingival fibroblasts in an in vitro defect healing model. *Int J Periodontics Restorative Dent.* 2011 Nov-Dec;31(6):671-8.

- Sculean A, Auschill TM, Donos N, Brex M, Arweiler NB.** Effect of an enamel matrix protein derivative (Emdogain) on ex vivo dental plaque vitality. *J Clin Periodontol.* 2001 Nov;28(11):1074-8.
- Shu R, Song AM, Wang HY, Zhang XL.** [Effects of enamel matrix proteins on the proliferation of human gingival epithelial cells in vitro]. *Shanghai Kou Qiang Yi Xue.* 2006 Feb;15(1):38-41. Chinese.
- Song AM, Shu R, Xie YF, Song ZC, Li HY, Liu XF, Zhang XL.** A study of enamel matrix proteins on differentiation of porcine bone marrow stromal cells into cementoblasts. *Cell Prolif.* 2007 Jun;40(3):381-96. doi: 10.1111/j.1365-2184.2007.00441.x.
- Spahr A, Lyngstadaas SP, Boeckh C, Andersson C, Podbielski A, Haller B.** Effect of the enamel matrix derivative Emdogain on the growth of periodontal pathogens in vitro. *J Clin Periodontol.* 2002 Jan;29(1):62-72.
- Villa O, Brookes SJ, Thiede B, Heijl L, Lyngstadaas SP, Reseland JE.** Subfractions of enamel matrix derivative differentially influence cytokine secretion from human oral fibroblasts. *J Tissue Eng.* 2015 Mar 19;6:2041731415575857. doi: 10.1177/2041731415575857.
- Yin YZ, Shen CJ, Song ZC, Zhang XL.** [Effect of enamel matrix protein on periodontal cells in an in vitro wound healing model]. *Shanghai Kou Qiang Yi Xue.* 2007 Jun;16(3):272-6. Chinese.
- Zilm PS, Bartold PM.** Proteomic identification of proteinase inhibitors in the porcine enamel matrix derivative, EMD(®). *J Periodontal Res.* 2011 Feb;46(1):111-7. doi: 10.1111/j.1600-0765.2010.01320.x.

### General literature, preclinical in vivo

- Al-Hezaimi K, Al-Askar M, Al-Fahad H, Al-Rasheed A, Al-Sourani N, Griffin T, O'Neill R, Javed F.** Effect of enamel matrix derivative protein on the healing of standardized epithelial wounds: a histomorphometric analysis in vivo. *Int Wound J.* 2012 Aug;9(4):436-41. doi: 10.1111/j.1742-481X.2011.00904.x.
- Alhezaimi K, Al-Shalan T, O'Neill R, Shapurian T, Naghshbandi J, Levi P Jr, Griffin T.** Connective tissue-cementum regeneration: a new histologic regeneration following the use of enamel matrix derivative in dehiscence-type defects. A dog model. *Int J Periodontics Restorative Dent.* 2009 Aug;29(4):425-33.
- Araújo M, Hayacibara R, Sonohara M, Cardaropoli G, Lindhe J.** Effect of enamel matrix proteins (Emdogain®) on healing after re-implantation of "periodontally compromised" roots. An experimental study in the dog. *J Clin Periodontol.* 2003 Oct;30(10):855-61.
- Araújo MG, Lindhe J.** GTR treatment of degree III furcation defects following application of enamel matrix proteins. An experimental study in dogs. *J Clin Periodontol.* 1998 Jun;25(6):524-30.
- Bajić MP, Danilović V, Prokić B, Prokić BB, Manojlović M, Živković S.** Histological Effects of Enamel Matrix Derivative on Exposed Dental Pulp. *Srp Arh Celok Lek.* 2015 Jul-Aug;143(7-8):397-403.
- Cornelini R, Scarano A, Piattelli M, Andreana S, Covani U, Quaranta A, Piattelli A.** Effect of enamel matrix derivative (Emdogain) on bone defects in rabbit tibias. *J Oral Implantol.* 2004;30(2):69-73. doi: 10.1563/0.642.1.
- Corrêa MG, Gomes Campos ML, Marques MR, Casati MZ, Nociti FH Jr, Sallum EA.** Histometric analysis of the effect of enamel matrix derivative on the healing of periodontal defects in rats with diabetes. *J Periodontol.* 2013 Sep;84(9):1309-18. doi: 10.1902/jop.2012.120354.
- Craig RG, Kamer AR, Kallur SP, Inoue M, Tarnow DP.** Effects of periodontal cell grafts and enamel matrix proteins on the implant-connective tissue interface: a pilot study in the minipig. *J Oral Implantol.* 2006;32(5):228-36. doi: 10.1563/820.1.
- de Oliveira CA, Spolidório LC, Cirelli JA, Marcantonio RA.** Acellular dermal matrix allograft used alone and in combination with enamel matrix protein in gingival recession: histologic study in dogs. *Int J Periodontics Restorative Dent.* 2005 Dec;25(6):595-603.
- Harrison JW, Roda RS.** Intermediate cementum. Development, structure, composition, and potential functions. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1995 May;79(5):624-33.
- Igarashi R, Sahara T, Shimizu-Ishiyama M, Sasaki T.** Porcine enamel matrix derivative enhances the formation of reparative dentine and dentine bridges during wound healing of amputated rat molars. *J Electron Microsc (Tokyo).* 2003;52(2):227-36.

- Inaba H, Kawai S, Nakayama K, Okahashi N, Amano A.** Effect of enamel matrix derivative on periodontal ligament cells in vitro is diminished by *Porphyromonas gingivalis*. *J Periodontol*. 2004 Jun;75(6):858-65. doi: 10.1902/jop.2004.75.6.858.
- Inaba H, Tagashira M, Kanda T, Ohno T, Kawai S, Amano A.** Apple- and hop-polyphenols protect periodontal ligament cells stimulated with enamel matrix derivative from *Porphyromonas gingivalis*. *J Periodontol*. 2005 Dec;76(12):2223-9. doi: 10.1902/jop.2005.76.12.2223.
- Iqbal MK, Bamaas N.** Effect of enamel matrix derivative (EMDOGAIN) upon periodontal healing after replantation of permanent incisors in beagle dogs. *Dent Traumatol*. 2001 Feb;17(1):36-45.
- Kadonishi Y, Deie M, Takata T, Ochi M.** Acceleration of tendon-bone healing in anterior cruciate ligament reconstruction using an enamel matrix derivative in a rat model. *J Bone Joint Surg Br*. 2012 Feb;94(2):205-9. doi: 10.1302/0301-620X.94B2.26904.
- Kawana F, Sawae Y, Sahara T, Tanaka S, Debari K, Shimizu M, Sasaki T.** Porcine enamel matrix derivative enhances trabecular bone regeneration during wound healing of injured rat femur. *Anat Rec*. 2001 Dec 1;264(4):438-46.
- Kikuchi S.** [Experimental study of periodontal tissue regeneration after the application of enamel matrix derivative in rat periodontal defects]. *Kokubyo Gakkai Zasshi*. 2001 Mar;68(1):82-92. Japanese.
- Laaksonen M, Suojanen J, Nurmenniemi S, Läärä E, Sorsa T, Salo T.** The enamel matrix derivative (Emdogain) enhances human tongue carcinoma cells gelatinase production, migration and metastasis formation. *Oral Oncol*. 2008 Aug;44(8):733-42. doi: 10.1016/j.oraloncology.2007.09.008.
- Lam K, Sae-Lim V.** The effect of Emdogain gel on periodontal healing in replanted monkeys' teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2004 Jan;97(1):100-7. doi: 10.1016/S1079210403003184.
- Mardas N, Kraehenmann M, Dard M.** Regenerative wound healing in acute degree III mandibular defects in dogs. *Quintessence Int*. 2012 May;43(5):e48-59.
- Matsumoto N, Minakami M, Hatakeyama J, Haruna C, Morotomi T, Izumi T, Anan H.** Histologic evaluation of the effects of Emdogain gel on injured root apex in rats. *J Endod*. 2014 Dec;40(12):1989-94. doi: 10.1016/j.joen.2014.08.024.
- Maymon-Gil T, Weinberg E, Nemcovsky C, Weinreb M.** Enamel Matrix Derivative Promotes Healing of a Surgical Wound in the Rat Oral Mucosa. *J Periodontol*. 2016 Jan 16:1-16. doi: 10.1902/jop.2016.150567.
- Miron RJ, Wei L, Yang S, Caluseru OM, Sculean A, Zhang Y.** Effect of enamel matrix derivative on periodontal wound healing and regeneration in an osteoporotic model. *J Periodontol*. 2014 Nov;85(11):1603-11. doi: 10.1902/jop.2014.130745.
- Nakamura Y, Hammarström L, Lundberg E, Ekdahl H, Matsumoto K, Gestrelus S, Lyngstadaas SP.** Enamel matrix derivative promotes reparative processes in the dental pulp. *Adv Dent Res*. 2001 Aug;15:105-7. doi: 10.1177/08959374010150010201.
- Nakamura Y, Hammarström L, Matsumoto K, Lyngstadaas SP.** The induction of reparative dentine by enamel proteins. *Int Endod J*. 2002 May;35(5):407-17.
- Nakamura Y, Slaby I, Matsumoto K, Ritchie HH, Lyngstadaas SP.** Immunohistochemical characterization of rapid dentin formation induced by enamel matrix derivative. *Calcif Tissue Int*. 2004 Sep;75(3):243-52. doi: 10.1007/s00223-003-0153-y.
- Nemcovsky CE, Zahavi S, Moses O, Kebudi E, Artzi Z, Beny L, Weinreb M.** Effect of enamel matrix protein derivative on healing of surgical supra-infrabony periodontal defects in the rat molar: a histomorphometric study. *J Periodontol*. 2006 Jun;77(6):996-1002. doi: 10.1902/jop.2006.050317.
- Onodera H, Shibukawa Y, Sugito H, Ota M, Yamada S.** Periodontal regeneration in intrabony defects after application of enamel matrix proteins with guided tissue regeneration: an experimental study in dogs. *Biomed Res*. 2005 Apr;26(2):69-77.
- Pimentel SP, Sallum AW, Saldanha JB, Casati MZ, Nociti FH Jr, Sallum EA.** Enamel matrix derivative versus guided tissue regeneration in the presence of nicotine: a histomorphometric study in dogs. *J Clin Periodontol*. 2006 Dec;33(12):900-7. doi: 10.1111/j.1600-051X.2006.00989.x.
- Poi WR, Carvalho RM, Panzarini SR, Sonoda CK, Manfrin TM, Rodrigues Tda S.** Influence of enamel matrix derivative (Emdogain) and sodium fluoride on the healing process in delayed tooth replantation: histologic and histometric analysis in rats. *Dent Traumatol*. 2007 Feb;23(1):35-41. doi: 10.1111/j.1600-9657.2006.00481.x.

- Potijanyakul P, Sattayasansakul W, Pongpanich S, Leepong N, Kintarak S.** Effects of enamel matrix derivative on bioactive glass in rat calvarium defects. *J Oral Implantol.* 2010;36(3):195-204. doi: 10.1563/AAID-JOI-D-09-00042.
- Regazzini PF, Novaes AB Jr, de Oliveira PT, Palioto DB, Taba M Jr, de Souza SL, Grisi MF.** Comparative study of enamel matrix derivative with or without GTR in the treatment of class II furcation lesions in dogs. *Int J Periodontics Restorative Dent.* 2004 Oct;24(5):476-87.
- Sakallioğlu U, Açıkgöz G, Ayas B, Kirtiloğlu T, Sakallioğlu E.** Healing of periodontal defects treated with enamel matrix proteins and root surface conditioning--an experimental study in dogs. *Biomaterials.* 2004 May;25(10):1831-40.
- Sallum EA, Pimentel SP, Saldanha JB, Nogueira-Filho GR, Casati MZ, Nociti FH, Sallum AW.** Enamel matrix derivative and guided tissue regeneration in the treatment of dehiscence-type defects: a histomorphometric study in dogs. *J Periodontol.* 2004 Oct;75(10):1357-63. doi: 10.1902/jop.2004.75.10.1357.
- Sawae Y, Sahara T, Kawana F, Sasaki T.** Effects of enamel matrix derivative on mineralized tissue formation during bone wound healing in rat parietal bone defects. *J Electron Microsc (Tokyo).* 2002;51(6):413-23.
- Sculean A, Berakdar M, Donos N, Auschill TM, Arweiler NB.** The effect of postsurgical administration of a selective cyclo-oxygenase-2 inhibitor on the healing of intrabony defects following treatment with enamel matrix proteins. *Clin Oral Investig.* 2003 Jun;7(2):108-12. doi: 10.1007/s00784-003-0200-0.
- Sculean A, Donos N, Brex M, Karring T, Reich E.** Healing of fenestration-type defects following treatment with guided tissue regeneration or enamel matrix proteins. An experimental study in monkeys. *Clin Oral Investig.* 2000 Mar;4(1):50-6.
- Sculean A, Junker R, Donos N, Berakdar M, Brex M, Dünker N.** Immunohistochemical evaluation of matrix molecules associated with wound healing following regenerative periodontal treatment in monkeys. *Clin Oral Investig.* 2002 Sep;6(3):175-82. doi: 10.1007/s00784-002-0161-8.
- Shirakata Y, Eliezer M, Nemcovsky CE, Weinreb M, Dard M, Sculean A, Bosshardt DD, Moses O.** Periodontal healing after application of enamel matrix derivative in surgical supra/infrabony periodontal defects in rats with streptozotocin-induced diabetes. *J Periodontol Res.* 2014 Feb;49(1):93-101. doi: 10.1111/jre.12084.
- Shirakata Y, Yoshimoto T, Goto H, Yonamine Y, Kadomatsu H, Miyamoto M, Nakamura T, Hayashi C, Izumi Y.** Favorable periodontal healing of 1-wall infrabony defects after application of calcium phosphate cement wall alone or in combination with enamel matrix derivative: a pilot study with canine mandibles. *J Periodontol.* 2007 May;78(5):889-98. doi: 10.1902/jop.2007.060353.
- Shirakata Y, Yoshimoto T, Takeuchi N, Taniyama K, Noguchi K.** Effects of EMD in combination with bone swaging and calcium phosphate bone cement on periodontal regeneration in one-wall intrabony defects in dogs. *J Periodontol Res.* 2013 Feb;48(1):37-43. doi: 10.1111/j.1600-0765.2012.01499.x.
- Villa O, Wohlfahrt JC, Mdlá I, Petzold C, Reseland JE, Snead ML, Lyngstadaas SP.** Proline-Rich Peptide Mimics Effects of Enamel Matrix Derivative on Rat Oral Mucosa Incisional Wound Healing. *J Periodontol.* 2015 Dec;86(12):1386-95. doi: 10.1902/jop.2015.150207.
- Wang Y, Zhang Y, Jing D, Shuang Y, Miron RJ.** Enamel matrix derivative improves gingival fibroblast cell behavior cultured on titanium surfaces. *Clin Oral Investig.* 2015 Aug 14. doi: 10.1007/s00784-015-1558-5.
- Yuan K, Chen CL, Lin MT.** Enamel matrix derivative exhibits angiogenic effect in vitro and in a murine model. *J Clin Periodontol.* 2003 Aug;30(8):732-8.

## Clinical literature specific to soft tissue wound healing

- Giannobile WV, Hollister SJ, Ma PX.** Future Prospects for Periodontal Bioengineering Using Growth Factors. *Clinic Adv Periodontics.* 2011 Aug 1;1(2):88-94. doi: 10.1902/cap.2011.110041.
- Guimarães GF, de Araújo VC, Nery JC, Peruzzo DC, Soares AB.** Microvessel Density Evaluation of the Effect of Enamel Matrix Derivative on Soft Tissue After Implant Placement: A Preliminary Study. *Int J Periodontics Restorative Dent.* 2015. Sep-Oct;35(5):733-8. doi: 10.11607/prd.2044.
- Lyngstadaas SP, Wohlfahrt JC, Brookes SJ, Paine ML, Snead ML, Reseland JE.** Enamel matrix proteins; old molecules for new applications. *Orthod Craniofac Res.* 2009 Aug;12(3):243-53. doi: 10.1111/j.1601-6343.2009.01459.x.

- Mirastschijski U, Konrad D, Lundberg E, Lyngstadaas SP, Jorgensen LN, Agren MS.** Effects of a topical enamel matrix derivative on skin wound healing. *Wound Repair Regen.* 2004 Jan-Feb;12(1):100-8. doi: 10.1111/j.1067-1927.2004.012117.x.
- Miron RJ, Dard M, Weinreb M.** Enamel matrix derivative, inflammation and soft tissue wound healing. *J Periodontal Res.* 2015 Oct;50(5):555-69. doi: 10.1111/jre.12245.
- Nevins ML, Camelo M, Schupbach P, Nevins M, Kim SW, Kim DM.** Human buccal plate extraction socket regeneration with recombinant human platelet-derived growth factor BB or enamel matrix derivative. *Int J Periodontics Restorative Dent.* 2011 Sep-Oct;31(5):481-92.
- Rebele SF, Zuhr O, Schneider D, Jung RE, Hürzeler MB.** Tunnel technique with connective tissue graft versus coronally advanced flap with enamel matrix derivative for root coverage: a RCT using 3D digital measuring methods. Part II. Volumetric studies on healing dynamics and gingival dimensions. *J Clin Periodontol.* 2014 Jun;41(6):593-603. doi: 10.1111/jcpe.12254.
- Villa O, Wohlfahrt JC, Koldslund OC, Brookes SJ, Lyngstadaas SP, Aass AM, Reseland JE.** EMD in periodontal regenerative surgery modulates cytokine profiles: A randomised controlled clinical trial. *Sci Rep.* 2016 Mar 15;6:23060. doi: 10.1038/srep23060.
- Wennström JL, Lindhe J.** Some effects of enamel matrix proteins on wound healing in the dento-gingival region. *J Clin Periodontol.* 2002 Jan;29(1):9-14.
- Zeren KJ.** Minimally invasive extraction and immediate implant placement: the preservation of esthetics. *Int J Periodontics Restorative Dent.* 2006 Apr;26(2):171-81.

## Clinical literature reporting wound healing in the context of periodontal wound healing

- Al Machot E, Hoffmann T, Lorenz K, Khalili I, Noack B.** Clinical outcomes after treatment of periodontal intrabony defects with nanocrystalline hydroxyapatite (Ostim) or enamel matrix derivatives (Emdogain): a randomized controlled clinical trial. *Biomed Res Int.* 2014;2014:786353. doi: 10.1155/2014/786353.
- Andersen KM, Selvig KA, Leknes KN.** Altered healing following mucogingival surgery in a patient with Crohn's disease: a literature review and case report. *J Periodontol.* 2003 Apr;74(4):537-46. doi: 10.1902/jop.2003.74.4.537.
- Andrade PF, Grisi MF, Marcaccini AM, Fernandes PG, Reino DM, Souza SL, Taba M, Palioto DB, Novaes AB.** Comparison between micro- and macrosurgical techniques for the treatment of localized gingival recessions using coronally positioned flaps and enamel matrix derivative. *J Periodontol.* 2010 Nov;81(11):1572-9. doi: 10.1902/jop.2010.100155.
- Aroca S, Keglevich T, Nikolidakis D, Gera I, Nagy K, Azzi R, Etienne D.** Treatment of class III multiple gingival recessions: a randomized-clinical trial. *J Clin Periodontol.* 2010 Jan;37(1):88-97. doi: 10.1111/j.1600-051X.2009.01492.x.
- Berlucchi I, Francetti L, Del Fabbro M, Testori T, Weinstein RL.** Enamel matrix proteins (Emdogain) in combination with coronally advanced flap or subepithelial connective tissue graft in the treatment of shallow gingival recessions. *Int J Periodontics Restorative Dent.* 2002 Dec;22(6):583-93.
- Bosshardt DD, Stadlinger B, Terheyden H.** Cell-to-cell communication--periodontal regeneration. *Clin Oral Implants Res.* 2015 Mar;26(3):229-39. doi: 10.1111/clr.12543.
- Bosshardt DD.** Biological mediators and periodontal regeneration: a review of enamel matrix proteins at the cellular and molecular levels. *J Clin Periodontol.* 2008 Sep;35(8 Suppl):87-105. doi: 10.1111/j.1600-051X.2008.01264.x.
- Cardaropoli G, Leonhardt AS.** Enamel matrix proteins in the treatment of deep intrabony defects. *J Periodontol.* 2002 May;73(5):501-4. doi: 10.1902/jop.2002.73.5.501.
- Chen FM, Zhang J, Zhang M, An Y, Chen F, Wu ZF.** A review on endogenous regenerative technology in periodontal regenerative medicine. *Biomaterials.* 2010 Nov;31(31):7892-927. doi: 10.1016/j.biomaterials.2010.07.019.
- Chen L, Cha J, Guiha R, Bouwsma OJ.** Root coverage with enamel matrix derivatives. *Compend Contin Educ Dent.* 2002 Sep;23(9):797-800, 802, 804 passim; quiz 808.
- Cheng GL, Fu E, Tu YK, Shen EC, Chiu HC, Huang RY, Yuh DY, Chiang CY.** Root coverage by coronally advanced flap with connective tissue graft and/or enamel matrix derivative: a meta-analysis. *J Periodontal Res.* 2015 Apr;50(2):220-30. doi: 10.1111/jre.12199.

- Chitsazi MT, Mostofi Zadeh Farahani R, Pourabbas M, Bahaeddin N.** Efficacy of open flap debridement with and without enamel matrix derivatives in the treatment of mandibular degree II furcation involvement. *Clin Oral Investig.* 2007 Dec;11(4):385-9. doi: 10.1007/s00784-007-0134-z.
- Cortellini P, Pini Prato G.** Coronally advanced flap and combination therapy for root coverage. Clinical strategies based on scientific evidence and clinical experience. *Periodontol 2000.* 2012 Jun;59(1):158-84. doi: 10.1111/j.1600-0757.2011.00434.x.
- Cortellini P, Pini-Prato G, Nieri M, Tonetti MS.** Minimally invasive surgical technique and enamel matrix derivative in intrabony defects: 2. Factors associated with healing outcomes. *Int J Periodontics Restorative Dent.* 2009 Jun;29(3):257-65.
- Cortellini P, Tonetti MS.** A minimally invasive surgical technique with an enamel matrix derivative in the regenerative treatment of intra-bony defects: a novel approach to limit morbidity. *J Clin Periodontol.* 2007 Jan;34(1):87-93. doi: 10.1111/j.1600-051X.2006.01020.x.
- Cortellini P, Tonetti MS.** Clinical and radiographic outcomes of the modified minimally invasive surgical technique with and without regenerative materials: a randomized-controlled trial in intra-bony defects. *J Clin Periodontol.* 2011 Apr;38(4):365-73. doi: 10.1111/j.1600-051X.2011.01705.x.
- Cortellini P, Tonetti MS.** Improved wound stability with a modified minimally invasive surgical technique in the regenerative treatment of isolated interdental intrabony defects. *J Clin Periodontol.* 2009 Feb;36(2):157-63. doi: 10.1111/j.1600-051X.2008.01352.x.
- Deschner J, Nokhbehshaim M.** Regulatory effects of inflammatory and biomechanical signals on regenerative periodontal healing. *Int J Oral Maxillofac Implants.* 2013 Nov-Dec;28(6):e472-7. doi: 10.11607/jomi.te27.
- Donos N, Sculean A, Glavind L, Reich E, Karring T.** Wound healing of degree III furcation involvements following guided tissue regeneration and/or Emdogain. A histologic study. *J Clin Periodontol.* 2003 Dec;30(12):1061-8.
- Döri F, Arweiler N, Gera I, Sculean A.** Clinical evaluation of an enamel matrix protein derivative combined with either a natural bone mineral or beta-tricalcium phosphate. *J Periodontol.* 2005 Dec;76(12):2236-43. doi: 10.1902/jop.2005.76.12.2236.
- Döri F, Arweiler N, Húszár T, Gera I, Miron RJ, Sculean A.** Five-year results evaluating the effects of platelet-rich plasma on the healing of intrabony defects treated with enamel matrix derivative and natural bone mineral. *J Periodontol.* 2013 Nov;84(11):1546-55. doi: 10.1902/jop.2013.120501.
- Dori F.** [Effect of combined therapeutic methods on healing of periodontal vertical bone defects in regenerative surgery]. *Orv Hetil.* 2009 Mar 15;150(11):517-22. doi: 10.1556/OH.2009.28500. Hungarian.
- Farina R, Simonelli A, Rizzi A, Pramstraller M, Cucchi A, Trombelli L.** Early postoperative healing following buccal single flap approach to access intraosseous periodontal defects. *Clin Oral Investig.* 2013 Jul;17(6):1573-83. doi: 10.1007/s00784-012-0838-6.
- Fransson H.** On the repair of the dentine barrier. *Swed Dent J Suppl.* 2012;(226):9-84.
- Fridström M, Schollin J, Crossner CG.** Evaluating Emdogain and healing of replanted teeth using an intra-individual experimental-control study design. *Dent Traumatol.* 2008 Jun;24(3):299-304. doi: 10.1111/j.1600-9657.2008.00559.x.
- Fujishiro N, Anan H, Hamachi T, Maeda K.** The role of macrophages in the periodontal regeneration using Emdogain gel. *J Periodontol Res.* 2008 Apr;43(2):143-55. doi: 10.1111/j.1600-0765.2007.01004.x.
- Giannobile WV, Somerman MJ.** Growth and amelogenin-like factors in periodontal wound healing. A systematic review. *Ann Periodontol.* 2003 Dec;8(1):193-204. doi: 10.1902/annals.2003.8.1.193.
- Gilio DA.** Clinical efficacy of the Nd:YAG laser for combination therapy using EMD for periodontal reconstructive surgery: clinical case reports. *Dent Today.* 2001 Sep;20(9):106-11.
- Gkraniias ND, Graziani F, Sculean A, Donos N.** Wound healing following regenerative procedures in furcation degree III defects: histomorphometric outcomes. *Clin Oral Investig.* 2012 Feb;16(1):239-49. doi: 10.1007/s00784-010-0478-7.
- Gurinsky BS, Mills MP, Mellonig JT.** Clinical evaluation of demineralized freeze-dried bone allograft and enamel matrix derivative versus enamel matrix derivative alone for the treatment of periodontal osseous defects in humans. *J Periodontol.* 2004 Oct;75(10):1309-18. doi: 10.1902/jop.2004.75.10.1309.

**Hagenaars S, Louwse PH, Timmerman MF, Van der Velden U, Van der Weijden GA.** Soft-tissue wound healing following periodontal surgery and Emdogain application. *J Clin Periodontol.* 2004 Oct;31(10):850-6. doi: 10.1111/j.1600-051X.2004.00571.x.

**Heard RH, Mellonig JT, Brunsvold MA, Lasho DJ, Meffert RM, Cochran DL.** Clinical evaluation of wound healing following multiple exposures to enamel matrix protein derivative in the treatment of intrabony periodontal defects. *J Periodontol.* 2000 Nov;71(11):1715-21. doi: 10.1902/jop.2000.71.11.1715.

**Heijl L.** Periodontal regeneration with enamel matrix derivative in one human experimental defect. A case report. *J Clin Periodontol.* 1997 Sep;24(9 Pt 2):693-6.

**Hoidal MJ, Grimard BA, Mills MP, Schoolfield JD, Mellonig JT, Mealey BL.** Clinical evaluation of demineralized freeze-dried bone allograft with and without enamel matrix derivative for the treatment of periodontal osseous defects in humans. *J Periodontol.* 2008 Dec;79(12):2273-80. doi: 10.1902/jop.2008.080259.

**Hovey LR, Jones AA, McGuire M, Mellonig JT, Schoolfield J, Cochran DL.** Application of periodontal tissue engineering using enamel matrix derivative and a human fibroblast-derived dermal substitute to stimulate periodontal wound healing in Class III furcation defects. *J Periodontol.* 2006 May;77(5):790-9. doi: 10.1902/jop.2006.030264.

**Ito K, Akutagawa H.** Periosteal connective tissue grafting or root coverage with enamel matrix derivative: a case report. *J Esthet Restor Dent.* 2001;13(3):172-8.

**Ito K, Ito K, Owa M.** Connective tissue grafting for root coverage in multiple Class III gingival recessions with enamel matrix derivative: a case report. *Pract Periodontics Aesthet Dent.* 2000 Jun-Jul;12(5):441-6; quiz 448.

**Jepsen S, Topoll H, Rengers H, Heinz B, Teich M, Hoffmann T, Al-Machot E, Meyle J, Jervøe-Storm PM.** Clinical outcomes after treatment of intra-bony defects with an EMD/synthetic bone graft or EMD alone: a multicenter randomized-controlled clinical trial. *J Clin Periodontol.* 2008 May;35(5):420-8. doi: 10.1111/j.1600-051X.2008.01217.x.

**Kaida H, Hamachi T, Anan H, Maeda K.** Wound healing process of injured pulp tissues with emdogain gel. *J Endod.* 2008 Jan;34(1):26-30. doi: 10.1016/j.joen.2007.09.011.

**Kaner D, Bernimoulin JP, Kleber BM, Friedmann A.** Minimally invasive flap surgery and enamel matrix derivative in the treatment of localized aggressive periodontitis: case report. *Int J Periodontics Restorative Dent.* 2009 Feb;29(1):89-97.

**Kao DW, Fiorellini JP.** Regenerative periodontal therapy. *Front Oral Biol.* 2012;15:149-59. doi: 10.1159/000329677.

**Karring T.** Regenerative periodontal therapy. *J Int Acad Periodontol.* 2000 Oct;2(4):101-9.

**Kenny DJ, Barrett EJ, Johnston DH, Sigal MJ, Tenenbaum HC.** Clinical management of avulsed permanent incisors using Emdogain: initial report of an investigation. *J Can Dent Assoc.* 2000 Jan;66(1):21.

**Kurhańska-Flisykowska A, Łojewski W, Wyganowska-Swiatkowska M.** Effectiveness of Emdogain in the periodontal treatment. *Przegl Lek.* 2012;69(10):1046-8.

**Lafzi A, Farahani RM, Tubbs RS, Roushangar L, Shoja MM.** Enamel matrix derivative Emdogain as an adjuvant for a laterally-positioned flap in the treatment of gingival recession: an electron microscopic appraisal. *Folia Morphol (Warsz).* 2007 May;66(2):100-3.

**Lekovic V, Camargo PM, Weinlaender M, Kenney EB, Vasilic N.** Combination use of bovine porous bone mineral, enamel matrix proteins, and a bioabsorbable membrane in intrabony periodontal defects in humans. *J Periodontol.* 2001 May;72(5):583-9. doi: 10.1902/jop.2001.72.5.583.

**Majzoub Z, Bobbo M, Atiyeh F, Cordioli G.** Two patterns of histologic healing in an intrabony defect following treatment with enamel matrix derivative: a human case report. *Int J Periodontics Restorative Dent.* 2005 Jun;25(3):283-94.

**Nokhbehshaim M, Deschner B, Bourauel C, Reimann S, Winter J, Rath B, Jäger A, Jepsen S, Deschner J.** Interactions of enamel matrix derivative and biomechanical loading in periodontal regenerative healing. *J Periodontol.* 2011 Dec;82(12):1725-34. doi: 10.1902/jop.2011.100678.

**Nokhbehshaim M, Keser S, Jäger A, Jepsen S, Deschner J.** Regulation of regenerative periodontal healing by NAMPT. *Mediators Inflamm.* 2013;2013:202530. doi: 10.1155/2013/202530.

**Nokhbehshaim M, Keser S, Nogueira AV, Cirelli JA, Jepsen S, Jäger A, Eick S, Deschner J.** Beneficial effects of adiponectin on periodontal ligament cells under normal and regenerative conditions. *J Diabetes Res.* 2014;2014:796565. doi: 10.1155/2014/796565.



- Okuda K, Miyazaki A, Momose M, Murata M, Nomura T, Kubota T, Wolff LF, Yoshie H.** Levels of tissue inhibitor of metalloproteinases-1 and matrix metalloproteinases-1 and -8 in gingival crevicular fluid following treatment with enamel matrix derivative (EMDOGAIN). *J Periodontal Res.* 2001 Oct;36(5):309-16.
- Oortgiesen DA, Meijer GJ, Bronckers AL, Walboomers XF, Jansen JA.** Regeneration of the periodontium using enamel matrix derivative in combination with an injectable bone cement. *Clin Oral Investig.* 2013 Mar;17(2):411-21. doi: 10.1007/s00784-012-0743-z.
- Oringer RJ.** Biological mediators for periodontal and bone regeneration. *Compend Contin Educ Dent.* 2002 Jun;23(6):501-4, 506-10, 512 passim; quiz 518.
- Ozcelik O, Cenk Haytac M, Seydaoglu G.** Enamel matrix derivative and low-level laser therapy in the treatment of intra-bony defects: a randomized placebo-controlled clinical trial. *J Clin Periodontol.* 2008 Feb;35(2):147-56. doi: 10.1111/j.1600-051X.2007.01176.x.
- Parodi R, Liuzzo G, Patrucco P, Brunel G, Santarelli GA, Birardi V, Gasparetto B.** Use of Emdogain in the treatment of deep intrabony defects: 12-month clinical results. Histologic and radiographic evaluation. *Int J Periodontics Restorative Dent.* 2000 Dec;20(6):584-95.
- Rasperini G, Acunzo R, Barnett A, Pagni G.** The soft tissue wall technique for the regenerative treatment of non-contained infrabony defects: a case series. *Int J Periodontics Restorative Dent.* 2013 May-Jun;33(3):e79-87. doi: 10.11607/prd.1628.
- Rathva VJ.** Enamel matrix protein derivatives: role in periodontal regeneration. *Clin Cosmet Investig Dent.* 2011 Dec 1;3:79-92. doi: 10.2147/CCIDEN.S25347.
- Ribeiro FV, Casarin RC, Júnior FH, Sallum EA, Casati MZ.** The role of enamel matrix derivative protein in minimally invasive surgery in treating intrabony defects in single-rooted teeth: a randomized clinical trial. *J Periodontol.* 2011 Apr;82(4):522-32. doi: 10.1902/jop.2010.100454.
- Röllke L, Schacher B, Wohlfeil M, Kim TS, Kaltschmitt J, Krieger J, Krigar DM, Reitmeier P, Eickholz P.** Regenerative therapy of infrabony defects with or without systemic doxycycline. A randomized placebo-controlled trial. *J Clin Periodontol.* 2012 May;39(5):448-56. doi: 10.1111/j.1600-051X.2012.01861.x.
- Saito A, Hayakawa H, Ota K, Fujinami K, Nikaido M, Makiishi T.** Treatment of periodontal defects with enamel matrix derivative: clinical evaluation at early healing stages. *Bull Tokyo Dent Coll.* 2010;51(2):85-93.
- Sallum EA, Casati MZ, Caffesse RG, Funis LP, Nociti Júnior FH, Sallum AW.** Coronally positioned flap with or without enamel matrix protein derivative for the treatment of gingival recessions. *Am J Dent.* 2003 Oct;16(5):287-91.
- Sculean A, Barbé G, Chiantella GC, Arweiler NB, Berakdar M, Brex M.** Clinical evaluation of an enamel matrix protein derivative combined with a bioactive glass for the treatment of intrabony periodontal defects in humans. *J Periodontol.* 2002 Apr;73(4):401-8. doi: 10.1902/jop.2002.73.4.401.
- Sculean A, Blaes A, Arweiler N, Reich E, Donos N, Brex M.** The effect of postsurgical antibiotics on the healing of intrabony defects following treatment with enamel matrix proteins. *J Periodontol.* 2001 Feb;72(2):190-5. doi: 10.1902/jop.2001.72.2.190.
- Sculean A, Chiantella GC, Windisch P, Donos N.** Clinical and histologic evaluation of human intrabony defects treated with an enamel matrix protein derivative (Emdogain). *Int J Periodontics Restorative Dent.* 2000 Aug;20(4):374-81.
- Sculean A, Donos N, Windisch P, Brex M, Gera I, Reich E, Karring T.** Healing of human intrabony defects following treatment with enamel matrix proteins or guided tissue regeneration. *J Periodontal Res.* 1999 Aug;34(6):310-22.
- Sculean A, Junker R, Donos N, Windisch P, Brex M, Dünker N.** Immunohistochemical evaluation of matrix molecules associated with wound healing following treatment with an enamel matrix protein derivative in humans. *Clin Oral Investig.* 2003 Sep;7(3):167-74. doi: 10.1007/s00784-003-0212-9.
- Sculean A, Nikolidakis D, Nikou G, Ivanovic A, Chapple IL, Stavropoulos A.** Biomaterials for promoting periodontal regeneration in human intrabony defects: a systematic review. *Periodontol 2000.* 2015 Jun;68(1):182-216. doi: 10.1111/prd.12086.
- Sculean A, Pietruska M, Arweiler NB, Auschill TM, Nemcovsky C.** Four-year results of a prospective-controlled clinical study evaluating healing of intra-bony defects following treatment with an enamel matrix protein derivative alone or combined with a bioactive glass. *J Clin Periodontol.* 2007 Jun;34(6):507-13. doi: 10.1111/j.1600-051X.2007.01084.x.

- Sculean A, Pietruska M, Schwarz F, Willershäusen B, Arweiler NB, Auschill TM.** Healing of human intrabony defects following regenerative periodontal therapy with an enamel matrix protein derivative alone or combined with a bioactive glass. A controlled clinical study. *J Clin Periodontol.* 2005 Jan;32(1):111-7. doi: 10.1111/j.1600-051X.2004.00635.x.
- Sculean A, Rathe F, Junker R, Becker J, Schwarz F, Arweiler N.** [The use of Emdogain in periodontal and osseous regeneration]. *Schweiz Monatsschr Zahnmed.* 2007;117(6):598-606. German.
- Sculean A, Schwarz F, Becker J, Brex M.** The application of an enamel matrix protein derivative (Emdogain) in regenerative periodontal therapy: a review. *Med Princ Pract.* 2007;16(3):167-80. doi: 10.1159/000100386.
- Sculean A, Schwarz F, Berakdar M, Windisch P, Arweiler NB, Romanos GE.** Healing of intrabony defects following surgical treatment with or without an Er:YAG laser. *J Clin Periodontol.* 2004 Aug;31(8):604-8. doi: 10.1111/j.1600-051X.2004.00525.x.
- Sculean A, Windisch P, Döri F, Keglevich T, Molnár B, Gera I.** Emdogain in regenerative periodontal therapy. A review of the literature. *Fogorv Sz.* 2007 Oct;100(5):220-32, 211-9. English, Hungarian.
- Sculean A, Windisch P, Keglevich T, Chiantella GC, Gera I, Donos N.** Clinical and histologic evaluation of human intrabony defects treated with an enamel matrix protein derivative combined with a bovine-derived xenograft. *Int J Periodontics Restorative Dent.* 2003 Feb;23(1):47-55.
- Sculean A, Windisch P, Keglevich T, Fabi B, Lundgren E, Lyngstadaas PS.** Presence of an enamel matrix protein derivative on human teeth following periodontal surgery. *Clin Oral Investig.* 2002 Sep;6(3):183-7. doi: 10.1007/s00784-002-0171-6.
- Szatmári P, Gera I.** [Treatment of localized intrabony periodontal defects with enamel matrix derivative (Emdogain). Case series]. *Fogorv Sz.* 2014 Mar;107(1):15-28. Hungarian.
- Thalmair T, Fickl S, Bolz W, Wachtel H.** The double split flap: a surgical approach for regenerative treatment of interproximal defects. *J Clin Periodontol.* 2009 Oct;36(10):877-81. doi: 10.1111/j.1600-051X.2009.01461.x.
- Tobita M, Mizuno H.** Adipose-derived stem cells and periodontal tissue engineering. *Int J Oral Maxillofac Implants.* 2013 Nov-Dec;28(6):e487-93. doi: 10.11607/jomi.te29.
- Tonetti MS, Fourmoussis I, Suvan J, Cortellini P, Brägger U, Lang NP;** European Research Group on Periodontology (ERGOPERIO). Healing, post-operative morbidity and patient perception of outcomes following regenerative therapy of deep intrabony defects. *J Clin Periodontol.* 2004 Dec;31(12):1092-8. doi: 10.1111/j.1600-051X.2004.00615.x.
- Trabulsi M, Oh TJ, Eber R, Weber D, Wang HL.** Effect of enamel matrix derivative on collagen guided tissue regeneration-based root coverage procedure. *J Periodontol.* 2004 Nov;75(11):1446-57. doi: 10.1902/jop.2004.75.11.1446.
- Trombelli L, Bottega S, Zucchelli G.** Supracrestal soft tissue preservation with enamel matrix proteins in treatment of deep intrabony defects. *J Clin Periodontol.* 2002 May;29(5):433-9.
- Wachtel H, Schenk G, Böhm S, Weng D, Zuhr O, Hürzeler MB.** Microsurgical access flap and enamel matrix derivative for the treatment of periodontal intrabony defects: a controlled clinical study. *J Clin Periodontol.* 2003 Jun;30(6):496-504.
- Windisch P, Sculean A, Klein F, Tóth V, Eickholz P, István G.** [Comparative analysis of the sensitivity and accuracy of clinical, radiographic and histometric measurements in assessing periodontal attachment levels]. *Fogorv Sz.* 2002 Jun;95(3):93-8. Hungarian.
- Yilmaz S, Cakar G, Yildirim B, Sculean A.** Healing of two and three wall intrabony periodontal defects following treatment with an enamel matrix derivative combined with autogenous bone. *J Clin Periodontol.* 2010 Jun;37(6):544-50. doi: 10.1111/j.1600-051X.2010.01567.x.
- Yukna RA, Mellonig JT.** Histologic evaluation of periodontal healing in humans following regenerative therapy with enamel matrix derivative. A 10-case series. *J Periodontol.* 2000 May;71(5):752-9. doi: 10.1902/jop.2000.71.5.752.