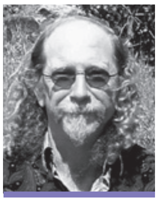

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Activité du miel et de la propolis
sur les biofilms gastro-intestinaux

BIBLIOGRAPHIE

[1] Sender R. 2016. Revised estimates for the number of human and bacteria cells in the body. PLoS Biol., 14: e1002533.

[2] Dingeo G. et al. 2020. Phytochemicals as modifiers of gut microbial communities. Food Funct., 11: 8444.

[3] Bergman E. N. 1990. Energy contributions of volatile fatty acids from the gastrointestinal tract in various species. Physiol. Rev., 70: 567-590.

[4] Rienks J. et al. 2018. Polyphenol exposure and risk of type 2 diabetes: dose-response meta-analyses and systematic review of prospective cohort studies. Am. J. Clin. Nutr., 108: 49-61.

[5] Grosso G. et al. 2015. Dietary polyphenols and cancer incidence: a comprehensive meta-analysis. Eur. J. Public Health, 25: ckv175-177.

[6] Poti F. et al. 2019. Polyphenol health effects on cardiovascular and neurodegenerative disorders: A review and meta-analysis. Int. J. Mol. Sci., 20: 351.

[7] Riccio P. & Rossano R. 2018. Diet, Gut Microbiota, and Vitamins D + A in Multiple Sclerosis. Neurotherapeutics, 15: 75-91.

[8] Zhong S. et al. 2023. The role of single and mixed biofilms in Clostridioides difficile infection and strategies for prevention and inhibition. Critical Reviews in Microbiology, DOI : 10.1080/1040841X.2023.2189950

[9] Tytgat HLP et al. 2019. Bowel biofilms : tipping points between a healthy and compromised gut ? Trends Microbiol. 27[1]: 17-25.

[10] Tay WH et al. 2016. Polymicrobial-host interactions during infection. J. Mol. Biol., 428[17]: 3355-3371.

[11] Feuerstadt P et al. 2021. Clinical complications in patients with primary and recurrent Clostridioides difficile infection: a real-world data analysis. SAGE Open Med., 9: 2050312120986733.

[12] Tremblay YD, Dupuy B. 2022. The blueprint for building a biofilm the Clostridioides difficile way. Curr Opin Microbiol, 66: 39-45.

[13] Dejea CM et al. 2014. Microbiota organization is a distinct feature of proximal colorectal cancers. Proc. Natl. Acad. Sci. U. S. A., 111: 18321-18326.

[14] Drewes JL et al. 2017. High-resolution bacterial 16S rRNA gene profile meta-analysis and biofilm status reveal common colorectal cancer consortia. NPJ Biofilms Microbiomes, 3 : 34.

[15] Meza-Torres J, Auria E, Dupuy B, Tremblay YDN. 2021. Wolf in Sheep's clothing : Clostridioides difficile biofilm as a reservoir for recurrent infections. Microorganisms, 9[9]: 1922.

[16] Piotrowski M. et al. 2018. Antimicrobial effects of propolis on Clostridium difficile belonging to the different PCR-ribotypes. Annales Universitatis Mariae Curie-Sklodowska sectio B – Geographia Geologia Mineralogia et Petrographia. DOI : 10.17951/c.2016.71.2.33

[17] Ross T et al. 2019. Clostridioides difficile LuxS mediates inter-bacterial interactions within biofilms. Sci Rep., 9: 1-15.

[18] Hassall J et al. 2021. Dissecting individual interactions between pathogenic and commensal bacteria within a multispecies gut microbial community. mSphere, 6[2]: e00013–00021.

[19] Normington C et al. 2021. Biofilms harbour Clostridioides difficile, serving as a reservoir for recurrent infection. npj Biofilms and Microbiomes, 7: 16 https://doi.org/10.1038/s41522-021-00184-w

[20] Azimirad M et al. 2020. Coexistence of Clostridioides difficile and Staphylococcus aureus in gut of Iranian outpatients with underlying inflammatory bowel disease. Anaerobe, 61: 102-113.

[21] Faden H. 2021. Review and commentary on the importance of bile acids in the life cycle of Clostridioides difficile in children and adults. J Pediatric Infect Dis Soc., 28: 10[5]: 659-664. doi: 10.1093/jpids/piaa150. PMID: 33626138.

[22] Lu J. et al. 2019. Honey can inhibit and eliminate biofilms produced by Pseudomonas aeruginosa. Scientific Reports, 9: 18160 https://doi.org/10.1038/s41598-019-54576-2

[23] AFSSA. 2010. Avis de l'agence française de sécurité sanitaire des aliments relatif aux conséquences sur les flores microbiennes d'une réduction en taux de sel dans les aliments. Afssa-Saisine n° 2008-SA-0173

[24] Hammond N. et al. 2014. Biofilm formation of Clostridium difficile and susceptibility to Manuka Honey. BMC Complementary and Alternative Medicine, 14: 329

[25] Okhiria OA et al. 2009. Honey modulates biofilms of Pseudomonas aeruginosa in a time and dose dependent manner. J Api Product & Api Medical Science, 1[1]: 6-10

[26] Alandejani T et al. 2009. Effectiveness of honey on Staphylococcus aureus and Pseudomonas aeruginosa biofilms. Otolaryngology, 141[1]: 114-118. doi: 10.1016/j.otohns.2009.01.005.

[27] Maddocks S. et al. 2013. Manuka honey inhibits adhesion and invasion of medically important wound bacteria. Future Microbiology, 8[12]: 1523-1536

[28] Fernandes L et al. 2020. Honey as a Strategy to Fight Candida tropicalis in Mixed-Biofilms with Pseudomonas aeruginosa. Antibiotics, 21: 9[2]: 43. doi: 10.3390/antibiotics9020043. PMID: 31973242; PMCID: PMC7168267.

[29] Majtan, J et al. 2014. Anti-biofilm effects of honey against wound pathogens Proteus mirabilis and Enterobacter cloacae. Phytother. Res., 28 : 69-75. doi: 10.1002/ptr.4957

[30] Abbas HA. 2014. Comparative antibacterial and antibiofilm activities of manuka honey and egyptian clover honey. Asian Journal of Applied Sciences (ISSN: 2321 – 0893) Volume 02 – Issue 02, April

[31] Ansari MA et al. 2013. Effect of Jujube Honey on Candida albicans Growth and Biofilm Formation. Archives of Medical Research, 44[5]: 352-360.

[32] Nett JE et al. 2010. Andes genetic basis of Candida biofilm resistance due to drug-sequestering matrix glucan. J Infect Dis, 202: 171-175.

[33] Al-kafaween M.A. et al. 2021. Effects of Selected Malaysian Kelulut Honey on Biofilm Formation and the Gene Expression Profile of Staphylococcus Aureus, Pseudomonas Aeruginosa and Escherichia Coli. Jordan Journal of Pharmaceutical Sciences, 14[1]: 9-26.

[34] Wasfi et al. 2020. Proteus Biofilm Therapeutic Strategies. Frontiers in Cellular and Infection Microbiology, 10: 414

[35] Bulman Z et al. 2011. A novel property of propolis (bee glue): anti-pathogenic activity by inhibition of N-acyl-homoserine lactone mediated signal- ing in bacteria. J Ethnopharmacol, 138: 788–797

[36] Rasmussen TB & Givskov M. 2006. Quorum-sensing inhibitors as anti-pathogenic drugs. Int J Med Microbiol, 296:149-161.

[37] Gemiarto AT et al. 2015. Isoprenyl caffeate, a major compound in manuka propolis, is a quorum-sensing inhibitor in Chromobacterium violaceum. Antonie van Leeuwenhoek, 108: 491-504 DOI 10.1007/s10482-015-0503-6

[38] Grecka K et al. 2019. The anti-staphylococcal potential of ethanolic polish propolis extracts. Molecules, 24: 1732.

[39] Stan T et al. 2016. Anti-Pathogenic Effect of Propolis Extracts from Different Romanian Regions on Staphylococcus Sp. Clinical Strains. Romanian Biotechnological Letters, 21[1] : 11166-11175.

[40] Koo H et al. 2002. Effects of compounds found in propolis on Streptococcus mutans growth and on glucosyltransferase activity. Antimicrobial Agents and Chemotherapy, 46: 1302-1309.

[41] Duarte S et al. 2003. Effect of a novel type of propolis and its chemical fractions on glucosyltransferases and on growth and adherence of Streptococcus mutans. Biological & Pharmaceutical Bulletin, 26[4]: 527-531.

[42] Kouidhi B et al. 2010. Anti-cariogenic and anti-biofilms activity of Tunisian propolis extract and its potential protective effect against cancer cells proliferation. Anaerobe, 16[6]: 566-571.

[43] Helaly GF et al. 2011. Dexpanthenol and propolis extract in combination with local antibiotics for treatment of Staphylococcal and Pseudomonal wound infections, Archives of Clinical Microbiology, 2: 1-15.

[44] Scazzocchio F et al. 2006. Multifactorial aspects of antimicrobial activity of propolis. Microbiological Research, 161[4]: 327-333.

[45] El-Guendouz S et al. 2018. Moroccan propolis: a natural antioxidant, antibacterial, and antibiofilm against staphylococcus aureus with no induction of resistance after continuous exposure. Evidence-Based Complementary and Alternative Medicine, Article ID 9759240, 19 pages. https://doi.org/10.1155/2018/9759240

[46] Bouchelaghem S et al. 2022. Evaluation of Total Phenolic and Flavonoid Contents, Antibacterial and Antibiofilm Activities of Hungarian Propolis Ethanolic Extract against Staphylococcus aureus. Molecules, 10.3390/molecules27020574.

[47] Daraghmeh J & Imtara H. 2020. In vitro evaluation of palestinian propolis as a natural product with antioxidant properties and antimicrobial activity against multidrug-resistant clinical isolates. J. Food Qual., 8861395.

[48] Wang F et al. 2021. Australian propolis ethanol extract exerts antibacterial activity against methicillin-resistant Staphylococcus aureus by mechanisms of disrupting cell structure, reversing resistance, and resisting biofilm. Braz. J. Microbiol., 52, 1651–1664.

[49] De Marco S. 2017. Antibiofilm and antioxidant activity of propolis and bud poplar resins versus Pseudomonas aeruginosa. Evidence-based complementary and alternative medicine. Article ID 5163575, 11 pages. https://doi.org/10.1155/2017/5163575

[50] Ramos I et al. 2010. Phenazine affect biofilm formation by Pseudomonas aeruginosa in similar ways at various scales. Res. Microbiol., 161: 187-191.

[51] Meto A et al. 2020. Propolis affects Pseudomonas aeruginosa growth, biofilm formation, eDNA release and phenazine production: potential involvement of polyphenols. Microorganisms, 8: 243. doi:10.3390/microorganisms8020243

[52] Widelski, J et al. 2023. Correlation between Chemical Profile of Georgian Propolis Extracts and Their Activity against Helicobacter pylori. Molecules, 28: 1374.
https://doi.org/10.3390/molecules28031374

[53] Krzyzek P et al. 2021. Myricetin as an antivirulence compound interfering with a morphological transformation into coccoid forms and potentiating activity of antibiotics against Helicobacter pylori. Int. J. Mol. Sci., 22: 2695.

[54] Leite Costa C. et al. 2021. Inhibitory effect of Brazilian red propolis on planktonic and biofilm forms of Clostridioides difficile. Anaerobe, 69: 102322
https://doi.org/10.1016/j.anaerobe.2021.102322Get rights and content

[55] Lohse MB et al. 2018. Development and regulation of single- and multi-species Candida albicans biofilms. Nat Rev Microbiol., 16[1]: 19-31. doi: 10.1038/nrmicro.2017.107. Epub Oct 3. PMID: 29062072; PMCID: PMC5726514.

[56] Kong EF et al. 2016. Commensal protection of Staphylococcus aureus against antimicrobials by Candida albicans biofilm matrix. mBio., 7: e 01365–16.

[57] Tobaldini-Valerio FK et al. 2016. Propolis: a potential natural product to fight Candida species infections. Future Microbiol. 11[8],1035-1046.

[58] Fernández-Calderón et al. 2021. Antifungal and anti-biofilm activity of a new Spanish extract of propolis against Candida glabrata. BMC Complementary Medicine and Therapies, 21: 147

[59] Vale-Silva LA & Sanglard D. 2015. Tipping the balance both ways: drug resistance and virulence in Candida glabrata. FEMS Yeast Res., 15[4]: fov025.

[60] Biswas C et al. 2017. Whole genome sequencing of Candida glabrata for detection of markers of antifungal drug resistance. J. Vis. Exp., 130: e56714, https://doi.org/10.3791/56714.

[61] Pippi B et al. 2015. In vitro evaluation of the acquisition of resistance, antifungal activity and synergism of Brazilian red propolis with antifungal drugs on Candida spp. J Appl Microbiol., 118[4]:839–50. https://doi.org/10.1111/jam.12746.

[62] Barros ILE et al. 2022. Promising effect of propolis and a byproduct on planktonic cells and biofilm formation by the main agents of human fungal infections. An Acad Bras Cienc, 94[2]: e20210189. DOI 10.1590/0001-3765202220210189

[63] Freires IA et al. 2016. Chemical composition and antifungal potential of Brazilian propolis against Candida spp. J Mycol Med, 26: 122-132.
https://doi.org/10.1016/j.mycmed.2016.01.003.

[64] Tamfu AN et al. 2022. Antibiofilm and anti-quorum sensing potential of cycloartane-type triterpene acids from cameroonian grassland propolis: phenolic profile and antioxidant activity of crude extract. Molecules, 27[15], 4872. https://doi.org/10.3390/molecules27154872

[65] Tavares L et al. 2022. Propolis: Encapsulation and application in the food and pharmaceutical industries. Trends in Food Science & Technology, 127: 169-180.

[66] Rivera-Yañez, N et al. 2021. Effects of Propolis on Infectious Diseases of Medical Relevance. Biology, 10: 428.
https://doi.org/10.3390/biology10050428

[67] Ceylan O et al. 2020. Design and in vitro antibiofilm activity of propolis diffusion-controlled biopolymers. Biotechnology and Applied Biochemistry, 68: 789-800.
https://doi.org/10.1002/bab.1991

[68] Ong TH et al. 2017. Chitosan-propolis nanoparticle formulation demonstrates anti-bacterial activity against Enterococcus faecalis biofilms. PLoS ONE, 12[3]: e0174888.
https://doi.org/10.1371/journal.pone.0174888