

## Full Bibliography of the Sources Examined for the Opinion on Triclosan – anti-microbial resistance

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- Adair FW, Geftic SG, Gelzer J. (1971) Resistance of *Pseudomonas* to quaternary ammonium compounds. *Appl Microbiol* 21:1058-1063.
- Adolfsson-Erici, M., Pettersson, M., Parkkonen, J. *et al.* (2002). Triclosan, a commonly used bactericide found in human milk and in the aquatic environment in Sweden. *Chemosphere*, 1485–1489.
- Aiello AE, Larson EL and Levy SB. (2007) Consumer antibacterial Soaps: Effective or Just Risky? *Clin Infect Dis* 45: S137-S147.
- Aiello AE, Marshall B, Levy SB, Della-Latta P, Larson E. (2004) Relationship between triclosan and susceptibilities of bacteria isolated from hands in the community. *Antimicrob Agents Chemother.* 48: 2973-2979.
- Aiello AE, Marshall B, Levy SB, Della-Latta P, Larson E. (2004) Relationship between triclosan and susceptibilities of bacteria isolated from hands in the community. *Antimicrob Agents Chemother.* 48(8): 2973 – 2979.
- Aiello AE, Marshall B, Levy SB, Della-Latta P, Lin SX, Larson E. (2005) Antibacterial cleaning products and drug resistance. *Emerging Infectious Diseases.* 11: 1565-1570.
- Alakomi H-L, Paananen A, Suihko M-L, Helander IM, Saarela M. (2006) Weakening effect of cell permeabilizers on Gram-negative bacteria causing biodeterioration. *Appl Environ Microbiol* 72: 4695-4703.
- Al-Doori Z, Morrison D, Edwards G, Gemmell C. (2003) Susceptibility of MRSA to triclosan. *J Antimicrob Chemother* 51(1): 185 – 186.
- Allmyr M, Adolfsson-Erici M, McLachlan MS and Sandborgh-Englund G. (2006) Triclosan in plasma and milk from Swedish nursing mothers and their exposure via personal care products. *Sci Total Environ* 372: 87-93.
- Allmyr M, Harden F, Toms LM, Mueller JF, McLachlan MS, Adolfsson-Erici M, Sandborgh-Englund G. (2008) The influence of age and gender on triclosan concentrations in Australian human blood serum. *Sci Total Environ* 393: 162-167.
- Aranami K and Readman JW. (2007) Photolytic degradation of triclosan in freshwater and seawater. *Chemosphere* 66: 1052-1056
- Ashby MJ, Neale JE, Knott SJ, Critchley IA. (1994) Effect of antibiotics on non-growing planktonic cells and biofilms of *Escherichia coli*. *J Antimicrob Chemother* 33:443-452.
- Ayres HM, Furr JR, Russell AD. (1999) Effect of permeabilizers on antibiotic sensitivity of *Pseudomonas aeruginosa*. *Lett Appl Microbiol* 28:13-16.
- Ayres HM, Payne DN, Furr JR, Russell AD. (1998) Effect of permeabilizing agents on antibacterial activity against a simple *Pseudomonas aeruginosa* biofilm. *Lett Appl Microbiol* 27:79-82.
- Bailey AM, Constantinidou C, Ivens A, Garvey MI, Webber MA, Coldham N, Hobman JL, Wain J, Woodward MJ, Piddock LJV. (2009) Exposure of *Escherichia coli* and *Salmonella enterica* serovar Typhimurium to triclosan induces a species-specific response, including drug detoxification. *J Antimicrob Chemother* 64:973-985.
- Bamber AI, Neal TJ. (1999) An assessment of triclosan susceptibility in methicillin resistant and methicillin sensitive *Staphylococcus aureus*. *J Hosp Infect* 41:107-109
- Bayston R, Ashraf W, Smith T. (2007): Triclosan resistance in methicillin-resistant *Staphylococcus aureus* expressed as small colony variants: a novel mode of evasion of susceptibility to antiseptics. *J Antimicrob Chemother* 59:848–853.

- Bendz D, Paxeus NA, Ginn TR, Loge FJ. (2005) Occurrence and fate of pharmaceutically active compounds in the environment, a case study: Hoje River in Sweden. *J Hazardous Materials* 122:195-204.
- Beier\_2008\_Bull Environ Contam Toxicol Lambert\_2004\_ J. Appl. Microbiol
- Bester K. (2003) Triclosan in a sewage treatment process-balances and monitoring data. *Water Res* 37:3891-3896.
- Bhargava HN, Leonard PA. (1996) Triclosan: applications and safety. *Am J Infect Control* 24:209-218.
- Birošová L, Mikulášová M. (2009) Development of triclosan and antibiotic resistance in *Salmonella enterica* serovar Typhimurium. *J Med Microbiol* 58:436-441.
- Bjorland J, Sunde M, Steinar Waage. (2001) Plasmid-borne smr gene causes resistance to quaternary ammonium compounds in bovine *Staphylococcus aureus*. *J Clin Microbiol* 39: 3999-4004
- Bock M , Lyndall J, Barber T, s Fuchsman P, Perruchon E, Capdevielle M., Probabilistic Application of a Fugacity Model to Predict Triclosan Fate during Wastewater Treatment. Integrated Environmental Assessment and Management. In Press, July 2010
- Boeris PS, Domenech CE, Lucchesi GI. (2007) Modification of phospholipid composition in *Pseudomonas putida* A ATCC 12633 induced by contact with tetradecyltrimethylammonium. *J Appl Microbiol* 103:1048-1054.
- Bojar W, Kazmierska K, Szalwinski M, Zareba T. (2009) Triclosan-Coated Sutures in Oral Surgery. *Adv Clin Exp Med* 18:401-405.
- Borges-Walmsley MI, Walmsley AR. (2001) The structure and function of drug pumps. *Trends Microbiol* 9:71-79.
- Borling P, Engelund B, Sørensen H. (2005) Kortlægning af triclosan Kortlægning af kemiske stoffer i forbrugerprodukter. Nr. 732006. Danish EPA: Copenhagen.
- Borling P, Engelund B, Sørensen H. (2005) Kortlægning af triclosan Kortlægning af kemiske stoffer i forbrugerprodukter. Nr. 732006. Danish EPA: Copenhagen.
- Boyce JM, Pittet D. (2002) Guideline for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Infect Control Hosp Epidemiol* 23:S3-40.
- Boyd GR, Reemtsma H, Grimm DA, Mitra S. (2003) pharmaceuticals and personal care products (PPCPs) in surface and treated waters of Louisiana, USA and Canada. *Sci Total Environ* 311:135-149.
- Brading M G, Cromwell V J, Green A K, DeBrabander S, Beasley T. (2004) The role of triclosan in dentifrice formulations, with particular reference to a new 0.3% triclosan calcium carbonate-based system. *Int Dental J* 54:291-298.
- Brading MG, Cromwell VJ, Green AK, DeBrabander S, Beasley T, Marsh PD. (2004) The role of Triclosan in dentifrice formulations, with particular reference to a new 0.3% Triclosan calcium carbonate-based system. *Int Dent J* 54:291-298.
- Brading MG, Marsh PD. (2003) The oral environment: the challenge for anti-microbials in oral care products. *Int Dent J* 53:353-362.
- Brady LM, Thomson M, Palmer MA, Harkness JL. (1990). "Successful control of endemic MRSA in a cardiothoracic surgical unit". *Med J Aust* 152:240-245.
- Braoudaki M, Hilton AC. (2004) Adaptive resistance in *Salmonella enterica* and *Escherichia coli* O157 and cross-resistance to antimicrobial agents. *J Clin Microbiol* 42:73-78.

- Braoudaki M, Hilton AC. (2004a) Low level of cross-resistance between triclosan and antibiotics in *Escherichia coli* K-12 and *E. coli* O55 compared to *E. coli* O157. *FEMS Microbiol Lett.* 235: 305 – 309.
- Braoudaki M, Hilton AC. (2004b) Adaptive resistance to biocides in *Salmonella enterica* and *Escherichia coli* O157 and cross-resistance to antimicrobial agents. *J Clin Microbiol.* 42(1): 73 – 78.
- Braoudaki M, Hilton AC. (2005) Mechanisms of resistance in *Salmonella enterica* adapted to erythromycin, benzalkonium chloride and triclosan. *Int J Antimicrob Agents.* 25:31–37
- Braoudaki M, Hilton AC. (2005) Mechanisms of resistance in *Salmonella enterica* adapted to erythromycin, benzalkonium chloride and triclosan. *Int J Antimicrob Agents.* 25(1): 31 – 37.
- Brenwald NP, Fraise AP. (2003) Triclosan resistance in methicillin-resistant *Staphylococcus aureus* (MRSA). *J Hosp Infect.* 55(2): 141 – 144.
- Broadley SJ, Jenkins PA, Furr JR, Russell AD. (1995) Potentiation of the effects of chlorhexidine diacetate and cetylpyridinium chloride on mycobacteria by ethambutol. *J Med Microbiol* 43:458-460.
- Brock, T.D., Madigan, M.T., Martinko, J.M. and Parker, J. (2000) *Biology of Microorganisms*, ninth edition. Prentice Hall, New Jersey
- Brown MH, Paulsen IT, Skurray RA. (1999) The multidrug efflux protein NorM is a prototype of a new family of transporters. *Mol Microbiol* 31:393-395.
- Brown MRW, Gilbert P. (1993) Sensitivity of biofilms to antimicrobial agents. *J Appl Bacteriol* 74:S87-97.
- Brözel VS, Cloete TE. (1994) Resistance of *Pseudomonas aeruginosa* to isothiazolone. *J Appl Bacteriol* 76:576-582.
- Bruinsma GM, Rustema-Abbing M, van der Mei HC, Lakkis C, Busscher HJ. (2006) Resistance to a polyquaternium-1 lens care solution and isoelectric points of *Pseudomonas aeruginosa* strains. *J Antimicrob Chemother* 57:764-766.
- Bryskier, A. (2002) Viridans group streptococci: a reservoir of resistant bacteria in oral cavities. *Clin Microbiol Infect* 8:65-69.
- Buckley A, Webber MA, Cooles S, Randall L, La Ragione RM, Woodward M, Piddock LJV (2006) The AcrAB-TolC efflux system of *Salmonella enterica* serovar Typhimurium plays a role in pathogenesis. *Cell Microbiol*, 8:847-856.
- Cadieux PA, Chew BH, Nott L, Szeney S, Elwood CN, Wignall GR, Goneau LW, Denstedt JD. (2009) Use of triclosan-eluting ureteral stents in patients with long-term stents. *J Endourol* 23:1187-1194.
- Cakmak A, Cirpanli Y, Bilensoy E, Yorganci K, Calis S, Saribas Z, Kaynaroglu V. (2009) Antibacterial activity of triclosan chitosan coated graft on hernia graft infection model. *Int J Pharm* 381:214-219.
- Calafat AM, Ye X, Wong LY, Reidy JA, Needham LL. (2008) Urinary concentrations of triclosan in the U.S. population: 2003-2004. *Environ Health Perspec* 116:303-307.
- Canosa P, Morales S, Rodriguez I, Rubi E, Cela R, Gomez M. (2005) Aquatic degradation of triclosan and formation of toxic chlorophenols in presence of low concentrations of free chlorine. *Anal Bioanal Chem* 383:1119-1126.
- Capdevielle M, Van Egmond R, Whelan M, Versteeg D, Matthias Hofmann-Kamensk M, Inauen J, Cunningham V, Woltering D. (2008) Consideration of Exposure and Species Sensitivity of Triclosan in the Freshwater Environment Integrated Environ Assess Manag 4:15-23.

- Carson, R. T., E. Larson, S. B. Levy, B. M. Marshall, and A. E. Aiello. 2008. Use of antibacterial consumer products containing quaternary ammonium compounds and drug resistance in the community. *Journal of Antimicrobial Chemotherapy* 62(5):1160-1162.
- Cerf, O., Carpentier, B., Sanders, P. Tests for determining in-use concentrations of antibiotics and disinfectants are based on entirely different concepts: "resistance" has different meanings. *International Journal of Food Microbiology* 136 (2010) 247-254
- Cha J, Cupples AM. (2009) Detection of the antimicrobials triclocarban and triclosan in agricultural soils following land application of municipal biosolids. *Water Res* 43:2522-2530.
- Chalew TEA, Halden R (2009) Environmental exposure of aquatic and terrestrial biota to triclosan and triclocarban. *J Am Water Resources Assoc* 45:4-13.
- Champlin FR, Ellison ML, Bullard JW, Conrad RS. (2005) Effect of outer membrane permeabilisation on intrinsic resistance to low triclosan levels in *Pseudomonas aeruginosa*. *Int J Antimicrob Agents*. 26:159-164.
- Chapman JS. (2003) Disinfectant resistance mechanisms, cross-resistance, and co-resistance. *Int Biodeter Biodegrad* 51:271-276.
- Chau WC, Wu JL, Zongwei Z (2008) Investigation of levels and fate of triclosan in environmental waters from the analysis of gas chromatography coupled with ion trap mass spectrometry. *Chemosphere* 73:S13-S17
- Chen Y, Pi B, Zhou H, Yu Y, Li L. (2009) Triclosan resistance in clinical isolates of *Acinetobacter baumannii*. *J Med Microbiol* 58:1086-1091
- Chew BH, Cadieux PA, Reid G, Denstedt JD. (2006) *In-Vitro* Activity of Triclosan-Eluting Ureteral Stents against Common Bacterial Uropathogens. *J Endourol* 20:949-958.
- Chu S, Metcalfe CD. (2007) Simultaneous determination of triclocarban and triclosan in municipal biosolids by liquid chromatography tandem mass spectrometry. *J Chromatogr A* 1164:212-218.
- Chuanchuen R, Beinlich K, Hoang TT, Becher A, Karkhoff-Schweizer RR, Schweizer HP (2001) Cross-resistance between triclosan and antibiotics in *Pseudomonas aeruginosa* is mediated by multidrug efflux pumps: exposure of a susceptible mutant strain to triclosan selects nxrB mutants overexpressing MexCD-OprJ. *Antimicrob Agents Chemother* 45:428-432.
- Chuanchuen R, Karkhoff-Schweizer RR, Schweizer HP. (2003) High-level triclosan resistance in *Pseudomonas aeruginosa* is solely a result of efflux. *Am J Infect Control* 31:124-127.
- Chuanchuen R, Karkhoff-Schweizer RR, Schweizer HP. (2003) High-level triclosan resistance in *Pseudomonas aeruginosa* is solely a result of efflux. *Am J Infect Control*. 31: 124 - 127.
- Chuanchuen R, Murata T, Gotoh N, Schweizer HP (2005) Substrate-dependent utilization of OprM or OpmH by the *Pseudomonas aeruginosa* MexJK efflux pump. *Antimicrob Agents Chemother* 49:2113-2136.
- Chuanchuen R, Narasaki CT, Schweizer HP (2002) The MexJK efflux pump of *Pseudomonas aeruginosa* requires OprM for antibiotic efflux but not for effect of triclosan. *J bacteriol* 184:5036-5044.
- Chuanchuen R, Narasaki CT, Schweizer HP. (2002) The MexJK efflux pump of *Pseudomonas aeruginosa* requires OprM for antibiotic efflux but not for efflux of triclosan. *J Bacteriol*. 184(18): 5036 - 5044.
- Cloete TE. (2003) Resistance mechanisms of bacteria to antimicrobial compounds. *Int Biodeter Biodegrad* 51:277-282.

- Cole EC, Addison RM, Dulaney PD, Leese KE (2006) Investigation of antibiotic and antibacterial resistance in *Staphylococcus* from the skin of users and non-users of antibacterial wash products in home environments. Annual Conference on Antimicrobial Resistance, June 26-28, Bethesda, MD.
- Cole EC, Addison RM, Rubino JR, Leese KE, Dulaney PD, Newell MS, Wilkins J, Gaber DJ, Wineinger T, Criger DA (2003) Investigation of antibiotic and antibacterial agent cross-resistance in target bacteria from homes of antibacterial product users and nonusers. *J Appl Microbiol* 95:664–676.
- Cole EC, Addison RM, Rubino JR, Leese KE, Dulaney PD, Newell MS, Wilkins J, Gaber DJ, Wineinger T, Criger DA. (2003) Investigation of antibiotic and antibacterial agent cross-resistance in target bacteria from homes of antibacterial product users and nonusers. *J Appl Microbiol.* 95(4): 664 – 676.
- Coogan MA, Edziyie RE, La Point TW, Venables BJ (2007) Algal bioaccumulation of triclocarban, triclosan, and methyl-triclosan in a North Texas wastewater treatment plant receiving stream. *Chemosphere* 67:1911-1918.
- Coogan MA, La point TW (2008) Snail bioaccumulation of triclocarban, triclosan, and methyltriclosan in a North Texas, USA, stream affected by wastewater treatment plant runoff. *Environ Toxicol Chem* 27:1788-1793.
- Cookson B. (2005) Clinical significance of emergence of bacterial antimicrobial resistance in the hospital environment. *J Appl Microbiol* 99:989-996.
- Cookson BD, Farrelly H, Stapleton P, Garvey RPJ, Price MR. (1991) Transferable resistance to triclosan in MRSA. *Br Med J* 337:1548–1549.
- Cottell A, Denyer, SP, Hanlon GW, Maillard J-Y. (2009) Triclosan-tolerant bacteria: Changes in susceptibility to antibiotics. *J Hosp Infect* 72:71-76.
- Cullinan MP, Hamlet SM, Westerman B, Palmer JE, Faddy MJ, Seymour GJ. (2003a) Acquisition and loss of *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans* and *Prevotella intermedia* over a 5-year period: effect of a triclosan/copolymer dentifrice. *J Clin Periodontol.* 30: 532 – 541.
- Cullinan MP, Westerman B, Hamlet SM, Palmer JE, Faddy MJ, Seymour GJ. (2003b) The effect of a triclosan-containing dentifrice on the progression of periodontal disease in an adult population. *J Clin Periodontol.* 30: 414 – 419.
- Dantas, G., Sommer, MO, Oluwasegun, RD, Church, GM. (2008) Bacterial subsisting on antibiotics. *Science* 320:100-103.
- Darouiche RO, Mansouri MD, Gawande PV, Madhyastha S (2009) Antimicrobial and antibiofilm efficacy of triclosan and DispersinBw Combination. *J Antimicrobial Chemother* 64:88–93.
- Das JR, Bhakoo M, Jones MV, Gilbert P (1998) Changes in the biocide susceptibility of *Staphylococcus epidermidis* and *Escherichia coli* cells associated with rapid attachment to plastic surfaces. *J Appl Microbiol* 84:852-858.
- Davies R M, Elwood RP, Davies GM. (2004) Effectiveness of a toothpaste containing Triclosan and polyvinyl-methyether maleic acid copolymer in improving plaque control and gingival health. A systematic review. *J Clin Periodontol* 31:1029-1033.
- Davies RM, Ellwood RP, Davies GM. (2004) The effectiveness of a toothpaste containing triclosan and polyvinyl-methyl ether maleic acid copolymer in improving plaque control and gingival health. *J Clin Periodont* 31:1029-1033.
- Davies RM. (2007) The clinical efficacy of triclosan/copolymer and other common therapeutic approaches to periodontal health. *Clin Microbiol Infect* 13:25-29.

- Davin-Regli A, Bolla JM, James C, Lavigne JP, Chevalier J, Garnotel E, Molitor A, Pagès JM (2008) Membrane permeability and regulation of drug "influx and efflux" in enterobacterial pathogens, *Current Drug Targets* 9:750-759.
- DeLorenzo ME, Keller JM, Arthur CD, Finnegan MC, Harper HE, Winder VL, Zdankiewicz DL. (2008) Toxicity of the antimicrobial compound triclosan and formation of the metabolite methyl-triclosan in estuarine systems *Environ Toxicol* 23:224 –232.
- Demple B. (1996) Redox signaling and gene control in the *Escherichia coli* soxRS oxidative stress regulon - a review. *Gene* 179:53-57.
- Denyer SP, Maillard J-Y. (2002) Cellular impermeability and uptake of biocides and antibiotics in Gram-negative bacteria. *J Appl Microbiol* 92:S35-45.
- Depardieu F, Podglajen I, Leclercq R, Collatz E, Courvalin P. (2007), Modes and modulations of antibiotic resistance gene expression, *Clin Microbiol Rev* 20:79-114
- DeVizio W, Davies R. (2004) Rationale for the daily use of a dentifrice containing triclosan in the maintenance of oral health. *Compend Contin Educ Dent*. 25(7 Suppl 1): 55 – 58.
- Dodd MC, Kohler HP, von Gunten U. (2009) Oxidation of antibacterial compounds by ozone and hydroxyl radical: elimination of biological activity during aqueous ozonation process. *Environ Sci Technol* 43:2498-2504.
- Doyle MP. (2006) Antimicrobial Resistance: Implications for the Food System. *Comprehensive Reviews in Food Science and Food Safety* 5:71-137.
- Dye C, Schlabach M, Green J, Remberger M, Kaj L, Palm-Cousins A, Brorström-Lundén E. (2007) Bronopol, resorcinol, m-cresol and triclosan in the Nordic environment. Nordic Council of Ministers, Copenhagen. TemaNord: 585.
- Dynes JJ, Lawrence JR, Korber DR, Swerhone GD, Leppard GG, Hitchcock AP. (2009) Morphological and biochemical changes in *Pseudomonas fluorescens* biofilms induced by sub-inhibitory exposure to antimicrobial agents. *Can J Microbiol* 55:163-178.
- EARSS (European Antimicrobial Resistance Surveillance System). Annual Report 2005. Available from <http://www.rivm.nl/earss/>
- EFSA, Assessment of the possible effect of the four antimicrobial treatment substances on the emergence of antimicrobial resistance, Scientific Opinion of the Panel on Biological Hazards, Adopted on 6 March 2008, *The EFSA Journal* (2008) 659, 1-26
- EFSA, Opinion of the Scientific Panel on food additives, flavourings, processing aids and materials in contact with food (AFC) on a request from the Commission related to a 3<sup>rd</sup> list of substances for food contact materials adopted on 15 March 2004, *The EFSA Journal* (2004) 37, 1-7
- Eley BM. (1999) Antibacterial agents in the control of supragingival plaque – a review. *Brit Dent J* 186:286-296.
- Escalada GM, Russell AD, Maillard J-Y, Ochs D. (2005) Triclosan-bacteria interactions: single or multiple target sites? *Lett Appl Microbiol* 41:476-481.
- Fair PA, Lee HB, Adams J, Darling C, Pacepavicius G, Alae M, Bossart GD, Henry N, Muir D (2009) Occurrence of triclosan in plasma of wild atlantic bottlenose dolphins (*Tursiops truncatus*) and in their environment. *Environ Pollut* 157:2248-2254.
- Fan F, Yan K, Wallis NG, Reed S, Moore TD, Rittenhouse SF, DeWolf WE Jr, Huang J, McDevitt D, Miller WH, Seefeld MA, Newlander KA, Jakas DR, Head MS, Payne DJ. (2002) Defining and combating the mechanisms of triclosan resistance in clinical isolates of *Staphylococcus aureus*. *Antimicrob Agents Chemother* 46:3343–3347.
- Fan F, Yan K, Wallis NG, Reed S, Moore TD, Rittenhouse SF, DeWolf WE Jr,

- Farre M, Asperger D, Kantiani L, Gonzalez S, Petrovic M, Barcelo D. (2008) Assessment of the acute toxicity of triclosan and methyl triclosan in wastewater based on the bioluminescence inhibition of *Vibrio fischeri*. *Anal Bioanal Chem* 390:1999-2007.
- Federle TW, Kaiser SK, Nuck. BA (2002) Fate and effects of triclosan in the activated sludge. *Environ Toxicol Chem* 21:1330-1337.
- Fernandes M, Shareef A, Karkkainen M and Kookana R. (2008) The occurrence of endocrine disrupting chemicals and triclosan in sediments of Barker Inlet, South Australia. A Report prepared for the Adelaide and Mount Lofty Ranges Natural Resources Management Board. SARDI Publication Number F2008/001026-1. South Australian Research & Development Institute (Aquatic Sciences), Adelaide. <http://www.sardi.sa.gov.au>
- Field JA, Sierra-Alvarez R. (2008a) Microbial degradation of chlorinated dioxins. *Chemosphere* 71:1015-1018.
- Field JA, Sierra-Alvarez R. (2008b) Microbial degradation of chlorinated benzenes, *Biodegradation* 19:463-480.
- Fine DH, Furgang D, Barnett ML. (2001) Comparative antimicrobial activities of antiseptic mouthrinses against isogenic planktonic and biofilm forms of *Actinobacillus actinomycetemcomitans*. *J Clin Periodontol.* 28(7): 697 – 700.
- Fine, DH, Furgang D, Markowitz K, Sreenivasan PK, Klimpel K, DeVizio, W. (2006) The antimicrobial effect of a triclosan/copolymer dentifrice on oral micro-organisms in vivo. *J Am Dent Assoc* 137:1407-1414.
- Fischler GF, Fuls JL, Dail EW, Duran MH, Rodgers, Waggoner AL (2007) Effect of Hand Wash Agents on Controlling the Transmission of Pathogenic Bacteria from Hands to Food. *J Food Protection* 70:2873–2877.
- Fiss EM, Rule KL, Vikesland PJ. (2007) Formation of chloroform and other chlorinated byproducts by chlorination of triclosan-containing antibacterial products. *Environmental science & technology* 41:2387-2394.
- Fjeld E, Schlabach M, Berge J.A, Eggen T, Snilsberg P, Källberg G, Rognerud S, Enge EK, Borgen A, Gundersen H (2004) Screening of selected new organic contaminants - brominated flame retardants, chlorinated paraffins, bisphenol-A and Triclosan. ISBN 82-577-4488-3.
- Ford HR, Jones P, Gaines B, Reblock K, Simpkins DL. (2005) Intraoperative handling and wound healing: controlled clinical trial comparing Coated VICRYL Plus Antibacterial Suture (coated polyglactin 910 suture with triclosan) with Coated VICRYL Suture (coated polyglactin 910 suture). *Surg Infect* 6:313–21.
- Fraise AP. (2002) Susceptibility of antibiotic-resistant cocci to biocides. *J Appl Micro Symp Suppl.* 92: 158S – 162S.
- Fraud S, Hann AC, Maillard J-Y, Russell AD. (2003) Effects of ortho-phthalaldehyde, glutaraldehyde and chlorhexidine diacetate on *Mycobacterium chelonae* and *M. abscessus* strains with modified permeability. *J Antimicrob Chemother* 51:575-584.
- Freundlich JS, Wang F, Vilcheze C, Gulten G, Langley R, Schiehser GA, Jacobus DP, Jacobs WR, Sacchetti JC. (2009) Triclosan derivatives: towards potent inhibitors of drug sensitive and drug resistant *Mycobacterium tuberculosis*. *Chem Med Chem* 4: 241-248.
- Fuchsman P Lyndall J, Bock M, Lauren D, Barber T, Leigh K, Perruchon E, Capdevielle M. Terrestrial Ecological Risk Evaluation for Triclosan in Land-Applied Biosolids Integrated Environmental Assessment and Management. In Press, July 2010
- Fuls JL, Rodgers ND, Fischler GE, Howard JM, Patel M, Weidner PL, Duran MH. (2008) Alternative hand contamination technique to compare the activities of antimicrobial and nonantimicrobial soaps under different test conditions. *Appl Environ Microbiol* 74:3739-3744.

- Gandhi PA, Sawant AD, Wilson LA, Ahearn DG. (1993) Adaptation and growth of *Serratia marcescens* in contact lens disinfectant solution containing chlorhexidine gluconate. *Appl Environ Microbiol* 59:183-188.
- Gilbert P and Moore LE. (2005) Cationic antiseptics: diversity of action under a common epithet. *J Appl Microbiol* 99: 703-715.
- Gilbert P, Allison DG, McBain AJ. (2002) Biofilms in vitro and in vivo: do singular mechanisms imply cross-resistance? *J Appl Microbiol* 92:S98-110.
- Gilbert P, Allison DG, McBain AJ. (2002) Biofilms in vitro and in vivo: do singular mechanisms imply cross-resistance? *J Appl Micro Symp Suppl.* 92: 98S - 110S.
- Gilbert P, McBain A, Sreenivasan P (2007), Common therapeutic approaches for the control of oral biofilms: microbiological safety and efficacy. *Clin Microbiol Infect* 13 (Suppl. 4): 17-24.
- Gilbert P, McBain AJ, Rickard AH. (2003) Formation of microbial biofilm in hygienic situations: a problem of control. *Inter Biodeter Biodegrad* 51:245-248.
- Gilbert P, McBain AJ. (2002) Literature-based evaluation of the potential risks associated with impregnation of medical devices and implants with triclosan. *Surg Infect.* 3 Suppl 1: S55 - S63.
- Gilbert P, McBain AJ. (2002) Literature-based evaluation of the potential risks associated with impregnation of medical devices and implants with triclosan. *Surg Infect (Larchmt)* 3(suppl 1):S55-S63.
- Giwerzman B, Jensen ET, Hoiby N, Kharazmi A, Costerton JW. (1991). Induction of beta-lactamase production in *Pseudomonas aeruginosa* biofilm. *Antimicrob Agents Chemother* 35:1008-1010.
- Gjerme P, Saxton CA. (1991) Antibacterial dentifrices. Clinical data and relevance with emphasis on zinc/ Triclosan. *J Clin Periodontol* 18:468-472.
- Glassmeyer ST, Furlong ET, Kolpin DW, Cahill JD, Zaugg SD, Werner SL, Meyer MT, Kryak DD. (2005) Transport of chemical and microbial compounds from known wastewater discharges: potential for use as indicators of human fecal contamination. *Environ Sci Technol* 39:5157-5169.
- Gomez Escalada M, Harwood JL, Maillard J-Y, Ochs D (2005b). Triclosan inhibition of fatty acid synthesis and its effect on growth of *E. coli* and *Ps. aeruginosa*. *J Antimicrob Chemother* 55:879-882.
- Gomez Escalada M, Russell AD, Maillard J-Y, Ochs D. (2005a) Triclosan-bacteria interactions: single or multiple target sites? *Lett Appl Microbiol* 41:476-481.
- Gomez Escalada, M. (2003) Studies on the mechanisms of action of and resistance to a phenylether, triclosan. PhD Thesis, Cardiff University.
- Goodfellow G, Lee-Brotherton V, Daniels J, Roberts A, Nestmann E. (2003) Antibacterial resistance and triclosan. Society of Toxicology Annual Meeting, Salt Lake City, UT.
- Guérin-Méchin L, Dubois-Brissonnet F, Heyd B, Leveau JY. (1999). Specific variations of fatty acid composition of *Pseudomonas aeruginosa* ATCC 15442 induced by quaternary ammonium compounds and relation with resistance to bactericidal activity. *J Appl Microbiol* 87:735-742.
- Guérin-Méchin L, Dubois-Brissonnet F, Heyd B, Leveau JY. (2000) Quaternary ammonium compounds stresses induce specific variations in fatty acid composition of *Pseudomonas aeruginosa*. *Inter J Food Microbiol* 55:157-159.
- Guillén J, Bernabeu A, Shapiro S, Villalaín J. (2004) Location and orientation of Triclosan in phospholipid model membranes. *Eur Biophys J* 33:448-453.



- Gunsolley JC. (2006) A meta-analysis of six-month studies of antiplaque and antigingivitis agents. *J Am Dent Assoc.* 137:1649-1657.
- Halden RU and Paull DH. (2005) Co-occurrence of triclocarban and triclosan in U.S. water resources. *Environ Sci Technol* 39:1420-1426.
- Hammond SA, Morgan JR, Russell AD. (1987) Comparative susceptibility of hospital isolates of Gram-negative bacteria to antiseptics and disinfectants. *J Hosp Infect* 9:255-264.
- Harbarth S, Samore MH. (2005) Antimicrobial resistance determinants and future control. *Emerg Infect Dis* 11:794-801.
- Hawkey PM, Jones AM. (2009) The changing epidemiology of resistance. *J Antimicrob-Chemother* 64 (Suppl. 1): i3-10
- Hawkey PM. (2004) Mycobactericidal agents. In: Fraiese AP, Lambert PA, Maillard J-Y, editors. *Principles and Practice of Disinfection, Preservation and Sterilization* 4th edn. Oxford: Blackwell Scientific Publication; p. 191-204.
- Hay AG, Dees PM, Sayler GS. (2001) Growth of bacterial consortium on triclosan. *FEMS Microbiol Ecol* 36:105-112.
- Heath RJ, Li J, Roland GE, Rock CO. (2000) Inhibition of the *Staphylococcus aureus* NADPH-dependent Enoyl-acyl carrier protein reductase by triclosan and hexachlorophene. *J Biol Chem* 275:4654-4659.
- Heath RJ, Su N, Murphy CK, Rock CO. (2000). The enoyl-[acyl-carrier-protein] reductases FabI and FabL from *Bacillus subtilis*. *J Biol Chem* 275:40128-40133.
- Heath RJ, White SW, Rock CO (2002) Inhibitors of fatty acid synthesis as antimicrobial chemotherapeutics. *Appl Microbiol Biotechnol* 58:695-703.
- Heath RJ, Yu YT, Shapiro MA, Olson E, Rock CO. (1998) Broad spectrum antimicrobial biocides target the FabI component of fatty acid synthesis. *J Biol Chem* 273:30316-30320.
- Heath RJ, Yu Y-T, Shapiro S, Olson E, Rock CO. (1998) Broad spectrum antimicrobial biocides target the FabI component of fatty acid biosynthesis. *J Biol Chem* 273:30316-30320.
- Heath, R, Rubin J, Holland D, Zhang EL, Snow ME, Rock CO. (1999) Mechanism of triclosan inhibition of bacterial fatty acid biosynthesis. *J Biol Chem* 274:11110-11114.
- Heidler J, Halden RU. (2007) Mass balance assessment of triclosan removal during conventional sewage treatment. *Chemosphere* 66:362-369.
- Hoang TQ. (2000) The use of triclosan in supportive treatment of gingivitis and periodontitis. *J West Soc Periodontol Periodontal Abst.* 48(4): 101 - 108.
- Hon HS, Ko G and Zoh KD. (2009) Kinetics and mechanism of photolysis and TiO<sub>2</sub> photocatalysis of triclosan. *J Hazardous Materials* 166:954-960.
- Hua W, Bennet ER and Letcher RJ. (2005) Triclosan in waste and surface waters from the upper Detroit River by liquid chromatography-electrospray-tandem quadrupole mass spectrometry. *Environ Intern* 31:621-630
- Huang CT, Yu FP, McFeters GA, Stewart PS. (1995) Nonuniform spatial patterns of respiratory activity within biofilms during disinfection. *Appl Environ Microbiol* 61:2252-2256.
- Huang J, McDevitt D, Miller WH, Seefeld MA, Newlander KA, Jakas DR, Head MS, Payne DJ. (2002) Defining and combating the mechanisms of triclosan resistance in clinical isolates of *Staphylococcus aureus*. *Antimicrob Agents Chemother.* 46(11): 3343 - 3347.

- Ingerslev F, Vaclavik E, Halling-Sorenson B. (2003) Pharmaceutical and personal care products: a source of endocrine disruption in the environment? *Pure Appl Chem* 75: 1181-1893
- Itoh Y, Wang X, Hinnebusch BJ, Preston JF, Romeo T. (2005) Depolymerization of b-1,6-N-acetyl-D-glucosamine disrupts the integrity of diverse bacterial biofilms. *J Bacteriol* 187: 382-387.
- Jang H-J, Chang MW, Toghrol F, Bentley WE. (2008) Microarray analysis of toxicogenomic effects of triclosan on *Staphylococcus aureus*. *Appl Microbiol Biotechnol* 78:695-707.
- Jin Y, Yip HK. (2002) Supragingival calculus: formation and control. *Crit Rev Oral Biol Med*. 13(5): 426 - 441.
- Johnson SA, Goddard PA, Iliffe C, Timmins B, Rickard AH, Robson G, Handley PS. (2002) Comparative susceptibility of resident and transient hand bacteria to para-chloro-meta-xyleneol and triclosan. *J Appl Microbiol*. 93(2): 336 - 344.
- Jones CL, Ritchie JA, Marsh PD, Van der Ouderaa F. (1987) The effect of long term use of a dentifrice containing zinc citrate and a non-ionic agent on the oral flora. *J Dent Res* 67:46-50.
- Jones CL, Saxton CA, Ritchie JA. (1990) Microbiological and clinical effects of a dentifrice containing zinc citrate and Triclosan in the human experimental gingivitis model. *J Clin Periodontol* 17 570-574.
- Jones GLI, Muller CT, O'Reilly M, Stickler DJ. (2006) Effect of triclosan on the development of bacterial biofilms by urinary tract pathogens on urinary catheters. *J Antimicrob Chemother* 57:266-272.
- Jones MW, Herd TM, Christie HJ. (1989) Resistance of *Pseudomonas aeruginosa* to amphoteric and quaternary ammonium biocides. *Microbios* 58:49-61.
- Jones R D, Jampani H B, Neman J L *et al.* (2000) Triclosan: a review of effectiveness and safety in health care settings. *Am J Infect Control* 28:184-196.
- Juhas M, van der Meer JR, Gaillard M, Harding RM, Hood DW, Crook DW. (2009) Genomic islands: tools of bacterial horizontal gene transfer and evolution. *FEMS Microbiol Rev* 33:376-393.
- Justinger C, Moussavian MR, Schlueter C, Kopp B, Kollmar O, Schilling MK. (2009). Antibiotic coating of abdominal closure sutures and wound infection. *Surgery* 145:330-334.
- Kampf G, Kramer A. (2004) Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. *Clin Microbiol Rev*. 17(4): 863 - 893.
- Kanda R, Griffin P, James HA, Fothergill J. (2003) Pharmaceutical and personal care products in sewage treatment work. *J Environ Monit* 5: 823-830.
- Kantiani L, Farré , Asperger D, Rubio F, González S, Alda MJL, Petrović M, Shelver WL, Barceló D. (2008) Triclosan and methyl-triclosan monitoring study in the northeast of Spain using a magnetic particle enzyme immunoassay and confirmatory analysis by gas chromatography-mass spectrometry. *J Hydrol* 361:1-9.
- Kaplan JB, Ragunath C, Velliyagounder K, Fine DH, Ramasubu N. (2004) Enzymatic detachment of *Staphylococcus epidermidis* biofilms. *Antimicrob Agents Chemother* 48: 2633-2636.
- Karatzas KA, Webber MA, Jorgensen F, Woodward MJ, Piddock LJ, Humphrey TJ. (2007) Prolonged treatment of *Salmonella enterica* serovar Typhimurium with commercial disinfectants selects for multiple antibiotic resistance, increased efflux and reduced invasiveness, *J Antimicrob Chemother* 60:947-955

- Kastbjerg VG, Halberg Lardsen M, Gram L, Ingmer H. (2010). Influence of sublethal concentrations of common disinfectants on expression of virulence genes in *Listeria monocytogenes*. *Appl Environ Microbiol* 76:303-309.
- Kim JW, Jang HS, Kim JG, Ishibashi H, Hirano M, Nasu K, Ichikawa N., Takao Y, Shinohara R and Arizono K. (2009) Occurrence of Pharmaceutical and personal care products in surface water from Mankyung River, South Korea. *J Health Sci* 55: 249-258.
- Kinney CA, Furlong ET, Zaugg SD, Burkhard MR, Werner SL, Cahill JD, Jorgensen GR. (2006) Survey of organic wastewater contaminants in biosolids destined for land application. *Environ Sci Technol* 40: 7207-7215.
- Knudsen BE, Chew BH, Denstedt JD. (2005) Drug-eluting biomaterials in urology: the time is ripe. *BJU Int* 95:726-727.
- Kolpin DW, Furlong ET, Meyer MT, Thurman EM, Zaugg SD, Barber LB, Buxton HT. (2002) Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A National Reconnaissance. *Environ Sci Technol* 36:1202-1211.
- Kolpin DW, Skopec M, Meyer MT, Furlong ET, Zaugg SD. (2004) Urban contribution of pharmaceuticals other organic wastewater contaminants to streams during differing flow conditions. *Sci Total Environ* 328:119-130.
- Kremer L, Dover LG, Morbidoni HR, Vilcheze C, Maughan WN, Baulard A, Tu SC, Honore N, Deretic V, Sacchettini JC, Loch C, Jacobs WR Jr, Besra GS. (2003) Inhibition of InhA activity, but not KasA activity, induces formation of a KasA-containing complex in mycobacteria. *J Biol Chem.* 278(23): 20547 – 20554.
- Kumar KS, S. Priya M, Peck AM, Sajwan KS. (2010) Mass Loadings of Triclosan and Triclocarban from Four Wastewater Treatment Plants to Three Rivers and Landfill in Savannah, Georgia, USA. *Arch Environ Contam Toxicol* 58:275-285
- Kummerle N, Feucht HH, Kaulfers PM. (1996) Plasmid-mediated formaldehyde resistance in *Escherichia coli*: characterization of resistance gene. *Antimicrob Agents Chemother* 40:2276-2279.
- Lai S, Tremblay J, Deziel E (2009). Swarming motility: a multicellular behaviour conferring antimicrobial resistance. *Environ Microbiol* 11:126-136.
- Lambert PA. (2002) Cellular impermeability and uptake of biocides and antibiotics in Gram-positive bacteria and mycobacteria. *J Appl Microbiol* 92(Suppl.):S46-S55.
- Lambert RJW. (2004) Comparative analysis of antibiotic and antimicrobial biocide susceptibility data in clinical isolates of methicillin-sensitive *Staphylococcus aureus*, methicillin-resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa* between 1989 and 2000. *J Appl Microbiol.* 97(4): 699 – 711.
- Larson EL, Lin SX, Gomez-Pichardo C, Della-Latta P. (2004) Effect of antibacterial home cleaning and handwashing products on infectious disease symptoms: a randomized, double-blind trial. *Ann Intern Med* 140:321-329.
- Latch DE, Packer JL, Stender BL, VanOverbeke J, Arnold WA, McNeill K. (2005) Aqueous Photochemistry of Triclosan: Formation of 2,4-Dichlorophenol, 2,8-Dichlorodibenzo-p-Dioxin, and Oligomerization Products. *Environ Toxicol Chem* 24:517-525.
- Lawrence JR, Zhu B, Swehone GDW, Roy J, Wassenar LI, Topp E, Korber DR. (2009) Comparative microscale analysis of the effects of triclosan and triclocarban on the structure and function of river biofilm communities. *Sci Total Environ* 407:3307-3316.
- Lear CJ, Maillard, J-Y, Dettmar PW, Goddard PA, Russell AD. (2002) Chloroxylenol- and triclosan- tolerant bacteria from industrial sources. *J Indus Microbiol Biotechnol* 29:238-242.
- Lear JC, Maillard JY, Dettmar PW, Goddard PA, Russell AD. (2002) Chloroxylenol- and triclosan-tolerant bacteria from industrial sources. *J Ind Micro Biotech.* 29: 238 – 242.

- Lear JC, Maillard J-Y, Dettmar PW, Goddard PA, Russell AD. (2006) Chloroxylenol- and triclosan-tolerant bacteria from industrial sources – susceptibility to antibiotics and other biocides. *Inter BiodeterBiodegrad* 57:51-56.
- Ledder RG, Gilbert P, Willis C and McBain AJ. (2006) Effects of chronic triclosan exposure upon the antimicrobial susceptibility of 40 *ex-situ* environmental and human isolates. *J Appl Microbiol* 100:1132-1140.
- Levy CW, Roujeinikova A, Sedelnikova S, Baker PJ, Stuitje R, Slabast AR, Rice DW, Rafferty JB. (1999) Molecular basis of triclosan activity. *Nature* 398:384–385.
- Levy SB. (2002) Active efflux, a common mechanism for biocide and antibiotic resistance. *J Appl Micro Symp Suppl.* 92: 65S – 71S.
- Lin J, Michel LO, Zhang QJ. (2002) CmeABC functions as a multidrug efflux system in *Campylobacter jejuni*. *Antimicro. Agents Chemother.*, 46, 2124-2131.
- Lindström A, Buerge IJ, Poiger T, Bergqvist PA, Müller MD, Buser HR. (2002) Occurrence and environmental behavior of the bactericide triclosan and its methyl derivative in surface waters and in wastewater. *Environ Sci Technol* 36:2322-2329.
- Lishman L, Smyth SA, Sarafin K, Kleywegt S, Toito J, Peart T, Lee B, Servos M, Beland M, Seto P. (2006) Occurrence and reductions of pharmaceuticals and personal care products and estrogens by municipal wastewater treatment plants in Ontario, Canada. *Sci Total Environ* 367:544-558.
- Lopez-Avila V, Hites RA (1980) Organic compounds in an industrial wastewater. Their transport into sediments. *Environ Sci Tech* 14:1382-1390.
- Lores M, Llompарт M, Sanchwz-Prado L, Gracia-Jares C and Cela R. (2005) Confirmation of the formation of dichlorodibenzo-p-dioxin in the photodegradation of triclosan by photo-SPME. *Anal Bioanal Chem* 381:1294-1298
- Loughlin MF, Jones MV, Lambert PA. (2002) *Pseudomonas aeruginosa* cells adapted to benzalkonium chloride resistance to other membrane-active agents but not to clinically relevant antibiotics. *J Antimicrob Chemother.* 49: 631 – 639.
- Lygre H, Moe G, Skalevik R, Holmsen H. (2003) Interaction of triclosan with eukaryotic membrane lipids. *Eur J Oral Sci.* 111: 216 – 222.
- Lyndall J, Fuchsman P Bock M Barber T, Lauren D, Leigh K , Perruchon E, Capdevielle M. Probabilistic Risk Evaluation for Triclosan in Surface Water, Sediments, and Aquatic Biota Tissues. Integrated Environmental Assessment and Management. In Press, July 2010
- Maillard J-Y, Denyer SP. (2009) Emerging bacterial resistance following biocide exposure: should we be concerned? *Chemica Oggi* 27:26-28.
- Maillard J-Y. (2002) Bacterial target sites for biocide action. *J Appl Microbiol* 92: S16-27.
- Maillard J-Y. (2005a) Usage of antimicrobial biocides and products in the healthcare environment: efficacy, policies, management and perceived problems. *Ther Clin Risk Manag* 1:340-370.
- Maillard J-Y. (2005b) Biocides: Health care application. *Pharm J* 275:639-642.
- Maillard J-Y. (2007) Bacterial resistance to biocides in the healthcare environment: shall we be concerned? *J Hosp Infect* 65 (suppl 2): 60-72.
- Maira-Litrán T, Allison DG, Gilbert P. (2000). An evaluation of the potential of the multiple antibiotic resistance operon (*mar*) and the multidrug efflux pump *acrAB* to moderate resistance towards ciprofloxacin in *Escherichia coli* biofilms. *J Antimicrob Chemother* 45:789-795.

- Manzoor SE, Lambert PA, Griffiths PA, Gill MJ, Fraise AP. (1999) Reduced glutaraldehyde susceptibility in *Mycobacterium chelonae* associated with altered cell wall polysaccharides. *J Antimicrob Chemother* 43:759-765.
- Marsh PD, Bradshaw DJ. (1993) Microbiological effects of new agents in dentifrices for plaque control. *Int Dent J* 43:399-406.
- Marsh PD. (1991) Dentifrices containing new agents for the control of plaque and gingivitis: microbiological aspects. *J Clin Periodontol* 18:462-467.
- Marshall BM, Robleto E, Dumont T, Billhimer W, Wiandt K, Keswick B, Levy SB. (2003) The frequency of bacteria and antibiotic resistance in homes that use and do not use surface antibacterial agents. American Society of Microbiology, General Meeting, Washington, DC, Poster A-147.
- Massengo-Tiassé RP, Cronan JE. (2008) *Vibrio cholerae* FabV defines a new class of enoyl-acyl carrier protein reductase. *J Biol Chem* 283:1308-1316.
- Massengo-Tiassé, R. P., and J. E. Cronan. 2008. *Vibrio cholerae* FabV defines a new class of enoyl-acyl carrier protein. *Journal of Biological Chemistry*, 283. 1308-1316. McBain, A.J., R. G. Bartolo, C. E. Catrenich, D. Charbonneau, R. G. Ledder and P. Gilbert. 2003. Effects of triclosan-containing rinse on the dynamics and antimicrobial susceptibility of in vitro plaque ecosystems. *Antimicrobial Agents and Chemotherapy*. 47(11):3531-3538.
- McAvoy DC, Schatowitz B, Jacob M, Hauk A, Eckhoff WS (2009) Measurement of triclosan in wastewater treatment systems. *Environmental Toxicol Chem* 21:1323-1329.
- McAvoy DC, Schatowitz B, Jacob M, Hauk A, Eckhoff WS. (2002) Measurement of triclosan in wastewater treatment systems. *Environ Toxicol Chem* 21:1323-1329.
- McBain A J, Rickard AH, Gilbert P. (2002) Possible implications of biocide accumulation in the environment on the prevalence of bacterial antibiotic resistance. *J Ind Micro Biotech*. 29: 326 – 330.
- McBain AJ, Bartolo RG, Catrenich CE, Charbonneau D, Ledder RG, Gilbert P. (2003a) Effects of triclosan-containing rinse on the dynamics and antimicrobial susceptibility of in vitro plaque ecosystems. *Antimicrob Agents Chemother*. 47(11): 3531 – 3538.
- McBain AJ, Bartolo RG, Catrenich CE, Charbonneau D, Ledder RG, Price BB, Gilbert P. (2003) Exposure of Sink Drain Microcosms to Triclosan: Population Dynamics and Antimicrobial Susceptibility. *Appl Environ Microbiol* 69:5433-5442.
- McBain AJ, Bartolo RG, Catrenich CE, Charbonneau D, Ledder RG, Price BB, Gilbert P. (2003b) Exposure of sink drain microcosms to triclosan: Population dynamics and antimicrobial susceptibility. *Appl Environ Micro*. 69(9):5433 – 5442.
- McBain AJ, Ledder RG, Sreenivasan P, Gilbert P. (2004) Selection for high-level resistance by chronic triclosan exposure is not universal. *J Antimicrob Chemother* 53:772-777.
- McBain AJ, Ledder RG, Sreenivasan P, Gilbert P. (2004) Selection for high-level resistance by chronic triclosan exposure is not universal. *J Antimicrob Chemother*. 53: 772 – 777.
- McDonnell G, Russell AD. (1999) Antiseptics and disinfectants: activity, action and resistance. *Clin Microbiol Rev* 12:147-179.
- McDonnell G, Russell AD. (1999) Antiseptics and Disinfectants: Activity, Action, and Resistance. *Clin Micro Reviews* 12(1): 147 – 179.
- McKeegan KS, Borges-Walmsley MI, Walmsley AR. (2003) The structure and function of drug pumps: an update. *Trends Microbiol* 11:21-29.
- McLeod R, Muench SP, Rafferty J B *et al.* (2001) Triclosan inhibits the growth of *Plasmodium falciparum* and *Toxoplasma gondii* by inhibition of apicomplexan FabI. *Int J Parasitology* 31:109-113.

- McMahon T, Shamim N, Gowda S, Angle G, Leighton T. 5-Chloro-2-(2,4-dichlorophenoxy) phenol (Triclosan): Risk Assessment for the Reregistration Eligibility Decision (RED) Document. Case No 2340. PC Code: 054901. DP Barcode: 373535. US EPA, Washington DC, 17 April 2008
- McMurry LM, McDermott PF, Levy SB. (1999) Genetic evidence that *InhA* of *Mycobacterium smegmatis* is a target for triclosan. *Antimicrob Agent Chemother* 43:711-713.
- McMurry LM, Oethinger M, Levy SB. (1998a) Triclosan targets lipid synthesis. *Nature* 394: 531-532.
- McMurry LM, Oethinger M, Levy SB. (1998b) Overexpression of *marA*, *soxS*, or *acrAB* produces resistance to triclosan in laboratory and clinical strains of *Escherichia coli*. *FEMS Microbiol Lett* 166:305-309.
- McNeil MR, Brennan PJ. (1991) Structure, function and biogenesis of the cell envelope of mycobacteria in relation to bacterial physiology, pathogenesis and drug resistance; some thoughts and possibilities arising from recent structural information. *Res Microbiol* 142:451-463.
- Meade MJ, Waddell RL, Callahan TM. (2001) Soil bacteria *Pseudomonas putida* and *Alcaligenes xylosoxidans subsp. dentrificans* inactivate triclosan in liquid and solid substrates. *FEMS Microbiol Lett* 204:45-48
- Méchin L, Dubois-Brissonnet F, Heyd B, Leveau JY. (1999). Adaptation of *Pseudomonas aeruginosa* ATCC 15442 to didecyldimethylammonium bromide induces changes in membrane fatty acid composition and in resistance of cells. *J Appl Microbiol* 86:859-866.
- Miller T, Heidler J, Chillrud S, DeLaquil A, Ritchie J, Mihalic J, Bopp R, Halden RU. (2008) Fate of triclosan and triclocarban in estuarine sediment. *Environ Sci Technol* 42: 4570-4576.
- Mima T, Joshi S, Gomez Escalada M, Schweizer HP. (2007) Identification and characterization of TriABC-OpmH, a triclosan efflux pump of *Pseudomonas aeruginosa* requiring two membrane fusion proteins. *J Bacteriol* 189:7600-7609
- Mishra S, Karmodiya K, Parasuraman P, Surolia A, Surolia N. (2008) Design, synthesis, and application of novel triclosan prodrugs as potential antimalarial and antibacterial agents. *BioorgMed Chem* 16:5536-5556.
- Moken MC, McMurry LM, Levy SB. (1997) Selection of multiple-antibiotic-resistant (*Mar*) mutants of *Escherichia coli* by using the disinfectant pine oil: Roles of the *mar* and *acrAB* loci. *Antimicrob Agents Chemother* 41:2770-2772.
- Morales S, Canosa P, Rodriguez I, Rubi E, Cela R. (2005) Microwave assisted extraction followed by gas chromatography with tandem mass spectrometry for the determination of triclosan and two related chlorophenols in sludge and sediments. *J Chromatogr A* 1082:128-135.
- Munton TJ, Russell AD. (1970) Effect of glutaraldehyde on protoplasts of *Bacillus megaterium*. *J Gen Microbiol* 63:367-370.
- National Industrial Chemicals Notification and Assessment Scheme, Australia. Priority Existing Chemical Assessment Report No. 30. Triclosan. 2009
- Neumegen RA, Fernández-Alba AR, Chisti Y. (2005). Toxicities of triclosan, phenol, and copper sulfate in activated sludge. *Environ Toxicol* 20:160-164.
- NICNAS (National Industrial Chemicals Notification and Assessment Scheme), Australia. Priority Existing Chemical Assessment Report No. 30, Triclosan. 2009. <http://www.nicnas.gov.au/publications/car/pec/pec30.asp>
- Niederman R. (2005) Triclosan-containing toothpastes reduce plaque and gingivitis. *Evid Based Dent* 6: 33.

- Nikaido H. (2003) Molecular basis of bacterial outer membrane permeability revisited. *Microbiol Mol Biol Rev* 67:593-656.
- Noguchi N, Tamura M, Narui K, Wakasugi K, Sasatsu M. (2002) Frequency and genetic characterization of multidrug-resistant mutants of *Staphylococcus aureus* after selection with individual antiseptics and fluoroquinolones. *Biol Pharm Bull* 25:1129-1132.
- Okumura T, Nishikawa Y (1996) Gas chromatography-mass spectrometry determination of triclosans in water, sediment and fish samples via methylation with diazomethane. *Anal Chim Acta* 325:175-184.
- Orhan M, Kut D and Gunesoglu C. (2009) Improving the Antibacterial Activity of Cotton Fabrics Finished with Triclosan by the Use of 1,2,3,4-Butanetetracarboxylic Acid and Citric Acid. *J Appl Polymer Sci* 111:1344-1352.
- Pan Y, Breidt F, Kathariou S. (2006) Resistance of *Listeria monocytogenes* biofilms to sanitizing agents in a simulated food processing environment. *Appl Environ Microbiol* 72:7711-7717.
- Parikh SL, Xiao G, Tonge PJ. (2000). Inhibition of InhA, enoyl reductase from *Mycobacterium tuberculosis* by triclosan and isoniazid. *Biochemistry* 39:7645-7650.
- Paulsen IT, Brown MH, Skurray RA. (1996) Proton-dependent multidrug efflux systems. *Microbiol Rev* 60:575-608.
- Paulsen IT, Brown MH, Skurray RA. (1998) Characterization of the earliest known *Staphylococcus aureus* plasmid encoding a multidrug efflux system. *J Bacteriol* 180:3477-3479.
- Paxeus N. (1996) Organic pollutants in the effluents of large wastewater treatment plants in Sweden. *Water Res* 30:1115-1122.
- Pearce H, Messenger S, Maillard J-Y. (1999) Effect of biocides commonly used in the hospital environment on the transfer of antibiotic-resistance genes in *Staphylococcus aureus*. *J Hos Infect* 43:101-108.
- Peter S, Nayak DG, Philip P, Bijlani NS. (2004) Antiplaque and antigingivitis efficacy of toothpastes containing Triclosan and fluoride. *Int Dent J* 54:299-303.
- Phan TN, Marquis RE. (2006) Triclosan inhibition of membrane enzymes and glycolysis of *Streptococcus mutans* in suspensions and biofilms. *Can J Microbiol* 52:977-983.
- Piddock LJV. (2006) Clinically relevant chromosomally encoded multidrug resistance efflux pump in bacteria. *Clin Microbiol Rev* 19:382-402.
- Poole K. (2001) Multidrug resistance in Gram-negative bacteria. *Curr Opin Microbiol* 4:500-508.
- Poole K. (2002a) Mechanisms of bacterial biocide and antibiotic resistance. *J Appl Microbiol* 92:S55-64.
- Poole K. (2002b) Outer membranes and efflux: the path to multidrug resistance in Gram-negative bacteria. *Curr Pharm Biotechnol* 3:77-98
- Poole K. (2007) Efflux pumps as antimicrobial resistance mechanisms. *Ann Med* 39:162-176.
- Prada D, Mezuca M, Gómez MJ, Cerda V, Ferrer I, Farre F, Townshend A, Aguera A, Hernando MD, Fernández-Alba AR. (2004) Evidence of 2,7/2,8-dibenzodichloro-p-dioxin as a photodegradation product of triclosan in water and wastewater samples *Anal Chim Acta* 524: =241-247
- Prince J, Ayliffe GAJ. (1972). In-use testing of disinfectants in hospitals. *J Clin Pathol* 25:586-589.

- Pumbwe L, Randall LP, Woodward MJ, Piddock LJV. (2005) Expression of the efflux pump genes *cmeB*, *cmeF* and the porin gene *porA* in multiply antibiotic-resistant *Campylobacter* spp. *J Antimicrob Chemother* 54:341-347.
- Putman M, van Veen HW, Degener JE, Konings WN. (2009) Antibiotic resistance: era of the multidrug pump. *Mol Microbiol* 36:772-773.
- Pycke BF, Crabbé A, Verstraete W, Leys N. Characterization of triclosan-resistant mutants reveals multiple antimicrobial resistance mechanisms in *Rhodospirillum rubrum* S1H. *Appl Environ Microbiol*. 2010 May;76(10):3116-23. Epub 2010 Mar 19
- Quinn T, O'Mahony R, Baird AW, Drudy D, Whyte P, Fanning S. (2006). Multi-drug resistance in *Salmonella enterica*: efflux mechanisms and their relationships with the development of chromosomal resistance gene clusters. *Curr Drug Targets*7:849-860.
- Rabih O, Darouiche RO, Mansouri MD, Purushottam V. Gawande PV, Madhyastha S. (2009) Antimicrobial and antibiofilm efficacy of triclosan and DispersinBw combination *J Antimicrob Chemother* 64:88-93.
- Randall LP, Cooles SW, Coldham NG, Penuela EG, Mott AC, Woodward, MJ, Piddock LJV, Webber MA. (2007) Commonly used farm disinfectants can select for mutant *Salmonella enterica* serovar Typhimurium with decreased susceptibility to biocides and antibiotics without compromising virulence. *J Antimicrob Chemother* 60:1273-1280.
- Randall LP, Cooles SW, Piddock LJ, Woodward MJ. (2004) Effect of triclosan or a phenolic farm disinfectant on the selection of antibiotic-resistant *Salmonella enterica*. *J Antimicrob Chemother*. 54(3): 621 - 627.
- Randall LP, Ridley AM, Cooles SW, Sharma M, Sayers AR, Pumbwe L, Newell DG, Piddock LJ, Woodward MJ. (2003) Prevalence of multiple antibiotic resistance in 443 *Campylobacter* spp. Isolated from humans and animals. *J Antimicrob Chemother*. 52(3): 507 - 510.
- Rastogi SC, Jensen GJ and Johansen JD. Survey and risk assessment of chemical substances in deodorants. Survey of Chemicals in Consumer Products No. 86,2007. Danish EPA, Copenhagen,
- Rastogi SC, Krongaard T, Jensen GH. Antibacterial compounds in clothing articles. Survey of Chemicals in Consumer Products No. 24, 2003, Danish EPA, Copenhagen.
- Rawat R, Whitty A, Tonge PJ. (2003) The isoniazid-NAD adduct is a slow, tight-binding inhibitor of InhA, the Mycobacterium tuberculosis enoyl reductase: adduct affinity and drug resistance. *Proc Natl Acad Sci U S A*. 100(24): 13881 - 13886.
- Regos J, Hitz HR. (1974) Investigations on the mode of action of triclosan, a broad spectrum antimicrobial agent. *Zentralbl Bakteriell Hyg I Abt Orig* 226:390-401.
- Regos J, Zak O, Solf R, Vischer WA, Weirich EG. (1979) Antimicrobial spectrum of triclosan, a broad-spectrum antimicrobial agent for topical application. II. Comparison with some other antimicrobial agents. *Dermatologica* 158:72-79.
- Remberger M, Sternbeck J, Strömberg K. (2002) Screening av Triclosan och vissa bromerade fenoliska ämnen i Sverige. IVL Rapport B1477. In Swedish
- Remberger, M, Woldegiorgis A, Kaj L, Andersson J, Palm Cousins A, Dusan B, Ekheden Y, Brorström-Lundén, E Results from the Swedish Screening 2005., 2006, Subreport 2. Biocides. IVL Rapport B1700.
- Reuter G. (1984) Cleaning and disinfection in food hygiene. *Fleiswirtschaft* 64:668-672.
- Reuter G. (1989) Requirements on the efficacy of disinfectants in the food-processing area, 1 *Zentralblatt für Bakteriell Mikrobiol u Hyg, Serie B-Umwelthygiene Krankenhaushygiene Arbeitshygiene Präventive Med* 187:564-577.
- Reuter G. (1994) The effectiveness of cleaning and disinfection during meat production and processing - Influence factors and use recommendations. *Fleiswirtschaft* 74:808-813.



- RG. (2003) Development of bacterial resistance to several biocides and effects on antibiotic susceptibility. *J Hosp Infect.* 55(2): 98 – 107.
- Roberts AP, Mullany P. (2009) A modular master on the move: the Tn916 family of mobile genetic elements. *Trends Microbiol* 17:251-8.
- Rodricks, JV, Swenberg, JA, Borzelleca, Jf, Maronpot RR, Shipp, AM. (2010). Triclosan: A critical review of the experimental data and development of margins of safety for consumer products. *Critical Reviews in Toxicology*. In Press. Available electronically - [www.informahealthcare/txc/articles](http://www.informahealthcare/txc/articles)
- Rose H, Baldwin A, Dowson CG. (2009) Mahenthiralingam E. Biocide susceptibility of the *Burkholderia cepacia* complex. *J Antimicrob Chemother* 63:502-510.
- Roujeinikova A, Levy CW, Rowsell S, Sedelnikova S, Baker PJ, Minshull CA, Mistry A, Colls JG, Camble R, Stuitje AR, Slabas AR, Rafferty JB, Pauptit RA, Viner R, Rice DW. (1999) Crystallographic analysis of triclosan bound to enoyl reductase. *J Mol Biol* 294:527-535.
- Roujeinikova A, Levy CW, Rowsell S, Sedelnikova, S, Baker PJ, Minshull CA, Mistry A, Colls JG, Camble R, Stuitje AR, Slabas AR, Rafferty JB, Pauptit RA, Viner R, Rice DW. (1999) Crystallographic analysis of triclosan bound to enoyl reductase. *J Mol Biol.* 294: 527 – 535.
- Rule KL, Ebbett VR, Vikesland PJ. (2005) Formation of chloroform and chlorinated organics by free-chlorine-mediated oxidation of triclosan, *Environ Sci Tech* 39:3176-3185.
- Russell AD, Furr JR, Maillard J-Y. (1997) Microbial susceptibility and resistance to biocides: an understanding. *ASM News* 63:481-487.
- Russell AD, McDonnell G. (2000). Concentration: a major factor in studying biocidal action. *J Hosp Infect* 44:1-3.
- Russell AD. (1996) Activity of biocides against mycobacteria. *J Appl Bacteriol* 81:87-101.
- Russell AD. (2000) Do biocides select for antibiotic resistance? *J Pharm Pharmacol.* 52: 227 – 233.
- Russell AD. (2002a) Antibiotic and biocide resistance in bacteria: comments and conclusion. *J Appl Microbiol* 92:S171-173.
- Russell AD. (2002b) Introduction of biocides into clinical practice and the impact on antibiotic-resistant bacteria. *J Appl Microbiol* 92:S121-135.
- Russell AD. (2003) Biocide use and antibiotic resistance: the relevance of laboratory findings to clinical and environmental situations. *Lancet Infect Dis* 3:794–803.
- Russell AD. (2003) Biocide use and antibiotic resistance: the relevance of laboratory findings to clinical and environmental situations. *Lancet Infect Dis.* 3: 794 – 803.
- Russell AD. (2004) Whither triclosan? *J Antimicrob Chemother* 53: 693–695.
- Russell AD. (2004) Whither triclosan? *J Antimicrob Chemother.* 53(5): 693 – 695.
- Sabaliunas D, Webb SF, Hauk A, Jacob, M, Eckhoff WS. (2003) Environmental fate of triclosan in the River Aire basin, UK. *Water Res* 37:3145-3154.
- Samosø-Petersen L, Winther-Nielsen M, Madsen T. (2003) Fate and effects of triclosan. Danish Environmental Protection Agency, Project Number 861, Copenhagen, Denmark, 47 pp.
- Sánchez P, Linares JF, Moreno E, Martínez JL. (2005) The biocide triclosan selects *Stenotrophomonas maltophilia* mutants that overproduce the SmeDEF multidrug efflux pump. *Antimicrob Agents Chemother* 49:781-782.

- Sanchez P, Moreno E, Martinez JL. (2005) The biocide triclosan selects *Stenotrophomonas maltophilia* mutants that overproduce the SmeDEF multidrug efflux pump. *Antimicrob Agents Chemother.* 49(2): 781 – 782.
- Sanchez-Prado L, Llompарт M, Lores M, Fernández-Alvarez M, García-Jares C, Cela R. (2006b) Further research on photo-SPME of triclosan. *Anal Bioanal Chem* 384:1548-1457.
- Sanchez-Prado L, Llompарт M, Lores M, García-Jares C, Bayona JM, Cela R. (2006a) Monitoring the photochemical degradation of triclosan in wastewater by UV light and sunlight using solid-phase microextraction. *Chemosphere* 65:1338-1347.
- Sandborgh-Englund G, Adolfsson-Erici M, Odham G, Ekstrand J. (2006) Pharmacokinetics of triclosan following oral ingestion in humans. *J Toxicol Environ Health A* 69:1861-1873.
- Sanford JP. (1970) Disinfectants that don't. *Ann Intern Med* 72:282-283.
- Saxton CA, Svaton B, Lloyd AM. (1988) Antiplatelet effects and mode of action of a combination of zinc citrate and a nonionic antimicrobial agent. *Scand J Dent Res* 96: 212-217.
- Saxton CA, van der Ouderaa FJG. (1989) The effect of a dentifrice containing zinc citrate and Triclosan on developing gingivitis. *J Periodontol Res* 24:75-80.
- Saxton CA. (1986) The effect of a dentifrice containing zinc citrate and 2, 4, 4'-Trichloro- 2'-Hydroxydiphenyl Ether. *J Periodontol* 57:555-561.
- Saxton CA. (1989) Maintenance of gingival health by a dentifrice containing zinc citrate and Triclosan. *J Dent Res* 68 (Spec. Iss):1724-1726.
- SCC. 2002. Scientific Steering Committee. Opinion on triclosan resistance. Adopted by the SCC at its meeting of 27 – 28 June 2002.
- SCCP. (2006) Scientific Committee on Consumer Products, Opinion on: Triclosan (SCCP/1040/06). Adopted by the SCCP during the 9th plenary meeting of 10 October 2006.
- SCCP. (2009) Scientific Committee on Consumer Products opinion on: Triclosan (SCCP/1192/08) Adopted by the SCCP during the 19th plenary meeting on 21 January 2009 .
- SCENIHR, Scientific Committee on Emerging and Newly Identified Health Risks, The antibiotic resistance effect of biocides, adopted by the SCENIHR on January 19, 2009
- SCENIHR, Scientific Committee on Emerging and Newly Identified Health Risks, Research strategy to address the knowledge gaps on the antimicrobial resistance effects of biocides, adopted by the SCENIHR on March 17, 2010
- Schaeken MJM, van der Hoeven JS, Saxton CA, Cummins D. (1994) The effect of mouthrinses containing zinc and Triclosan on plaque accumulation and development of gingivitis in a 3-week clinical test. *J Clin Periodontol* 21:360-364.
- Schlüter A, Szczepanowski R, Pühler A, Top EM. (2007) Genomics of IncP-1 antibiotic resistance plasmids isolated from wastewater treatment plants provides evidence for a widely accessible drug resistance gene pool. *FEMS Microbiol Rev* 31:449-477.
- Schmid MB, Kaplan N. (2004) Reduced triclosan susceptibility in methicillin-resistant *Staphylococcus epidermidis*. *Antimicrob Agents Chemother* 48:1397–1399.
- Schmid MB, Kaplan N. (2004) Reduced triclosan susceptibility in methicillin-resistant *Staphylococcus epidermidis*. *Antimicrob Agents Chemother.* 48(4): 1397 – 1399.
- Schujman GE, Choi KH, Altabe S, Rock CO, de Mendoza D. (2001) Response of *Bacillus subtilis* to cerulenin and acquisition of resistance. *J Bacteriol.* 183(10): 3032 – 3040.
- Schweizer HP. (1998) Intrinsic resistance to inhibitors of fatty acid biosynthesis in *Pseudomonas aeruginosa* is due to efflux: application of a novel technique for

- generation of unmarked chromosomal mutations for the study of efflux systems. *Antimicrob Agents Chemother* 42:394-398.
- Schweizer HP. (2001) Triclosan: a widely used biocide and its link to antibiotics. *FEMS Microbiol Lett* 202:1-7.
- Seaman PF, Ochs D, Day, MJ. (2007) Small-colony variants: a novel mechanism for triclosan resistance in methicillin-resistant *Staphylococcus aureus*. *J Antimicrob Chemother* 59:43-50.
- Sidhu MS, Heir E, Leegaard T, Wiger K, Holck A. (2002). Frequency of disinfectant resistance genes and genetic linkage with beta-lactamase transposon Tn552 among clinical staphylococci. *Antimicrob Agents Chemother* 46:2797-2803.
- Sidhu MS, Heir E, Sørnum H, Holck A. (2001) Genetic linkage between resistance to quaternary ammonium compounds and beta-lactam antibiotics in food-related *Staphylococcus* spp. *Microb Drug Resist* 7:363-371.
- Singer H, Müller S, Tixier C, Pillonel. (2002) Triclosan: occurrence and fate of a widely used biocide in the aquatic environment: field measurements in wastewater treatment plants, surface waters, and lake sediments. *Environ Sci Technol* 36:4998-5004.
- Sivaraman S, Sullivan TJ, Johnson F, Novichenok P, Cui G, Simmerling C, Tonge PJ. (2004). Inhibition of the Bacterial Enoyl Reductase FabI by Triclosan: A Structure-Reactivity Analysis of FabI inhibition by triclosan analogues. *J Med Chem* 47:509-518.
- Slater-Radosti C, Van Aller G, Greenwood R, Nicholas, R, Keller PM, DeWolf WE, Fan F, Payne DJ, Jaworski DD. (2001) Biochemical and genetic characterization of the action of triclosan on *Staphylococcus aureus*. *J Antimicrob Chemother* 48:1-6.
- Smith K, Hunter IS. (2008) Efficacy of common hospital biocides with biofilms of multi-drug resistant clinical isolates. *J Med Microbiol* 57:966-973.
- Son HS, Gwangpyo Ko G, KD. (2009) Kinetics and mechanism of photolysis and TiO<sub>2</sub> photocatalysis of triclosan. *J Hazardous Materials* 166:954-960.
- Sondossi M, Rossmore HW, Wireman JW. (2002) Observations of resistance and cross-resistance to formaldehyde and a formaldehyde condensate biocide in *Pseudomonas aeruginosa*. *Int Biodeter* 21:105-106.
- Sreenivasan P, Gaffar A. (2002) Antiplaque biocides and bacterial resistance: a review. *J Clin Periodontol.* 29(11): 965 - 974.
- SSC. (2002) Opinion on Triclosan Resistance Adopted by the Scientific Steering Committee at its meeting on 27-28 June 2002
- Stackelberg PE, Furlong ET, Meyer MT, Zaugg SD, Hendersen AK, Reissman DB. (2004) persistence of pharmaceutical and other organic wastewater contaminants in a conventional drinking-water-treatment plant. *Sci Total Environ* 329:99-113.
- Stasinakis AS, Petalas AV, Mamais D, Thomaidis NS, Gatidou G, Lekkas TD. (2007) Investigation of triclosan fate and toxicity in continuous-flow activated sludge systems. *Chemosphere* 68: 375-381.
- Stephen KW, Saxton CA, Jones CL, Ritchie JA, Morrison T. (1990) Control of gingivitis and calculus by a dentifrice containing a zinc salt and Triclosan. *J Periodontol* 61 674-679.
- Stewart MJ, Parikh S, Xiao G, Tonge PJ, Kisher C. (1999) Structural basis and mechanisms of enoyl reductase inhibition by triclosan. *J Mol Biol* 290:859-865.
- Stewart MJ, Parikh S, Xiao G, Tonge PJ, Kisker C. (1999) Structural basis and mechanism of enoyl reductase inhibition by triclosan. *J Mol Biol.* 290(4): 859 - 865.
- Stickler DJ, Jones GL, Russell AD. (2003). Control of encrustation and blockage of Foley catheters. *Lancet* 361:1435-1437

- Stickler DJ, Jones GL. (2008) Reduced Susceptibility of *Proteus mirabilis* to triclosan. *Antimicrob Agents Chemother* 52:991-994.
- Stickler DJ. (2004) Intrinsic resistance of Gram-negative bacteria. In: Fraise AP, Lambert PA, Maillard J-Y, editors. *Principles and Practice of Disinfection, Preservation and Sterilization* 4th edn. Oxford: Blackwell Scientific Publication; p.154-69.
- Suarez S, Dodd MC, Omil F and von Gunten U. (2007) Kinetics of triclosan oxidation by aqueous ozone and consequent loss of antibacterial activity: relevance to municipal wastewater ozonation. *Water Res* 41:2481-2490.
- Suller MTE, Russell AD. (1999) Antibiotic and biocide resistance in methicillin-resistant *Staphylococcus aureus* and vancomycin resistant *Enterococcus*. *J Hosp Infect* 43:281-291.
- Suller MTE, Russell AD. (2000) Triclosan and antibiotic resistance in *Staphylococcus aureus*. *J Antimicrobial Chemother* 46:11-18.
- Suller MTE, Russell, AD. (1999) Antibiotic and biocide resistance in methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant enterococcus. *J Hosp Infect*. 43: 281 - 291.
- Sullivan A, Wretling B, Nord CE. (2003) Will triclosan in toothpaste select for resistant oral streptococci? *Clin Microbiol Infect* 9:306-309.
- Sullivan A, Wretling B, Nord CE. (2003) Will triclosan in toothpaste select for resistant oral streptococci? *Clin Microbiol Infect*. 9(4): 306 - 309.
- Svatun B, Saxton CA, Huntington E, Cummins D. (1993a) The effects of a silica dentifrice containing Triclosan and zinc citrate on supragingival plaque and calculus formation and the control of gingivitis. *Int Dent J* 43:431-439.
- Svatun B, Saxton CA, Huntington E, Cummins D. (1993b) The effects of three silica dentifrices containing Triclosan on supragingival plaque and calculus formation and on gingivitis. *Int Dent J* 43:441-452.
- Svatun B, Saxton CA, Rolla G, van der Ouderaa F. (1989a) One year study of the efficacy of a dentifrice containing zinc citrate and Triclosan to maintain gingival health. *Scand J Dent Res* 97:242-246.
- Svatun B, Saxton CA, Rolla G, van der Ouderaa F. (1989b) A one year study on the maintenance of gingival health by a dentifrice containing a zinc salt and non-anionic antimicrobial agent. *J Clin Periodontol* 16:75-80.
- Svatun B, Saxton CA, Rolla G. (1990) Six month study of the effect of a dentifrice containing zinc citrate and Triclosan on plaque, gingival health and calculus. *Scand J Dent Res* 98:301-304.
- Svatun B, Saxton CA, van der Ouderaa F, Rolla G. (1987) The influence of a dentifrice containing a zinc salt and nonionic anti-microbial agent on the maintenance of gingival health. *J Clin Periodontol* 14:457-461.
- Svensson A. (2002) Ecotoxic substances in sewage sludge – A study of 19 WWTPs in Vastra Gotaland, Sweden. *Lansstyrelsen I Vastra Gotaland, Report 2002:39*. In Swedish.
- Tabak M, Scher K, Hartog E, Romling U, Matthews KR, Chikindas ML, Yaron S. (2007) Effect of triclosan on *Salmonella typhimurium* at different growth stages and in biofilms. *FEMS Microbiol Lett* 267:200-206.
- Tabak M, Scher K, Chikindas ML, Yaron S. The synergistic activity of triclosan and ciprofloxacin on biofilms of *Salmonella Typhimurium*. *FEMS Microbiol Lett*. 2009 Nov;301(1):69-76. Epub 2009 Sep 23
- Tatarazako N, Ishibashi H, Teshima K, Kishi K, Arizono K. (2004) Effects of triclosan on various aquatic organisms. *Environ Sci* 11:133-1140

- Tattawasart U, Hann AC, Maillard J-Y, Furr JR, Russell AD. (2000a) Cytological changes in chlorhexidine-resistant isolates of *Pseudomonas stutzeri*. J Antimicrob Chemother; 45:145-152.
- Tattawasart U, Hann AC, Maillard J-Y, Furr JR, Russell AD. (2000b) membrane changes in *Pseudomonas stutzeri* strains resistant to chlorhexidine diacetate and cetylpyridinium chloride. Inter J Antimicrob Agents 16:233-238.
- Tattawasart U, Maillard JY, Furr JR, Russell AD. (1999) Development of resistance to chlorhexidine diacetate and cetylpyridinium chloride in *Pseudomonas stutzeri* and changes in antibiotic susceptibility. J Hosp Infect. 42(3): 219 – 229.
- Ternes TA, Joss A, Siegrist H (2004). Scrutinizing pharmaceuticals and personal care products in wastewater treatment. Environ Sci Technol 38:393A-399A
- Thomas L, Russell AD, Maillard, J-Y. (2005). Antimicrobial activity of chlorhexidine diacetate and benzalkonium chloride against *Pseudomonas aeruginosa* and its response to biocide residues. J Appl Microbiol 98:533-543.
- Thompson A, Griffin P, Stuetz R, Cartmell E. (2005) The fate and removal of triclosan during wastewater treatment. Water Environ Resh 77:63-67.
- Thorrold CA, Letsoalo ME, Dusé AG, Marais E. (2007) Efflux pump activity in fluoroquinolone and tetracycline resistant *Salmonella* and *E. coli* implicated in reduced susceptibility to household antimicrobial cleaning agents. Int J Food Microbiol 113:315-320.
- Tixier C, Singer HP, Canonica S, Stephan R. (2002) Phototransformation of Triclosan in Surface Waters: A Relevant Elimination Process for This Widely Used Biocide Laboratory Studies, Field Measurements, and Modeling. Environ Sci Technol 36:3482–3489
- Tkachenko O, Shepard J, Aris VM, joy A, Bello A, Londono I, Marku J, Soteropoulos P, Peteroy-Kelly MA. (2007) A triclosan-ciprofloxacin cross-resistant mutant strain of *Staphylococcus aureus* displays an alteration in the expression of several cell membrane structural and functional genes. Res Microbiol 158:651-658.
- U.S. EPA. 2009. Targeted National Sewage Sludge Survey: Sampling and Analysis Technical Report. Statistical Analysis Report. Available: <http://www.epa.gov/waterscience/biosolids/tnsss-overview.html#results> : Targeted National Sewage Sludge Survey Statistical Analysis Report ("Statistical Report") (PDF)
- Valkova N, Lepine F, Valeanu L, Dupont M, Labrie L, Bisailon J-G, Beaudet R, Shareck F, Villemur R. (2001) Hydrolysis of 4-hydroxybenzoic acid esters (parabens) and their aerobic transformation into phenol by the resistant *Enterobacter cloacae* strain EM. Appl Environ Microbiol 67:2404-2409.
- Van der Ouderaa FJG. (1991) Anti-plaque agents – Rationale and prospects for prevention of gingivitis and periodontal disease. J Clin Periodontol 18:447-454.
- van Stee LLP, Leonards PEG, Vreuls RJJ, Brinkman UAT. (1999) Identification of non-target compounds using gas chromatography with simultaneous atomic emission and mass spectrometric detection (GC-AED/MS): analysis of municipal wastewater. Analyst 124: 1547–1552.
- Villalain, J, Mateo, CR, Aranda FJ, Shapiro, S, Micol, V. (2001) Membranotropic effects of the antibacterial agent triclosan. Arch Biochem Biophys 390:128–136.
- Walker C, Borden LC, Zambon JJ, Bonta Cy, DeVizio W, Volpe AR. (1994) The effects of 0.3% triclosan-containing dentifrice on the microbial composition of supragingival plaque. J Clin Periodontol 21:334-341.
- Waller NJ, Kookana RS. (2009) Effect of triclosan on microbiological activity in Australian soils. Environ Toxicol Chem 28:65-70

- Walsh C, Fanning S. (2008) Antimicrobial resistance in foodborne pathogens – a cause for concern? *Current Drug Targets* 9:808-815
- Walsh SE, Maillard JY, Russell AD, Catrenich CE, Charbonneau DL, Bartolo
- Walsh SE, Maillard J-Y, Russell AD, Hann AC. (2001) Possible mechanisms for the relative efficacies of ortho-phthalaldehyde and glutaraldehyde against glutaraldehyde-resistant *Mycobacterium chelonae*. *J Appl Microbiol* 91:80-92.
- Waltman EL, Venables BJ, Waller WZ. (2006) Triclosan in a North Texas wastewater treatment plant and the influent and effluent of an experimental constructed wetland. *Environ Toxicol Chem* 25:367-372.
- Webber MA, Coldham NG, Woodward MJ and Piddock LJV. (2008b). Proteomic analysis of triclosan resistance in *Salmonella enterica* serovar Typhimurium. *J Antimicrob Chemother* 62:92-97.
- Webber MA, Randall LP, Cooles S, Woodward MJ, Piddock JV. (2008a) Triclosan resistance in *Salmonella enterica* serovar Typhimurium. *J Antimicrob Chemother* 62:83-91.
- Weber DJ, Rutala WA. (2006) Use of Germicides in the Home and the Health care Setting: Is There a Relationship Between Germicide Use and Antibiotic Resistance? *Infect Control Hosp Epidemiol* 27:1107-1119.
- Webster J, Foagali JL, Cartwright D. (1994) Elimination of methicillin-resistant *Staphylococcus aureus* from a neonatal intensive care unit after hand washing with triclosan. *J Paediatr Child Health* 30:59-64.
- Wert EC, Rosario-Ortiz FL, Snyder SA. (2009) Effect of ozone exposure on the oxidation of trace organic contaminants in wastewater. *Water Res* 43:1005-1014.
- WHO, the world health report 2007 - A safer future: global public health security in the 21<sup>st</sup> century; available at <http://www.who.int/whr/2007/en/index.html>
- Wignall GR, Goneau LW, Chew BH, Denstedt JD, Cadieux PA. (2008). The effects of triclosan on uropathogen susceptibility to clinically relevant antibiotics, *J Endourol* 22:2349-2356
- Wilcox MH, Hall J, Pike R Templeton PA, Fawley WN, Parnell P, Verity P. (2003) Use of perioperative mupirocin to prevent methicillin-resistant *Staphylococcus aureus* (MRSA) orthopaedic surgical site infections. *J Hosp Infect* 54:196-201.
- Wilcox, MH, Hall J, Pike H, Templeton PA, Fawley WN, Parnell P, Verity P. (2003) Use of perioperative mupirocin to prevent methicillin-resistant *Staphylococcus aureus* (MRSA) orthopaedic surgical site infections. *J Hosp Infect.* 54(3): 196 – 201.
- Williams C, McBride S, Mostler K *et al.* (1998) Efficacy of a dentifrice containing zinc citrate for the control of plaque and gingivitis: a six-month clinical study in adults. *Comp Cont Educ Dent*; 19 (Special Issue):4-15.
- Williams GJ and Stickler DJ. (2008) Effect of triclosan on the formation of crystalline biofilms by mixed communities of urinary tract pathogens on urinary catheters. *J Med Microbiol* 57:1135-1140.
- Winder CL, Al-Adham IS, Abdel Malek SM, Buultjens TE, Horrocks AJ, Collier PJ. (2000) Outer membrane protein shifts in biocide-resistant *Pseudomonas aeruginosa* PAO1. *J Appl Microbiol* 89:289-295.
- Wisniewska K, Piechowicz L, Galinski J. (2006) Reduced susceptibility to triclosan in methicillin-resistant *Staphylococcus aureus*. *Med Dosw Mikrobiol* 58:11-17.
- Xie Z, Ebinghaus R, Flöser G, Caba A and Ruck W. (2008) Occurrence and distribution of triclosan in the German Bight (North Sea). *Environ Poll* 156:1190-1195.
- Yazdankhah SP, Scheie AA, Hoiby EA, Lunestad BT, Heir E, Fotland TO, Nartestad K, Kruse H. (2006) Triclosan and antimicrobial resistance in bacteria: an overview. *Microb Drug Resist* 12:83-90

- Ying GG, Kookana. (2007) Triclosan in wastewaters and biosolids from Australian wastewater treatment plants. *Environ Int* 33:199-205.
- Yu JC, Kwong TY, Luo Q, Cai Z. (2006) Photolytic oxidation of triclosan. *Chemosphere* 65: 390-399
- Yu BJ, Kim JA, Pan JG Signature gene expression profile of triclosan-resistant *Escherichia coli*. *J Antimicrob Chemother.* 2010 Jun;65(6):1171-7. Epub 2010 Apr 21.
- Zafar AB, Butler RC, Reese DJ, Gaydos LA, Mennonna PA (1995) Use of 0.3% triclosan (Bacti-Stat) to eradicate an outbreak of methicillin-resistant *Staphylococcus aureus* in a neonatal nursery. *Am J Infect Control* 23:200-208.
- Zhang S, Zhang Q, Darisaw S, Ehie O, Wang G. (2007) Simultaneous quantification of polycyclic aromatic hydrocarbons (PAHS), polychlorinated biphenyls (PCBS), and pharmaceuticals and personal care products (PPCPS) in Mississippi River water, in New Orleans, Louisiana, USA. *Chemosphere* 66:1057-1069.
- Zhang YM, Lu YJ, Rock CO. (2004) The reductase steps of the type II fatty acid synthase as antimicrobial targets. *Lipids* 39:1055-1060.
- Zhao F. (2006) Biodegradation of triclosan by a triclosan-degrading isolate and an ammonia-oxidizing bacterium. A Thesis for the Master of Science, Office of Graduate Studies of Texas A&M University.
- Zhu L, Lin J, Ma J, Cronan JE, Wang H. (2010). The Triclosan Resistance of *Pseudomonas aeruginosa* PA01 is Due to FabV, a Triclosan-Resistant Enoyl-Acyl Carrier Protein Reductase. *Antimicrob Agents Chemother* 54:689-698.