

DAFTAR PUSTAKA

- Adam, G. (2020). A Beginner's Guide to RT-PCR, qPCR and RT-qPCR. *Biochem*, 42(3), 48–53.
- Ahmad, P., Estrin, N., Farshidfar, N., Zhang, Y., & Miron, R. J. (2025). Mechanistic Insights into Periodontal Ligament Stem Cell-derived Exosomes in Tissue Regeneration. *Clinical Oral Investigations*, 9(7), 1–25.
- Al Barashdi, M. A., Ali, A., McMullin, M. F., & Mills, K. (2021). Protein Tyrosine Phosphatase Receptor Type C (PTPRC or CD45). *Journal of Clinical Pathology*, 74(9), 548–552.
- Alberti, G., Russo, E., Corrao, S., Anzalone, R., Kruzliak, P., Miceli, V., Conaldi, P. G., Di Gaudio, F., & La Rocca, G. (2022). Current Perspectives on Adult Mesenchymal Stromal Cell-Derived Extracellular Vesicles: Biological Features and Clinical Indications. *Biomedicines*, 10(11), 1–24.
- Albuquerque-Souza, E., Schulte, F., Chen, T., Hardt, M., Hasturk, H., Van Dyke, T. E., Holzhausen, M., & Kantarci, A. (2020). Maresin-1 and Resolvin E1 Promote Regenerative Properties of Periodontal Ligament Stem Cells Under Inflammatory Conditions. *Frontiers in Immunology*, 11, 1–15.
- Ali, I. Q., Dakhil, B. R., Azeez, B. A. M. A., & Al-fahham, A. A. (2024). The Biochemistry and Clinical Importance of Ribonucleic Acid (RNA): A Review Article. *International Journal of Health & Medical Research*, 3(7), 540–544.
- Al-Khawaga, S., & Abdelalim, E. M. (2020). Potential Application of Mesenchymal Stem Cells and Their Exosomes in Lung Injury: an Emerging Therapeutic Option for COVID-19 Patients. *Stem Cell Research and Therapy*, 11(1), 1–33.
- Anderson, P., Carrillo-Gálvez, A. B., García-Pérez, A., Cobo, M., & Martín, F. (2013). CD105 (Endoglin)-Negative Murine Mesenchymal Stromal Cells Define a New Multipotent Subpopulation with Distinct Differentiation and Immunomodulatory Capacities. *PLoS ONE*, 8(10), 1–13.
- Asif, S., Khan, M., Waqar Arshad, M., & Shabbir, M. I. (2021). PCR Optimization for Beginners: A Step by Step Guide. *Research in Molecular Medicine*, 9(2), 81–102.
- Azarkina, K., Gromova, E., & Malashicheva, A. (2024). “A Friend Among Strangers” or the Ambiguous Roles of *RUNX2*. *Biomolecules*, 14(11), 1–17.
- Babaheidari, S. R. R., Niri, A. S., Mohammadi, M. H., Hamidpour, M., & Esmaili, S. (2025). DNA Methylation-Dependent Regulation of Lipoprotein Lipase Expression During Human Mesenchymal Stem Cell Differentiation into Adipocytes. *Iranian Journal of Blood and Cancer*, 17(1), 20–28.
- Banavar, S. R., Rawal, S. Y., Paterson, I. C., Singh, G., Davamani, F., Khoo, S. P., & Tan, E. L. (2021). Establishing a Technique for Isolation and

- Characterization of Human Periodontal Ligament Derived Mesenchymal Stem Cells. *Saudi Dental Journal*, 33(7), 693–701.
- Banyatworakul, P., Osathanon, T., Chumprasert, S., Pavasant, P., & Pirarat, N. (2021). Responses of Canine Periodontal Ligament Cells to Bubaline Blood Derived Platelet Rich Fibrin in Vitro. *Scientific Reports*, 11(1), 1–13.
- Binny, R. N., Priest, P., French, N. P., Parry, M., Lustig, A., Hendy, S. C., Maclaren, O. J., Ridings, K. M., Steyn, N., Vattiato, G., & Plank, M. J. (2023). Sensitivity of Reverse Transcription Polymerase Chain Reaction Tests for Severe Acute Respiratory Syndrome Coronavirus 2 through Time. *Journal of Infectious Diseases*, 227(1), 9–17.
- Bong, D., Sohn, J., & Lee, S. J. (2024). Brief Guide to RT-qPCR. *Molecules and Cells*, 47(12), 1–5.
- Calloni, R., Cordero, E. A. A., Henriques, J. A. P., & Bonatto, D. (2013). Reviewing and Updating the Major Molecular Markers for Stem Cells. *Stem Cells and Development*, 22(9), 1455–1476.
- Charitos, I. A., Ballini, A., Cantore, S., Boccellino, M., Di Domenico, M., Borsani, E., Nocini, R., Di Cosola, M., Santacroce, L., & Bottalico, L. (2021). Stem Cells: A Historical Review about Biological, Religious, and Ethical Issues. *Stem Cells International*, 2021, 1–11.
- Chen, M. X., Zhong, Y. J., Dong, Q. Q., Wong, H. M., & Wen, Y. F. (2021). Global, Regional, and National Burden of Severe Periodontitis, 1990–2019: An Analysis of the Global Burden of Disease Study 2019. *Journal of Clinical Periodontology*, 48(9), 1165–1188.
- Cho, Y. D., Kim, K. H., Lee, Y. M., Ku, Y., & Seol, Y. J. (2021). Periodontal Wound Healing and Tissue Regeneration: a Narrative Review. *Pharmaceutics*, 14(5), 1–17.
- Cruzat, V., Rogero, M. M., Keane, K. N., Curi, R., & Newsholme, P. (2018). Glutamine: Metabolism and Immune Function, Supplementation and Clinical Translation. *Nutrients*, 10(11), 1–33.
- Dai, P., Qi, G., Zhu, M., Du, Q., Wang, K., Gao, Y., Li, M., Feng, X., & Zhang, X. (2024). Periodontal Ligament Stem Cell Tissue Engineering Scaffolds Can Guide and Promote Canine Periodontal Tissue Regeneration. *Frontiers in Veterinary Science*, 11, 1–17.
- Dayem, A. A., Lee, S., Choi, H. Y., & Cho, S. G. (2018). The Impact of Adhesion Molecules on the Vitro Culture and Differentiation of Stem Cells. *Biotechnology Journal*, 13(2), 1–29.
- De Morree, A., & Rando, T. A. (2023). Regulation of Adult Stem Cell Quiescence and Its Functions in The Maintenance of Tissue Integrity. *Nature Reviews Molecular Cell Biology*, 24(5), 334–354.
- Delorme, B., Ringe, J., Pontikoglou, C., Gaillard, J., Langonné, A., Sensebé, L., Noël, D., Jorgensen, C., Häupl, T., & Charbord, P. (2009). Specific Lineage-

- Priming of Bone Marrow Mesenchymal Stem Cells Provides the Molecular Framework for Their Plasticity. *Stem Cells*, 27(5), 1142–1151.
- Devine, K. G., & Jheeta, S. (2020). De Novo Nucleic Acids: A Review of Synthetic Alternatives to DNA and RNA that Could Act as Bio-Information Storage Molecules. *Life*, 10(12), 1–21.
- Dominici, M., Le Blanc, K., Mueller, I., Slaper-Cortenbach, I., Marini, F. C., Krause, D. S., Deans, R. J., Keating, A., Prockop, D. J., & Horwitz, E. M. (2006). Minimal Criteria for Defining Multipotent Mesenchymal Stromal Cells. The International Society for Cellular Therapy Position Statement. *Cytotherapy*, 8(4), 315–317.
- Dorotheou, D., Bochaton-Piallat, M. L., Giannopoulou, C., & Kiliaridis, S. (2018). Expression of α -Smooth Muscle Actin in the Periodontal Ligament During Post-Emergent Tooth Eruption. *Journal of International Medical Research*, 46(6), 2423–2435.
- Dubey, A., Lavanya, L., Sadananda, D., Gouthami, K., Elfansu, K., Singh, A., Singh, A., & Singh, A. (2021). Inferences of Carbon Dioxide in Present-Day Cell Culture Systems: An Unacknowledged Problem and Perspectives. *Austin Therapeutics*, 6(1), 1–8.
- Endo, K., Fujita, N., Nakagawa, T., & Nishimura, R. (2019). Comparison of the Effect of Growth Factors on Chondrogenesis of Canine Mesenchymal Stem Cells. *Journal of Veterinary Medical Science*, 81(8), 1211–1218.
- Esfahanian, V., Ejeian, F., Mohebinia, H., Zojaji Nejad, Z. S., Yazdchi, M., Ebrahimi Dastgerdi, M., Ebrahimi Dastgerdi, M., & Nasr-Esfahani, M. H. (2023). Cellular Behaviors of Periodontal Ligament Stem Cells in the Presence of Bone Grafting Biomaterials. *Life*, 13(1), 1–9.
- Fakatava, N., Mitarai, H., Yuda, A., Haraguchi, A., Wada, H., Hasegawa, D., Maeda, H., & Wada, N. (2023). Actin Alpha 2, Smooth Muscle, a Transforming Growth Factor-B1-Induced Factor, Regulates Collagen Production in Human Periodontal Ligament Cells Via Smad2/3 Pathway. *Journal of Dental Sciences*, 18(2), 567–576.
- Fei, Z., Sun, C., Peng, X., Han, M., & Zhou, Q. (2022). Krüppel-Like Factor 4 Promotes the Proliferation and Osteogenic Differentiation of BMSCs through SOX2/IGF2 Pathway. *Acta Biochimica Polonica*, 69(2), 349–355.
- Ferencakova, M., Benova, A., Raska, I., Abaffy, P., Sindelka, R., Dzubanová, M., Pospisilová, E., Kolostová, K., Cajka, T., Paclík, A., Zikan, V., & Tencerová, M. (2023). Human Bone Marrow Stromal Cells: The Impact of Anticoagulants on Stem Cell Properties. *Frontiers in Cell and Developmental Biology*, 11, 1–16.
- Freeman, B. T., Jung, J. P., & Ogle, B. M. (2015). Single-Cell RNA-seq of Bone Marrow-Derived Mesenchymal Stem Cells Reveals Unique Profiles of Lineage Priming. *PLoS ONE*, 10(9), 1–16.

- Fulton, A. J., Fiani, N., & Verstraete, F. J. M. (2014). Canine pediatric dentistry. *Veterinary Clinics of North America - Small Animal Practice*, 44(2), 303–324.
- Galgaro, B. C., Beckenkamp, L. R., van den M. Nunnenkamp, M., Korb, V. G., Naasani, L. I. S., Roszek, K., & Wink, M. R. (2021). The adenosinergic pathway in mesenchymal stem cell fate and functions. *Medicinal Research Reviews*, 41(4), 2316–2349.
- Garna, D., Kaur, M., Hughes, F. J., & Ghuman, M. (2020). Comparison of the Expression of Periodontal Markers in Dental and Bone Marrow-derived Mesenchymal Stem Cells. *The Open Dentistry Journal*, 14(1), 196–202.
- Girach, A., Audo, I., Birch, D. G., Huckfeldt, R. M., Lam, B. L., Leroy, B. P., Michaelides, M., Russell, S. R., Sallum, J. M. F., Stingl, K., Tsang, S. H., & Yang, P. (2022). RNA-based Therapies in Inherited Retinal Diseases. *Therapeutic Advances in Ophthalmology*, 14, 1–20.
- Gökmen-Polar, Y. (2018). Overview of PCR-Based Technologies and Multiplexed Gene Analysis for Biomarker Studies. *Predictive Biomarkers in Oncology: Applications in Precision Medicine*, 1, 63–73.
- Grätz, C., Bui, M. L. U., Thaqi, G., Kirchner, B., Loewe, R. P., & Pfaffl, M. W. (2022). Obtaining Reliable RT-qPCR Results in Molecular Diagnostics—MIQE Goals and Pitfalls for Transcriptional Biomarker Discovery. *Life*, 12(3), 1–19.
- Grossner, T., Haberkorn, U., Hofmann, J., & Gotterbarm, T. (2022). Effects of Different Basal Cell Culture Media Upon the Osteogenic Response of hMSCs Evaluated by ^{99m}Tc-HDP Labeling. *International Journal of Molecular Sciences*, 23(11), 1–22.
- Gu, X., Li, X., Jin, Y., Zhang, Z., Li, M., Liu, D., & Wei, F. (2021). CDR1as Regulated by hnRNPM Maintains Stemness of Periodontal Ligament Stem Cells via miR-7/KLF4. *Journal of Cellular and Molecular Medicine*, 25(9), 4501–4515.
- Hassan, S. N., & Ahmad, F. (2020). The Relevance of Antibiotic Supplements in Mammalian Cell Cultures: Towards a Paradigm Shift. *Gulhane Medical Journal*, 4, 224–230.
- Hassanpour, M., Salybekov, A. A., Kobayashi, S., & Asahara, T. (2023). CD34 Positive Cells as Endothelial Progenitor Cells in Biology and Medicine. *Frontiers in Cell and Developmental Biology*, 11, 1–16.
- Hernandez-Quiles, M., Broekema, M. F., & Kalkhoven, E. (2021). PPARgamma in Metabolism, Immunity, and Cancer: Unified and Diverse Mechanisms of Action. *Frontiers in Endocrinology*, 12, 1–17.
- Houlihan, G., Arangundy-Franklin, S., Porebski, B. T., Subramanian, N., Taylor, A. I., & Holliger, P. (2020). Discovery and evolution of RNA and XNA reverse transcriptase function and fidelity. *Nature Chemistry*, 12(8), 683–690.

- Hu, C., Zhao, L., Zhang, L., Bao, Q., & Li, L. (2020). Mesenchymal Stem Cell-Based Cell-Free Strategies: Safe and Effective Treatments for Liver Injury. *Stem Cell Research and Therapy*, 11(1), 1–12.
- Hu, P., Leyton, L., Hagood, J. S., & Barker, T. H. (2022). Thy-1-Integrin Interactions in Cis and Trans Mediate Distinctive Signaling. *Frontiers in Cell and Developmental Biology*, 10, 1–20.
- Ichiyama-Kobayashi, S., Hata, K., Wakamori, K., Takahata, Y., Murakami, T., Yamanaka, H., Takano, H., Yao, R., Uzawa, N., & Nishimura, R. (2024). Chromatin Profiling Identifies Chondrocyte-specific *SOX9* Enhancers Important for Skeletal Development. *JCI insight*, 9(11), 1–18.
- Iwata, T., Yamato, M., Tsuchioka, H., Takagi, R., Mukobata, S., Washio, K., Okano, T., & Ishikawa, I. (2009). Periodontal Regeneration with Multi-Layered Periodontal Ligament-Derived Cell Sheets in a Canine Model. *Biomaterials*, 30(14), 2716–2723.
- Jarocho, D., Lukasiewicz, E., & Majka, M. (2008). Advantage of Mesenchymal Stem Cells (MSC) expansion directly from purified bone marrow CD105+ and CD271+ cells. *Folia Histochemica et Cytobiologica*, 46(3), 307–314.
- Jiang, N., Tian, X., Wang, Q., Hao, J., Jiang, J., & Wang, H. (2024). Regulation Mechanisms and Maintenance Strategies of Stemness in Mesenchymal Stem Cells. *Stem Cell Reviews and Reports*, 20(2), 455–483.
- Kannan, S., Ghosh, J., & Dhara, S. K. (2020). Osteogenic Differentiation Potential of Porcine Bone Marrow Mesenchymal Stem Cell Subpopulations Selected in Different Basal Media. *Biology Open*, 9(10), 1–11.
- Kawanabe, N., Murata, S., Murakami, K., Ishihara, Y., Hayano, S., Kurosaka, H., Kamioka, H., Takano-Yamamoto, T., & Yamashiro, T. (2010). Isolation of Multipotent Stem Cells in Human Periodontal Ligament Using Stage-Specific Embryonic Antigen-4. *Differentiation*, 79(2), 74–83.
- Knuth, C. A., Sastre, E. A., Fahy, N. B., Witte-Bouma, J., Ridwan, Y., Strabbing, E. M., Koudstaal, M. J., van de Peppel, J., Wolvius, E. B., Narcisi, R., & Farrell, E. (2019). Collagen Type X is Essential for Successful Mesenchymal Stem Cell-Mediated Cartilage Formation and Subsequent Endochondral Ossification. *European Cells and Materials*, 38, 106–122.
- Koh, B., Sulaiman, N., Ismadi, S. N. S. W., Ramli, R., Yunus, S. S. M., Idrus, R. B. H., Ariffin, S. H. Z., Wahab, R. M. A., & Yazid, M. D. (2021). Mesenchymal Stem Cells: A Comprehensive Methods for Odontoblastic Induction. *Biological Procedures Online*, 23(1), 2–13.
- Kok, R. N. U., Tans, S. J., & Van Zon, J. S. (2023). Minimizing Cell Number Fluctuations in Self-Renewing Tissues with a Stem-Cell Niche. *Physical Review E*, 108(6), 1–11.
- Krešić, N., Prišlin, M., Vlahović, D., Kostešić, P., Ljolje, I., Brnić, D., Turk, N., Musulin, A., & Habrun, B. (2021). The Expression Pattern of Surface Markers

- in Canine Adipose-Derived Mesenchymal Stem Cells. *International Journal of Molecular Sciences*, 22(14), 1–19.
- Krömer, J. O., Dietmair, S., Jacob, S. S., & Nielsen, L. K. (2011). Quantification of l-alanyl-l-glutamine in Mammalian Cell Culture Broth: Evaluation of Different Detectors. *Analytical Biochemistry*, 416(1), 129–131.
- Kuang, J., Yan, X., Genders, A. J., Granata, C., & Bishop, D. J. (2018). An Overview of Technical Considerations when Using Quantitative Real-Time PCR Analysis of Gene Expression in Human Exercise Research. *PLoS ONE*, 13(5), 1–27.
- Lerman, M. J., Lembong, J., Muramoto, S., Gillen, G., & Fisher, J. P. (2018). The Evolution of Polystyrene as a Cell Culture Material. *Tissue Engineering - Part B: Reviews*, 24(5), 359–372.
- Li, P., Ou, Q., Shi, S., & Shao, C. (2023). Immunomodulatory Properties of Mesenchymal Stem Cells/Dental Stem Cells and their Therapeutic Applications. *Cellular and Molecular Immunology*, 20(6), 558–569.
- Li, X., Liao, D., Sun, G., & Chu, H. W. (2020). Odontogenesis and Neuronal Differentiation Characteristics of Periodontal Ligament Stem Cells from Beagle Dog. *Journal of Cellular and Molecular Medicine*, 24(9), 5146–5151.
- Li, X., Wang, Y., Li, J., Mei, X., Liu, Y., & Huang, H. (2022). qPCR Tools: An R Package for qPCR Data Processing and Visualization. *Frontiers in Genetics*, 13, 1–6.
- Liczner, C., Duke, K., Juneau, G., Egli, M., & Wilds, C. J. (2021). Beyond Ribose and Phosphate: Selected Nucleic Acid Modifications for Structure–Function Investigations and Therapeutic Applications. *Beilstein Journal of Organic Chemistry*, 17, 908–931.
- Liu, Q., Li, M., Wang, S., Xiao, Z., Xiong, Y., & Wang, G. (2020). Recent Advances of Osterix Transcription Factor in Osteoblast Differentiation and Bone Formation. *Frontiers in Cell and Developmental Biology*, 8, 1–15.
- Liu, T. M., Wu, Y. N., Guo, X. M., Hui, J. H. P., Lee, E. H., & Lim, B. (2009). Effects of Ectopic *NANOG* and *OCT4* Overexpression on Mesenchymal Stem Cells. *Stem Cells and Development*, 18(7), 1013–1021.
- Lorázkó, G., Rácz, B., & Ózsvári, L. (2022). Changes in the Dentition of Small Dogs up to 4 Months of Age. *Animals*, 12(11), 1–12.
- Lu, V., Roy, I. J., Torres, A., Joly, J. H., Ahsan, F. M., Graham, N. A., & Teitell, M. A. (2022). Glutamine-dependent Signaling Controls Pluripotent Stem Cell Fate. *Developmental Cell*, 57(5), 610–623.
- Lu, Y., Qu, H., Qi, D., Xu, W., Liu, S., Jin, X., Song, P., Guo, Y., Jia, Y., Wang, X., Li, H., Li, Y., & Quan, C. (2019). *OCT4* Maintains Self-Renewal and Reverses Senescence in Human Hair Follicle Mesenchymal Stem Cells Through the Downregulation of P21 by DNA Methyltransferases. *Stem Cell Research and Therapy*, 10(1), 1–16.

- Lyra-Leite, D. M., Copley, R. R., Freeman, P. P., Pongpamorn, P., Shah, D., McKenna, D. E., Lenny, B., Pinheiro, E. A., Weddle, C. J., Gharib, M., Javed, H., Fonoudi, H., Sapkota, Y., & Burrige, P. W. (2023). Nutritional Requirements of Human Induced Pluripotent Stem Cells. *Stem Cell Reports*, 18(6), 1371–1387.
- Ma, H., Bell, K. N., & Loker, R. N. (2021). qPCR and qRT-PCR Analysis: Regulatory Points to Consider when Conducting Biodistribution and Vector Shedding Studies. *Molecular Therapy Methods and Clinical Development*, 20, 152–168.
- Ma, X., Wang, D., Zhao, W., & Xu, L. (2018). Deciphering the Roles of *PPAR γ* in Adipocytes via Dynamic Change of Transcription Complex. *Frontiers in Endocrinology*, 9, 1–10.
- Maleki, M., Ghanbarvand, F., Behvarz, M. R., Ejtemaei, M., & Ghadirkhomi, E. (2014). Comparison of Mesenchymal Stem Cell Markers in Multiple Human Adult Stem Cells. *International Journal of Stem Cells*, 7(2), 118–126.
- Margiana, R., Markov, A., Zekiy, A. O., Hamza, M. U., Al-Dabbagh, K. A., Al-Zubaidi, S. H., Hameed, N. M., Ahmad, I., Sivaraman, R., Kzar, H. H., Al-Gazally, M. E., Mustafa, Y. F., & Siahmansouri, H. (2022). Clinical Application of Mesenchymal Stem Cell in Regenerative Medicine: a Narrative Review. *Stem Cell Research and Therapy*, 13(1), 1–22.
- Minchin, S., & Lodge, J. (2019). Understanding biochemistry: Structure and Function of Nucleic Acids. *Essays in Biochemistry*, 63(4), 433–456.
- Mody, D. R., Lathiya, V., & Mankar, K. (2021). Periostin in Periodontics: A Brief Insight. *International Journal of Science and Healthcare Research*, 6(2), 147–149.
- Mohebbichamkhorami, F., Fattahi, R., Niknam, Z., Aliashrafi, M., Khakpour Naeimi, S., Gilanchi, S., & Zali, H. (2022). Periodontal Ligament Stem Cells as a Promising Therapeutic Target for Neural Damage. *Stem Cell Research and Therapy*, 13(1), 1–14.
- Murabayashi, D., Mochizuki, M., Tamaki, Y., & Nakahara, T. (2017). Practical Methods for Handling Human Periodontal Ligament Stem Cells in Serum-Free and Serum-Containing Culture Conditions Under Hypoxia: Implications for Regenerative Medicine. *Human Cell*, 30(3), 169–180.
- Na, J., & Kim, G. J. (2020). Recent Trends in Stem Cell Therapy for Premature Ovarian Insufficiency and its Therapeutic Potential: A Review. *Journal of Ovarian Research*, 13(1), 1–14.
- Nair, G. J., Sinha, Y., Srivastava, A. K., Kumar, N. S., & Hiremath, L. (2023). A Review on the Molecular Basis of Stemness of Mesenchymal Stem Cells. *World Journal of Biology Pharmacy and Health Sciences*, 15(2), 202–207.
- Niemiec, B. A. (2010). *Small Animal Dental, Oral & Maxillofacial Disease A Color Handbook*. USA: Manson Publishing.

- Novello, S., Tricot-Doleux, S., Novella, A., Pellen-Mussi, P., & Jeanne, S. (2022). Influence of Periodontal Ligament Stem Cell-Derived Conditioned Medium on Osteoblasts. *Pharmaceutics*, 14(4), 1–17.
- O'Connor, K. (2020). A Cautionary Tale about the Use of Colony-Forming Efficiency as a Proxy for the Survival of Mesenchymal Stem Cells. *Stem Cell Research and Therapy*, 11(1), 1–3.
- O'Neill, D. G., Mitchell, C. E., Humphrey, J., Church, D. B., Brodbelt, D. C., & Pegram, C. (2021). Epidemiology of Periodontal Disease in Dogs in the UK Primary-care Veterinary Setting. *Journal of Small Animal Practice*, 62(12), 1051–1061.
- Pamies, D., Leist, M., Coecke, S., Bowe, G., Allen, D. G., Gstraunthaler, G., Bal-Price, A., Pistollato, F., de Vries, R. B. M., Hogberg, H. T., Hartung, T., & Stacey, G. (2022). Guidance Document on Good Cell and Tissue Culture Practice 2.0 (GCCP 2.0). *Altex*, 39(1), 30–70.
- Pereira-Gómez, M., Fajardo, Á., Echeverría, N., López-Tort, F., Perbolianachis, P., Costáble, A., Aldunate, F., Moreno, P., & Moratorio, G. (2021). Evaluation of SYBR Green Real Time PCR for Detecting SARS-CoV-2 from Clinical Samples. *Journal of Virological Methods*, 289, 1–8.
- Pilgrim, C. R., McCahill, K. A., Rops, J. G., Dufour, J. M., Russell, K. A., & Koch, T. G. (2022). A Review of Fetal Bovine Serum in the Culture of Mesenchymal Stromal Cells and Potential Alternatives for Veterinary Medicine. *Frontiers in Veterinary Science*, 9, 1–11.
- Pinho, L. C., Santos, C., Fernandes, M. H., & Colaço, B. (2025). Canine Periodontal Ligament Stem Cells as a Tool for Periodontal Regeneration. *Research in Veterinary Science*, 193, 1–9.
- Pittenger, M. F., Discher, D. E., Péault, B. M., Phinney, D. G., Hare, J. M., & Caplan, A. I. (2019). Mesenchymal Stem Cell Perspective: Cell Biology to Clinical Progress. *npj Regenerative Medicine*, 4(1), 1–15.
- Pochampally, R. (2008). Colony Forming Unit Assays for MSCs. *Methods in Molecular Biology*, 449, 83–91.
- Poliwoda, S., Noor, N., Downs, E., Schaaf, A., Cantwell, A., Ganti, L., Kaye, A. D., Mosel, L. I., Carroll, C. B., Viswanath, O., & Urits, I. (2022). Stem Cells: a Comprehensive Review of Origins and Emerging Clinical Roles in Medical Practice. *Orthopedic Reviews*, 14(3), 1–9.
- Purbantoro, S. D., Osathanon, T., Nantavisai, S. N., & Sawangmake, C. (2022). Osteogenic Growth Peptide Enhances Osteogenic Differentiation of Human Periodontal Ligament Stem Cells. *Heliyon*, 8(7), 1–11.
- Purwaningrum, M., Giachelli, C. M., Osathanon, T., Rattanapuchpong, S., & Sawangmake, C. (2023). Dissecting Specific Wnt Components Governing Osteogenic Differentiation Potential by Human Periodontal Ligament Stem Cells Through Interleukin-6. *Scientific Reports*, 13(1), 1–19.

- Qin, L., Liu, N., Bao, C. L., Yang, D. Z., Ma, G. X., Yi, W. H., Xiao, G. Z., & Cao, H. L. (2023). Mesenchymal Stem Cells in Fibrotic Diseases—the Two Sides of the Same Coin. *Acta Pharmacologica Sinica*, 44(2), 268–287.
- Queiroz, A., Pelissari, C., Trierveiler, M., Albuquerque-Souza, E., Gasparoni, L. M., de França, B. N., & Holzhausen, M. (2021). Therapeutic Potential of Periodontal Ligament Stem Cells. *World Journal of Stem Cells*, 13(6), 605–618.
- Rahman, F. A., & Azwa, F. N. (2025). Comparative Dental Pulp Stem Cells (DPSCs) and Periodontal Ligament Stem Cells (PDLSCs): Difference in Effect of Aspirin on Osteoblast Potential of PDLSCs and DPSCs. *Tissue and Cell*, 94, 1–7.
- Reichard, A., & Asosingh, K. (2019). Best Practices for Preparing a Single Cell Suspension from Solid Tissues for Flow Cytometry. *Cytometry Part A*, 95(2), 219–226.
- Reiter, A. M., & Gracis, M. (2018). *BSAVA Manual of Canine and Feline Dentistry and Oral Surgery, 4th Edition*. UK: BSAVA.
- Rios, H. F., Ma, D., Xie, Y., Giannobile, W. V., Bonewald, L. F., Conway, S. J., & Feng, J. Q. (2008). Periostin Is Essential for the Integrity and Function of the Periodontal Ligament During Occlusal Loading in Mice. *Journal of Periodontology*, 79(8), 1480–1490.
- Roccaro, M., & Peli, A. (2020). Age Determination in Dog Puppies by Teeth Examination: Legal, Health and Welfare Implications, Review of the Literature and Practical Considerations. *Veterinaria Italiana*, 56(3), 149–162.
- Rodprasert, W., Nantavisai, S., Pathanachai, K., Pavasant, P., Osathanon, T., & Sawangmake, C. (2021). Tailored Generation of Insulin Producing Cells from Canine Mesenchymal Stem Cells Derived from Bone Marrow and Adipose Tissue. *Scientific Reports*, 11(1), 1–17.
- Rubio-Monterde, A., Quesada-González, D., & Merkoçi, A. (2023). Toward Integrated Molecular Lateral Flow Diagnostic Tests Using Advanced Micro- and Nanotechnology. *Analytical Chemistry*, 95(1), 468–489.
- Ruijter, J. M., Barnewall, R. J., Marsh, I. B., Szentirmay, A. N., Quinn, J. C., Van Houdt, R., Gunst, Q. D., & Van Den Hoff, M. J. B. (2021). Efficiency Correction Is Required for Accurate Quantitative PCR Analysis and Reporting. *Clinical Chemistry*, 67(6), 829–842.
- Sachdeva, S., Phadnaik, M. B., Mani, A., Saluja, H., & Singh, M. (2020). Prevalence and Distribution of Bone Defects Associated with Moderate and Severe Periodontitis Patients. *Clinical Epidemiology and Global Health*, 8(3), 712–717.
- Schoonderwoerd, M. J. A., Goumans, M. J. T. H., & Hawinkels, L. J. A. C. (2020). Endoglin: Beyond the Endothelium. *Biomolecules* 10(2), 1–17.

- Sedigh, S. H., Saffarpour, A., Jamshidi, S., Ashouri, M., Nassiri, S. M., Dehghan, M. M., Ranjbar, E., & Shafieian, R. (2023). In Vitro Investigation of Canine Periodontal Ligament-Derived Mesenchymal Stem Cells: A Possibility of Promising Tool for Periodontal Regeneration. *Journal of Oral Biology and Craniofacial Research*, 13(3), 403–411.
- Seo, B.M., Miura, M., Gronthos, S., Bartold, P.M., Batouli, S., & Brahimi, J. (2004). Investigation of Multipotent *POSTN* Stem Cells from Human Periodontal Ligament. *Lancet*, 364, 149–155.
- Shi, W., Wang, H., Pan, G., Geng, Y., Guo, Y., & Pei, D. (2006). Regulation of the Pluripotency Marker Rex-1 by *NANOG* and *SOX2*. *Journal of Biological Chemistry*, 281(33), 23319–23325.
- Smith, M. (2020). mRNA Transcription, Translation, and Defects in Developmental Cognitive and Behavioral Disorders. *Frontiers in Molecular Biosciences*, 7, 1–14.
- Stefańska, K., Bryl, R., Moncrieff, L., Pinto, N., Shibli, J. A., & Dyszkiewicz-Konwińska, M. (2020). Mesenchymal Stem Cells- A Historical Overview. *Medical Journal of Cell Biology*, 8(2), 83–87.
- Su, F., Liu, S. Sen, Ma, J. L., Wang, D. S., E, L. L., & Liu, H. C. (2015). Enhancement of Periodontal Tissue Regeneration by Transplantation of Osteoprotegerin-Engineered Periodontal Ligament Stem Cells. *Stem Cell Research and Therapy*, 6(1), 1–14.
- Taephatthanasagon, T., Purbantoro, S. D., Rodprasert, W., Pathanachai, K., Charoenlertkul, P., Mahanonda, R., Sa-Ard-lam, N., Kuncorojakti, S., Soedarmanto, A., Jamilah, N. S., Osathanon, T., Sawangmake, C., & Rattanapuchpong, S. (2024). Osteogenic Potentials in Canine Mesenchymal Stem Cells: Unraveling the Efficacy of Polycaprolactone/Hydroxyapatite Scaffolds in Veterinary Bone Regeneration. *BMC Veterinary Research*, 20(1), 1–15.
- Takebe, H., Sato, H., Mizoguchi, T., & Hosoya, A. (2025). Localization of α -Smooth Muscle Actin in Osteoblast Differentiation During Periodontal Development. *Cell and Tissue Research*, 399(1), 119–127.
- Takemitsu, H., Zhao, D., Yamamoto, I., Harada, Y., Michishita, M., & Arai, T. (2012). Comparison of Bone Marrow and Adipose Tissue-derived Canine Mesenchymal Stem Cells. *BMC Veterinary Research*, 8(150), 1–9.
- Tanaka, K., Iwasaki, K., Feghali, K. El, Komaki, M., Ishikawa, I., & Izumi, Y. (2011). Comparison of Characteristics of Periodontal Ligament Cells Obtained from Outgrowth and Enzyme-Digested Culture Methods. *Archives of Oral Biology*, 56(4), 380–388.
- Teunissen, M., Verseijden, F., Riemers, F. M., van Osch, G. J. V. M., & Tryfonidou, M. A. (2021). The Lower in Vitro Chondrogenic Potential of Canine Adipose Tissue-Derived Mesenchymal Stromal Cells (MSC)

- Compared to Bone Marrow-Derived MSC is Not Improved by BMP-2 or BMP-6. *Veterinary Journal*, 269, 1–8.
- Thorvaldsen, S., Øhrstrøm, P., & Hössjer, O. (2024). The Representation, Quantification, and Nature of Genetic Information. *Synthese*, 204(1), 1–38.
- Tomokiyo, A., Yoshida, S., Hamano, S., Hasegawa, D., Sugii, H., & Maeda, H. (2018). Detection, Characterization, and Clinical Application of Mesenchymal Stem Cells in Periodontal Ligament Tissue. *Stem Cells International*, 2018, 1–9.
- Trubiani, O., Pizzicannella, J., Caputi, S., Marchisio, M., Mazzon, E., Paganelli, R., Paganelli, A., & Diomedea, F. (2019). Periodontal Ligament Stem Cells: Current Knowledge and Future Perspectives. *Stem Cells and Development*, 28(15), 995–1003.
- Trubiani, O., Zalzal, S. F., Paganelli, R., Marchisio, M., Giancola, R., Pizzicannella, J., Bühring, H. J., Piattelli, M., Caputi, S., & Nanci, A. (2010). Expression Profile of the Embryonic Markers *NANOG*, OCT-4, SSEA-1, SSEA-4, and Frizzled-9 Receptor in Human Periodontal Ligament Mesenchymal Stem Cells. *Journal of Cellular Physiology*, 225(1), 123–131.
- Tsumanuma, Y., Iwata, T., Kinoshita, A., Washio, K., Yoshida, T., Yamada, A., Takagi, R., Yamato, M., Okano, T., & Izumi, Y. (2016). Allogeneic Transplantation of Periodontal Ligament-Derived Multipotent Mesenchymal Stromal Cell Sheets in Canine Critical-Size Supra-Alveolar Periodontal Defect Model. *BioResearch Open Access*, 5(1), 22–36.
- Uematsu, S., & Qian, S. B. (2025). Interpreting Ribosome Dynamics during mRNA Translation. *Journal of Biological Chemistry*, 301(8), 1–13.
- Verma, A., Verma, M., & Singh, A. (2020). Animal Tissue Culture Principles and Applications. *Animal Biotechnology: Models in Discovery and Translation*, 1, 269–293.
- Viswanathan, S., Shi, Y., Galipeau, J., Krampera, M., Leblanc, K., Martin, I., Nolte, J., Phinney, D. G., & Sensebe, L. (2019). Mesenchymal stem versus stromal cells: International Society for Cell & Gene Therapy (ISCT®) Mesenchymal Stromal Cell committee position statement on nomenclature. *Cytotherapy*, 21(10), 1019–1024.
- Walewska, A., Janucik, A., Tynecka, M., Moniuszko, M., & Eljaszewicz, A. (2023). Mesenchymal Stem Cells Under Epigenetic Control – the Role of Epigenetic Machinery in Fate Decision and Functional Properties. *Cell Death and Disease*, 14(11), 1–14.
- Wang, F., Li, P., Chu, H. C., & Lo, P. K. (2022). Nucleic Acids and Their Analogues for Biomedical Applications. *Biosensors*, 12(2), 1–35.
- Wang, M., Cai, J., Chen, J., Liu, J., Geng, X., Yu, X., & Yang, J. (2024). *PCR Techniques and Their Clinical Applications*. USA: IntechOpen.

- Wang, T., Zhou, Y., Zhang, W., Xue, Y., Xiao, Z., Zhou, Y., & Peng, X. (2023). Exosomes and Exosome Composite Scaffolds in Periodontal Tissue Engineering. *Frontiers in Bioengineering and Biotechnology*, 11, 1–16.
- Wang, W. J., Zhao, Y. M., Lin, B. C., Yang, J., & Ge, L. H. (2012). Identification of Multipotent Stem Cells from Adult Dog Periodontal Ligament. *European Journal of Oral Sciences*, 120(4), 303–310.
- Wang, W., Yuan, C., Liu, Z., Geng, T., Li, X., Wei, L., Niu, W., & Wang, P. (2020). Characteristic Comparison Between Canine and Human Dental Mesenchymal Stem Cells for Periodontal Regeneration Research in Preclinical Animal Studies. *Tissue and Cells*, 67, 1–9.
- Weiskirchen, S., Schröder, S. K., Buhl, E. M., & Weiskirchen, R. (2023). A Beginner's Guide to Cell Culture: Practical Advice for Preventing Needless Problems. *Cells*, 12(5), 1–23.
- Wen, S., Zheng, X., Yin, W., Liu, Y., Wang, R., Zhao, Y., Liu, Z., Li, C., Zeng, J., & Rong, M. (2024). Dental Stem Cell Dynamics in Periodontal Ligament Regeneration: from Mechanism to Application. *Stem Cell Research and Therapy*, 15(1), 1–19.
- Xu, H., Bai, D., Ruest, L. B., Feng, J. Q., Guo, Y. W., Tian, Y., Jing, Y., He, Y., & Han, X. L. (2015). Expression Analysis of α-Smooth Muscle Actin and Tenascin-C in the Periodontal Ligament Under Orthodontic Loading or in Vitro Culture. *International Journal of Oral Science*, 7(4), 232–241.
- Xu, S., Zhao, L., Li, Y., Gu, X., Liu, Z., Han, X., Li, W., & Ma, W. (2024). Activating the Healing Process: Three-Dimensional Culture of Stem Cells in Matrigel for Tissue Repair. *BMC Biotechnology*, 24(1), 1 – 13.
- Yang, J., Zhan, X. Z., Malola, J., Li, Z. Y., Pawar, J. S., Zhang, H. T., & Zha, Z. G. (2020). The Multiple Roles of Thy-1 in Cell Differentiation and Regeneration. *Differentiation*, 113, 38–48.
- Yang, M. C., Chi, N. H., Chou, N. K., Huang, Y. Y., Chung, T. W., Chang, Y. L., Liu, H. C., Shieh, M. J., & Wang, S. S. (2010). The Influence of Rat Mesenchymal Stem Cell CD44 Surface Markers on Cell Growth, Fibronectin Expression, and Cardiomyogenic Differentiation on Silk Fibroin-Hyaluronic Acid Cardiac Patches. *Biomaterials*, 31(5), 854–862.
- Yao, T., & Asayama, Y. (2017). Animal-cell Culture Media: History, Characteristics, and Current Issues. *Reproductive Medicine and Biology*, 16(2), 99–117.
- Yoo, S. Y., Lee, J. S., Cha, J. K., Kim, S. K., & Kim, C. S. (2019). Periodontal Healing Using a Collagen Matrix with Periodontal Ligament Progenitor Cells in a Dehiscence Defect Model in Beagle Dogs. *Journal of Periodontal and Implant Science*, 49(4), 215–227.
- Yoshihara, T., Morimoto, T., Hirata, H., Murayama, M., Nonaka, T., Tsukamoto, M., Toda, Y., Kobayashi, T., Izuhara, K., & Mawatari, M. (2023).

Mechanisms of Tissue Degeneration Mediated by Periostin in Spinal Degenerative Diseases and Their Implications for Pathology and Diagnosis: a Review. *Frontiers in Medicine*, 10, 1–18.

Zakrzewski, W., Dobrzyński, M., Szymonowicz, M., & Rybak, Z. (2019). Stem Cells: Past, Present, and Future. *Stem Cell Research and Therapy*, 10(1), 1–22.

Zavala, J., Ledbetter, A. D., Morgan, D. S., Dailey, L. A., Puckett, E., McCullough, S. D., & Higuchi, M. (2018). A New Cell Culture Exposure System for Studying the Toxicity of Volatile Chemicals at the Air–Liquid Interface. *Inhalation Toxicology*, 30(5), 169–177.

Zhang, Y., Li, H., Shang, S., Meng, S., Lin, T., Zhang, Y., & Liu, H. (2021). Evaluation Validation of a qPCR Curve Analysis Method and Conventional Approaches. *BMC Genomics*, 22, 1–12.

Zhao, Z., Liu, J., Weir, M. D., Schneider, A., Ma, T., Oates, T. W., Xu, H. H. K., Zhang, K., & Bai, Y. (2022). Periodontal Ligament Stem Cell-Based Bioactive Constructs for Bone Tissue Engineering. *Frontiers in Bioengineering and Biotechnology*, 10, 1–19.

Zhou, S., Chen, S., Jiang, Q., & Pei, M. (2019). Determinants of Stem Cell Lineage Differentiation Toward Chondrogenesis Versus Adipogenesis. *Cellular and Molecular Life Sciences*, 76(9), 1653–1680.

Zhou, Y., Li, Y., Mao, L., & Peng, H. (2012). Periodontal Healing by Periodontal Ligament Cell Sheets in a Teeth Replantation Model. *Archives of Oral Biology*, 57(2), 169–176.

Zhu, H., Mitsuhashi, N., Klein, A., Barsky, L. W., Weinberg, K., Barr, M. L., Demetriou, A., & Wu, G. D. (2006). The Role of the Hyaluronan Receptor CD44 in Mesenchymal Stem Cell Migration in the Extracellular Matrix. *Stem Cells*, 24(4), 928–935.

Zhu, S., Liu, Z., Yuan, C., Lin, Y., Yang, Y., Wang, H., Zhang, C., Wang, P., & Gu, M. (2020). Bidirectional ephrinB2-EphB4 Signaling Regulates the Osteogenic Differentiation of Canine Periodontal Ligament Stem Cells. *International Journal of Molecular Medicine*, 45(3), 897–909.

Zhu, W., & Liang, M. (2015). Periodontal Ligament Stem Cells: Current Status, Concerns, and Future Prospects. *Stem Cells International*, 2015, 1–11.

Ziauddin, S. M., Nakashima, M., Watanabe, H., Tominaga, M., & Iohara, K. (2022). Biological Characteristics and Pulp Regeneration Potential of Stem Cells from Canine Deciduous Teeth Compared with those of Permanent Teeth. *Stem Cell Research and Therapy*, 13(1), 1–13.