
**U. S. Food and Drug Administration
Center for Food Safety and Applied Nutrition
June 2, 2000**

Kinetics of Microbial Inactivation for Alternative Food Processing Technologies References

[\(Table of Contents\)](#)

Adegoke, G. O., Iwahashi, H. and Komatsu, Y. 1997. Inhibition of *Saccharomyces cerevisiae* by combination of hydrostatic pressure and monoterpenes. *J Food Sci.* 62(2): 404-405.

Akiyama, H. 2000. Otsuka Chemical Co., Ltd., 463 Kagasuno Kawauchi. CHO, Tokushima 771-0193 Japan (contact: Phone 0886-65-6672; Email: hakiyama@otsukac.co.jp).

Alderton, G. and Snell, N. 1969. Bacterial spores: Chemical sensitization to heat. *Science.* 163:1212

Alderton, G., Ito, K. A. and Chen, J. K. 1976. Chemical manipulation of the heat resistance of *Clostridium botulinum* spores. *Appl Environ Microbiol.* 31:492-498

Aleman, G. D., Farkas, D. F., McIntyre, S., Torres, J. A. and Wilhelmssen, E. 1994. Ultra-high pressure pasteurization of fresh cut pineapple. *J Food Protect.* 57(10):931-934

Aleman, G. D., Ting, E. Y., Mordre, S. C., Hawes, A. C. O., Walker, M., Farkas, D. F. and Torres, J. A. 1996. Pulsed ultra high pressure treatments for pasteurization of pineapple juice. *J Food Sci.* 61(2):388-390

Allen, M. 1969. Electrohydraulic process for producing antigens. U.S. Patent 3,445,566.

Alpas, H., Kalchayandand, N., Sikes, T., Dunne, C. P. and Ray, B. 1994. Hydrostatic pressure among strains of foodborne pathogens. *Applied and Environmental Microbiology.* 65(9):4248-4251

Ananth, V., Dickson, J. S., Olson, D. G. and Murano, E. A. 1998. Shelf-life extension, safety and quality of fresh pork loin treated with high hydrostatic pressure. *J Food Protect.* 61(12):1649-1656

Anantheswaran, R. C. and Liu, L. Z. 1994a. Effect of viscosity and salt concentration on microwave heating of model non-Newtonian liquid foods in cylindrical containers. *J Microwave Power Electromagnetic Energy*. 29:127

Anantheswaran, R. C. and Liu, L. Z. 1994b. Effect of shielding on flow profiles in water in a cylindrical container during microwave heating. *J Microwave Power Electromagnetic Energy*. 29(4):220

Anderson, W. A., McClure, P. J., Baird-Parker, A. C. and Cole, M. B. 1996. The application of a log-logistic model to describe the thermal inactivation of clostridium botulinum at 213B at temperatures below 121-1 degrees C0. *J Appl Bacteriol*. 80:283-290

Anonymous. 1980. The potential of Bach. *Food Manuf*. 55(10):53

Anonymous. 1989. *Canned Foods: principles of thermal process control, acidification and container closure evaluation*. Washington, DC. The Food Processors Institute. Fifth Edition.

Anonymous. 1996. Sterilization surfaces by irradiation with microwaves. *NASA Tech Briefs*. 140

Anonymous. 1996. Thermal processes for low-acid foods in metal containers. Washington, DC. National Food Processors Association. Bulletin 26-L 72-85.

Anonymous. 1999. Micro Denshi Co., Ltd., No. 8-25, 2-Chrome Yoshinodai, Kawagoeshi, Saitama 350, Japan.

Anonymous. 1999. U.S. food & drug administration center for food safety and & applied nutrition foodborne pathogenic microorganisms and natural toxins handbook [Bad Bug Book]. 2000. <http://vm.cfsan.fda.gov/list.html>

Anonymous. 1999. UV light provides alternative to heat pasteurization of juices. *Food Technol*. 53(9):144

Arabshahi, A. and Lund, D. B. 1985. Considerations in calculating kinetic parameters from experimental data. *J Food Process Eng*. 7:239-251

Arroyo, G., Sanz, P. D. and Prestamo, G. 1997. Effect of high pressure on the reduction of microbial populations in vegetables. *J Appl Microbiol*. 82:735-742

Ball, C. O. and Olson, F. C. W. 1957. *Sterilization in Food Technology*. McGraw-Hill Book Company. New York.

Ballestra, P., Da Silva, A. A. and Cuq, J. L. 1996. Inactivation of *Escherichia coli* by carbon dioxide under pressure. *J Food Sci*. 61(4):829-836

Barbosa-Cánovas, G.V., Pothakamury, U.R., and Barry, G.S. 1994. State of the art technologies for the stabilization of foods by non-thermal processes: physical methods. In: Barbosa-Cánovas, G.V., and Welti-Chanes, J.(eds.), Food Preservation by Moisture control. Lancaster, Technomic Publishing.pp. 423-532.

Barbosa-Canovas, G. V., Palou, E., Pothakamury, U. R. and Swanson, B. G. 1997. Application of light pulses in the sterilization of foods and packaging materials. Nonthermal Preservation of Foods. Chapter 6-139-161. Marcel Dekker. New York.

Barbosa-Cánovas, G.V., Gongora-Nieto, M.M., and Swanson, B.G. 1998. Nonthermal electrical methods in food preservation. Food Sci. Int. 4(5):363-370.

Barbosa-Canovas, G. V., Gongora-Nieto, M. M., Pothakamury, U. R. and Swanson, B. G. 1999. Preservation of foods with pulsed electric fields. 1-9, 76-107, 108-155. Academic Press Ltd. London.

Bassani, M. 1999. Personal communication. Micromac Systems.

Beattie, M. and Lewis, F. C. 1925. The electric current (apart from the heat generated) A bacteriological agent in the sterilization of milk and other fluids. J Hyg. 24:123

Bengtsson, N. E. and Green, W. 1970. Radio-frequency pasteurization of cured hams. J Food Sci. 35:681-687

Benito, A., Ventoura, G., Casadei, M., Robinson, T. and Mackey, B. 1999. Variation in resistance of natural isolates of Escherichia coli O157 to high hydrostatic pressure, mild heat, and other stresses. Appl Environ Microbiol. 65(4):1564-1569

Berlin, D. L., Herson, D. S., Hicks, D. T. and Hoover, D. G. 1999. Response of pathogenic vibrio species to high hydrostatic pressure. Appl Environ Microbiol. 65(6):2776-2780

Bernhardt, H. 1994. Desinfektion aufbereiteter oberflächenwasser mit UV-Strahlen. Wasser-Abwasser. 135(12):677-689

Bolton, J. R. 1999. Ultraviolet Applications Handbook. Bolton Photosciences, Inc. Ayr, ON, CA N0B 1E0.

Brauch, G., Haensler, U. and Ludwig, H. 1990. The effect of pressure on bacteriophages. High Pressure Res. 5:767-769

Bridgman, P. W. 1912. Water in the liquid and five solid forms under pressure. Proc Amer Acad Art Sci. 47:441-558

Brynjolfsson, A. 1979. Food irradiation and nutrition. The Professional Nutritionist. 11(4):7-10

- Buchanan, R. L. 1997. Identifying and controlling emerging foodborne pathogens: research needs. *Emerging Infectious Diseases*. 3(4):517-521
- Buffler, C. R. 1993. *Microwave cooking and processing: Engineering fundamentals for the food scientist*. Van Nostrand Reinhold. New York.
- Burfoot, D., Griffin, W. J. and James, S. J. 1988. Microwave pasteurization of prepared meals. *Journal of Food Engineering*. 8:145-156
- Burfoot, D., Railton, C. J., Foster, A. M. and Reavell, R. 1996. Modeling the pasteurization of prepared meal with microwaves at 896 MHz. *J Food Eng*. 30:117-133
- Burton, H. 1949. A survey of literature on bacterial effects of short electromagnetic waves. Shinfield, England. National Institute for Research in Dairying Shinfield. N. I. R. D. Paper No. 1041.
- Butz, P., Trangott, V., Ludwig, H., Ries, J. and Weber, H. 1990. The high pressure inactivation of bacteria and bacterial spores. *Die Pharm Ind*. 52:487-491
- Butz, P., Habison, G. and Ludwig, H. 1992. Influence of high pressure on a lipid-coated virus. R. Hayashi, K. Heremans and P. Masson(eds.). *High Pressure and Biotechnology*. London. John Libby & Co., Ltd. 61-64.
- Butz, P., Funtenberger, S., Haberditzl, T. and Tauscher, B. 1996. High pressure inactivation of *Byssoschlamys nivea* ascospores and other heat-resistant moulds. *Lebensm Wiss Technol*. 29:404-410
- Calderon-Miranda, M. L. 1998. Inactivation of *Listeria innocua* by pulsed electric fields and nisin. Pullman, WA. Washington State University.
- Carlez, A., Cheftel, J. C., Rosec, J. P., Richard, N., Saldana, J. L. and Balny, C. 1992. Effects of high pressure and bacteriostatic agents on the destruction of *Citrobacter freundii* in minced beef muscle. C. Balny, R. Hayashi, K. Heremans and P. Masson(eds.). *High Pressure and Biotechnology*. London, U.K. John Libby & Co., Ltd. 365-368.
- Carlez, A., Rosec, J. P., Richard, N. and Cheftel, J. C. 1994. Bacterial growth during chilled storage of pressure-treated minced meat. *Lebens Wiss Technol*. 27:48-54
- Carpi, G., Buzzoni, M., Gola, S., Maggi, A. and Rovere, P. 1995. Microbial and chemical shelf-life of high-pressure treated salmon cream at refrigeration temperatures. *Industria Conserve*. 70:386 - 397
- Carsberg, H. 1999. Sanitation: It's a small world. *Food Quality*. Jan/Feb:61-62

- Casasnovas, J., Anantheswaran, R. C., Shenk, J. and Puri, V. M. 1994. Thermal processing of food packaging waste using microwave heating. *J Microwave Power Electromagnetic Energy*. 29:171
- Castro, A. J. 1994. Pulsed electrical field modification of activity and denaturation of alkaline phosphatase. *Food Science and Human Nutrition*. Pullman, WA. Washington State University.
- Castro, A. J., Barbosa-Cánovas, G. V. and Swanson, B. G. 1993. Microbial inactivation of foods by pulsed electric fields. *J Food Process Pres*. 17:47-73
- CDC. 1998. Update: Multistate outbreak of listeriosis-United States, 1998-1999. *MMWR*. 47:1117-1118
- CDC. 1999. Incidence of foodborne illnesses: preliminary data from the foodborne diseases active surveillance network [Foodnet]-United States, 1998. *MMWR*. 48:189-194
- CDC. 2000. Surveillance for foodborne disease outbreaks-United States, 1993-1997. *Morbidity and Mortality Weekly Reports*. 49:1-51
- Chang, J. C. H., Ossoff, S. F., Lobe, D. C., Dorfman, M. H., Dumais, C. M., Qualis, R. G. and Johnson, J. D. 1985. UV inactivation of pathogenic and indicator microorganisms. *Appl Environl Microbiol*. 49:1361-1365
- Cheftel, J. C. 1992. Effects of high hydrostatic pressure on food constituents: An overview. C. Balny, Hayashi, R., Heremans, K., Masson, P. *High Pressure Biotechnol*. 224. 195-209.
- Cheftel, J. C. 1995. Review: high pressure, microbial inactivation and food preservation. *Food Sci Technol Int*. 1(2/3):75-90
- Chen, C. and Tseng, C. W. 1997. Effect of high hydrostatic pressure on the temperature dependence of *Saccharomyces cerevisiae* and *Zygosaccharomyces rouxii*. *Proc Biochem*. 32(4):337-343
- Chipley, J. R. 1980. Effects of microwave irradiation on microorganisms. *Adv Appl Microbiol*. Academic Press Inc. 26. 129-145.
- Chiu, C. P., Tateishi, K., Kosikowski, F. V. and Armbruster, G. 1984. Microwave treatment of pasteurized milk. *J Microwave Power*. 19(4):269-272
- Cho, H.-Y., Sastry, S. K. and Yousef, A. E. 1996. Growth kinetics of *Lactobacillus acidophilus* under ohmic heating. *Biotechnol Bioeng*. 49(3):334-340

- Cho, H.-Y., Sastry, S. K. and Yousef, A. E. 1999. Kinetics of inactivation of *Bacillus subtilis* spores by continuous or intermittent ohmic and conventional heating. *Biotechnol Bioeng.* 62(3):368-372
- Clouston, J. G. and Wills, P. A. 1969. Initiation of germination and inactivation of *Bacillus pumilus* spores by hydrostatic pressure. *J Bacteriol.* 97:684-690
- Coughlan, A., Hall, N. 1990. How magnetic field can influence your ions? *New Scientist.* 8(4):30
- Crawford, Y. J., Murano, E. A., Olson, D. G. and Shenoy, K. 1996. Use of high hydrostatic pressure and irradiation to eliminate *Clostridium sporogenes* in chicken breast. *J Food Protect.* 59:711-715
- Cross, G. A. and Fung, D. Y. C. 1982. The effect of microwaves on nutrient value of foods. *CRC Crit Rev Food Sci Nutr.* 16:355-381
- Culkin, K. A. and Fung, D. Y. C. 1975. Destruction of *Escherichia coli* and *Salmonella typhimurium* in microwave-cooked soups. *J Milk Food Technol.* 38(1):8-15
- Curry, R., Unklesbay, N., Clevenger, T., Brazos, B., Mesyats, G. and Filatov, A. 1999. The effect of high doses rate X-rays on *E. coli* O157:H7 in ground beef. *IEEE on Plasma Science.* in print.:
- Datta, A. K. 1991. Mathematical modeling of microwave processing as a tool to study safety. *American Society for Agricultural Engineers Paper* 91-6614.
- Datta, A. K. 1992. Error estimates for approximate kinetic parameters used in food literature. *J Food Eng.* 18:181-199
- Datta, A. K. and Hu, W. 1992. Quality optimization of dielectric heating processes. *Food Technol.* 46(12):53-56
- Datta, A. K. and Liu, J. 1992. Thermal time distributions for microwave and conventional heating of food. *Trans I Chem E.* 70(C):83-90
- Datta, A. K., Sun, E. and Solis, A. 1994. Food dielectric property data and its composition-based prediction. M. A. Rao and S. S. H. Rizvi(eds.). *Engineering Properties of Food.* New York. Marcel Dekker. 457-494.
- Datta, A. K. 2000. Fundamentals of heat and moisture transport for microwaveable food product and process development. A. K. Datta and R. C. Anatheswaran. (eds.). *Handbook of Microwave Technology for Food Applications.* Marcel Dekker, Inc. New York.

Davidson, P. M. 1999. Potential for emergence of resistance to antimicrobials used in the food industry. Proceeding Symposium on Food Microbiology. International Institute Life Science North America Tech Committe on Food Microbiology. p.19-21. Dearborn, MI

Davies, L. J., Kemp, M. R. and Fryer, P. J. 1999. The geometry of shadows: effects of inhomogeneities in electrical field processing. *J Food Eng.* 40:245-258

de Alwis, A. A. P., Halden, K. and Fryer, P. J. 1989. Shape and conductivity effects in ohmic heating of foods. *Chem Eng Res Des.* 67:159-168

de Alwis, A. A. P. and Fryer, P. J. 1990a. A finite element analysis of heat generation and transfer during ohmic heating of food. *Chem Eng Sci.* 45(6):1547-1559

de Alwis, A. A. P. and Fryer, P. J. 1990b. The use of direct resistance heating in the food industry. *J Food Eng.* 11:3-27

Decareau, R. V. 1985. Pasteurization and sterilization. *Microwaves in the food processing industry.* Academic Press.

DVGW Arbeitsblatt W 294, 1997. Desinfektionsanlagen für die Trinkwasserversorgung - Anforderungen und Prüfung. Bonn.

Dibben, D. 2000. Electromagnetics: fundamental aspects and numerical modeling. A. K. Datta and Anatheswaran. *Handbook of Microwave Technology For Food.* Marcel Dekker, Inc. New York.

Doyle, M. P. and Schoeni, J. L. 1984. Survival and growth characteristics of escherichia coli associated with hemorrhagic colitis. *Appl Env Microbiology.* 48:855-856

Dring, G. J. 1976. Some aspects of the effects of hydrostatic pressure on microorganisms. S. A. Skinner and V. Hugo(eds.). *Inhibition and inactivation of vegetative microbes.* New York. Academic Press Inc.

Dunn, J. E. and Pearlman, J. S. 1987. Methods and apparatus for extending the shelf-life of fluid food products. Maxwell Laboratories, Inc. U. S. Patent 4,695,472.

Dunn, J., Clark, R. W., Asmus, J. F., Pearlman, J. S., Boyer, K., Pairchaud, F. and Hofmann, G. 1988. Methods and apparatus for preservation of foodstuffs. US Int. Pat. Appl. No. WO 88/03369.

Dunn, J., Clark, R. W., Asmus, J. F., Pearlman, J. S., Boyer, K., Pairchaud, F. and Hofmann, G. A. 1991. Methods for preservation of foodstuffs. Maxwell Laboratories, Inc. US Patent 5,034,235.

Dunn, J., Clark, W. and Ott, T. 1995. Pulsed-light treatment of food and packaging. *Food Technol.* 49(9):95-98

- Dunn, J. 1996. Pulsed light and pulsed electric field for foods and eggs. *Poul Sci.* 75(9):1133-1136
- Dunn, J.E., Ott, T.M., Clark, R.W. 1996 Prolongation of shelf-life in perishable pod products. U.S. Patent 5,489,442
- Dunne, C. P., Dunn, J., Clark, W., Ott, T. and Bushnell, A. H. 1996. Application of high energy electric field pulses to preservation of foods for combat rations. Science and Technology for Force XXI. Department of the Army. Norfolk, Virginia. June 24-27. 7.
- Edebo, L., Selin, I. 1968. The effect of pressure shock-wave and some electrical quantities in the microbicidal effect of transient electric arcs in aqueous systems. *J Gen Microbiol.* 50:253-259
- El Moueffak, A. C., Antoine, M., Cruz, C., Demazeau, G., Largeteau, A., Montury, M., Roy, B. and Zuber, F. 1995. High pressure and pasteurization effect on duck foie gras. *Int J Food Sci Technol.* 30(6):737-743
- Enomoto, A., Nakamura, K., Hakoda, M. and Amaya, N. 1997. Lethal effect of high-pressure carbon dioxide on a bacterial spore. *J Ferment Bioeng.* 83(3):305-307
- EPRI. 1998. Pulsed electric field processing in the food industry: a status report on PEF. Palo Alto, CA. Industrial and Agricultural Technologies and Services. CR-109742.
- Estiaghi, M. N., Stute, R. and Knorr, D. 1994. High pressure and freezing pretreatment effects on drying, rehydration, texture and color of greenbeans, carrots and potatoes. *J Food Sci.* 59:1168-1170
- FABCO Technologies. 1998. PulsePower disinfects fresh juices, extends shelf-life. *Food Eng.* 10:47-50
- Fakhouri, M. O. and Ramaswamy, H. S. 1993. Temperature uniformity of microwave heated foods as influenced by product type and composition. *Food Res Int.* 26:89-95
- Farkas, J. 1997. Physical methods of food preservation. *Food Microbiology. Fundamentals and Frontiers.* M.P. Doyle, L.R. Beauchat, T.J. Montville(eds.). Washington, D.C. ASM Press. 497-519.
- Fedorov, N. E. and Rogov, I. A. 1960. Bactericidal effects of electrical impulses of high voltage in milk. *Dairy Sci Abstract.* 25(8):312-318
- Fernandez-Molina, J. J., Barkstrom, E., Torstensson, P., Barbosa-Canovas, G. V. and Swanson, B. G. 1999. Shelf-life extension of raw skim milk by combining heat and pulsed electric fields. *Food Res Int.*

Fleischman, G. J. 1996. Predicting temperature range in food slabs undergoing long term low power microwave heating. *J Food Eng.* 27(4):337-351

Floros, J. D. and Liang, H. 1994. Acoustically assisted diffusion through membranes and biomaterials. *Food Technol.* 48(12):79-84

Frankel, R. B. and Liburdy, R. P. 1995. Biological effects of static magnetic fields. In *Handbook of Biological Effects of Electromagnetic Fields*. Polk, C. and Postow, E. (Ed). 2nd Ed. CRC Press. Boca Raton, FL

Fryer, P. J., de Alwis, A. A. P., Koury, E., Stapley, A. G. F. and Zhang, L. 1992. Ohmic processing of solid-liquid mixtures: heat generation and convection effects. *J Food Eng.* 18:101-125

Fu, W.-R. and Hsieh, C.-C. 1999. Simulation and verification of two-dimensional ohmic heating in static system. *J Food Sci.* 64(6):946-949

Fujii, T., Satomi, M., Nakatsuka, G., Yamaguchi, T. and Okuzumi, M. 1994. Changes in freshness indexes and bacterial flora during storage of pressurized mackerel. *Shokuhin Eiseigaku Zasshi (J Food Hyg Soc Japan)*. 35(2):195-200

Fujii, T., Satomi, M., Nakatsuka, G. and Yamaguchi, T. 1995. Effect of media on the detection rate of pressure-injured bacteria. *Shokuhin Eiseigaku Zasshi (J Food Hyg Soc Japan)*. 36(1):17-21

Fujikawa, H., Ushioda, H. and Kudo?, Y. 1992. Kinetics of *Escherichia coli* destruction by microwave irradiation. *Appl Environ Microbiol.* 58(3):920-924

Fung, D. Y. C. and Cunningham, F. E. 1980. Effect of microwaves on microorganisms in foods. *J Food Protect.* 43(8):641-650

Garcia, M. L., Burgos, J., Sanz, B. and Ordonez, J. A. 1989. Effect of heat and ultrasonic waves on the survival of two strains of *Bacillus subtilis*. *J Appl Bacteriol.* 67:619-628

Garcia-Graells, V., Hauben, E. J. A. and Michiels, C. W. 1998. High-pressure inactivation and sublethal injury of pressure-resistant *Escherichia coli* mutants in fruit juices. *Appl Environ Microbiol.* 64:1566-1568

Gaskova, D., Sigler, K., Janderova, B. and Plasek, J. 1996. Effect of high-voltage electric pulses on yeast cells: Factors influencing the killing efficiency. *Bioelectrochem Bioenergetics.* 39:195-202

Gerencser, V.F., Barnothy, M.F., and Barnothy, J.M. 1962. Inhibition of bacterial growth by magnetic fields. *Nature*, 196:539-541.

- Gersdorf, R., deBoer, F.R., Wolfrat, J.C., Muller, F.A., Roeland, L.W. 1983. The high magnetic facility of the University of Amsterdam, high field magnetism. Proceedings International symposium on High Field Magnetism. Osaka, Japan. 277-287
- Gervilla, R., Capellas, M., Ferragut, V. and Guamis, B. 1997a. Effect of high hydrostatic pressure on *Listeria innocua* 910 CECT inoculated into ewes' milk. *J Food Protect.* 60(1):33-37
- Gervilla, R., Felipe, X., Ferragut, V. and Guamis, B. 1997b. Effect of high hydrostatic pressure on *Escherichia coli* and *Pseudomonas fluorescens* strains in bovine milk. *J Dairy Sci.* 80:2297-2303
- Giddings, N. J., Allard, H. A. and Hite, B. H. 1929. Inactivation of the tobacco mosaic virus by high pressure. *Phytopatology.* 19:749-750
- Gilliland, S. E. and Speck, M. L. 1967a. Inactivation of microorganisms by electrohydraulic shock. *Appl Microbiol.* 15(5):1031-1037
- Gilliland, S. E. and Speck, M. L. 1967b. Mechanism of the bactericidal action produced by electrohydraulic shock. *Appl Microbiol.* 15(5):1038-1044
- Gola, S., Foman, C., Carpi, G., Maggi, A., Cassara, A. and Rovere, P. 1996. Inactivation of bacterial spores in phosphate buffer and in vegetable cream treated at high pressures. R. Hayashi and C. Balny(eds.). *High Pressure Bioscience and Biotechnology.* Amsterdam. 253-259. Elsevier Science B. V.
- Goldblith, S. A. and Wang, D. I. C. 1967. Effect of microwaves on *Escherichia coli* and *Bacillus subtilis*. *Appl Microbiol.* 15(6):1371-1375
- Gould, G. W. and Sale, A. J. H. 1970. Initiation of germination of bacterial spores by hydrostatic pressure. *J Gen Microbiol.* 60:335-346
- Grahl, T., Sitzmann, W. and Markl, H. 1992. Killing of microorganisms in fluid media by high-voltage pulses. *DECHEMA Biotechnology Conferences.* 675-679.
- Grahl, T. and Maerkl, H. 1996. Killing of microorganisms by pulsed electric fields. *Applied MicrobiolBiotechnol.* 45(1/2):148-157
- Granum, P. E. 1997. *Bacillus cereus*. M. P. Doyle, L. R. Beauchat and T. J. Montville(eds.). *Food Microbiology: Fundamentals and Frontiers.* Washington, DC. American Society for Microbiology. 327-336.
- Gunasekaran, S. and Chiyung, A., 1994. Evaluating milk coagulation with ultrasonics. *Food Technol.* 48(12):74-78

- Gupta, R. P. and Murray, W. 1988. Pulsed high electric field sterilization. IEEE Pulsed Power Conf. Record. National Research Council. 58-64.
- Haas, G. J., Prescott, H. E., Dudley, E., Dik, R., Hintlan, C. and Keane, L. 1989. Inactivation of microorganisms by carbon dioxide under pressure. *J Food Safety*. 9:253-265
- Halden, K., de Alwis, A. A. P. and Fryer, P. J. 1990. Changes in the electrical conductivity of foods during ohmic heating. *Int J Food Sci Technol*. 25:9-25
- Hamid, M. A. K., Boulanger, R. J., Tong, S. C., Gallop, R. A. and Pereira, R. R. 1969. Microwave pasteurization of raw milk. *J Microwave Power*. 4(4):272-275
- Hara, A., Nagahama, G., Ohbayashi, A. and Hayashi, R. 1990. Effects of high pressure on inactivation of enzymes and microorganisms in nonpasteurized rice wine (Namazake). *Nippon Nogeikagaku Kaishi*. 64(5):1025-1030
- Harlfinger, L. 1992. Microwave sterilization. *Food Technol*. 46(12):57-61
- Hayakawa, I., Kanno, T., Tomita, M. and Fujio, Y. 1994a. Application of high pressure for spore inactivation and protein denaturation. *J Food Sci*. 59(1):159-163
- Hayakawa, I., Kanno, T., Yoshiyama, K. and Fujio, Y. 1994b. Oscillatory compared with continuous high pressure sterilization on *Bacillus stearothermophilus* spores. *J Food Sci*. 59(1):164-167
- Hayashi and Balny, C. *High Pressure Science and Biotechnology*. Hayashi and C. Balny. Amsterdam. Elsevier Science, B.V. 171-174, 253-259.
- Hayashi, R. 1991. *Pressure-processed food: Research and development*. San-Ei Publishing. Kyoto, Japan.
- Heddleson, R. A. and Doores, S. 1994. Factors affecting microwave heating of foods and microwave induced destruction of foodborne pathogens - a review. *J Food Protect*. 57(11):1025-1037
- Heddleson, R. A., Doores, S. and Anantheswaran, R. C. 1994. Parameters affecting destruction of *Salmonella* spp. by microwave heating. *J Food Sci*. 59(2):447-451
- Heinz, V. and Knorr, D. 1998. High pressure germination and inactivation kinetics of bacterial spores. N. S. Isaacs(ed.). *High Pressure Food Science, Bioscience and Chemistry*. Cambridge, UK. The Royal Society of Chemistry. 436-441
- Heinz, V. and Knorr, D. 1999. The effects of high pressure on microbial spores. European Conference on Emerging Food Science and Technology. Tampere, Finland. November 22-24, 1999.

Hendrickx, M., Maesmans, G., De Cordt, S., Van Loey, A., Noronha, J. and Tobback, P. 1995. Evaluation of the integrated time-temperature effect in thermal processing of foods. *CRC Crit Rev Food Sci Nutr.* 35(3):231-262

Heredia, N. L., Garcia, G. A., Luevanos, R., Labbe, R. G. and Garcia-Alvarado, J. S. 1997. Elevation of the heat resistance of vegetative cells and spores of *Clostridium perfringens* type A by sublethal heat shock. *J Food Prot.* 60(8):998

Heremans, K. 1995. High pressure effects on biomolecules. D. A. Ledward, D. E. Johnston, R. G. Earnshaw and A. P. M.

Hasting (eds.). High Pressure Processing of Foods. Leicestershire, UK. Nottingham University Press.

Hite, B. H. 1899. The effects of pressure in the preservation of milk. Morgantown. *Bull WV Univ Agric Exp Sta Morgantown.* 58. 15-35.

Hite, B. H., Giddings, N. J. and Weakly, C. E. 1914. The effects of pressure on certain microorganisms encountered in the preservation of fruits and vegetables. Morgantown. *Bull WV Univ Agric Exp Sta Morgantown.* 146. 1-67.

Ho, S. Y., G.S., M., Cross, J. D. and Griffiths, M. W. 1995. Inactivation of *Pseudomonas fluorescens* by high voltage electric pulses. *J Food Sci.* 60(6):1337-1343

Ho, S. Y. and Mittal, G. S. 1997. Analysis of 2 high voltage electric pulse systems for batch and continuous pasteurization of selected food products. Universty of Guelph. confidential.

Ho, S. Y., Mittal, G. S. and Cross, J. D. 1997. Effects of high field electric pulses on the activity of selected enzymes. *J Food Eng.* 31(1):69-84

Hofmann, G.A. 1985. Deactivation of microorganisms by an oscillating magnetic field. U.S. Patent 4,524,079.

Hong, S. I., Park, W. S. and Pyun, Y. R. 1997. Inactivation of *Lactobacillus* sp. from kimchi by high pressure carbon dioxide. *Lebensm Wiss Technol.* 30:681-685

Hoover, D. G., Metrick, C., Papineau, A. M., Farkas, D. F. and Knorr, D. 1989. Biological effects of high hydrostatic pressure on food microorganisms. *Food Technol.* 43(3):99-107

Hoover, D. G. 1993. Pressure effects on biological systems. *Food Technol.* 47(6):150-155

Hoover, D. G. 1997. Minimally processed fruits and vegetables: Reducing microbial load by nonthermal physical treatments. *Food Technol.* 51(6):66-69, 71

- Horie, Y., Kimura, K., Ida, M., Yosida, Y. and Ohki, K. 1991. Jam preparation by pressurization. *Nippon Nogeikagaku Kaishi*. 65(6):975-980
- Houben, J., Schoenmakers, L., van Putten, E., van Roon, P. and Krol, B. 1991. Radio-frequency pasteurization of sausage emulsions as a continuous process. *J Microwave Power Electromagnetic Energy*. 26(4):202-205
- Hoyer, O. 1998. Testing performance and monitoring of UV systems for drinking water disinfection. *Water Supply*. 16(1/2):419-442
- Hughes, D. E. and Nyborg, W. L. 1962. Cell disruption by ultrasound. *Science*. 38:108-114s
- Hülshager, H. and Nieman, E. G. 1980. Lethal effect of high-voltage pulses on e. coli K12. *Radiat Environ Biophys* 18(4):281-8
- Hülshager, H., Pottel, J. and Niemann, E. G. 1981. Killing of bacteria with electric pulses of high field strength. *Radiat Environ Biophys*. 20:53-65
- Hülshager, H., Pottel, J. and Niemann, E. G. 1983. Electric field effects on bacteria and yeast cells. *Radiat Environ Biophys*. 22:149-162
- ICMSF. 1996. Microorganisms in foods. Microbiological Specifications of Food Pathogens. Book 5. Blackie Academic and Professional Publ. London.
- Imai, T., Uemura, K., Ishida, N., Yoshizaki, S. and Noguchi, A. 1995. Ohmic heating of japanese white radish *Rhaphanus sativus*. *Int J Food Sci Technol*. 30:461-472
- Ishiguro, Y., Sato, T., Okamoto, T., Okamoto, K., Sakamoto, H., Inakuma, T. and Sonoda, Y. 1993. Effects of hydrostatic pressure and antimicrobial substances on the sterilization of tomato juice. *Nippon Nogeikagaku Kaishi*. 67(12):1707-1711
- IUVA. 2000. IUVA Website [International UltraViolet Association]. 2000. <http://www.iuva.org>
- Iwahashi, H., Fujii, S., Obuchi, K., Kaul, S. C., Sato, A. and Komatsu, Y. 1993. Hydrostatic pressure is like high temperature and oxidative stress in the damage it causes to yeast. *FEMS Microbiology Letters*. 108:53-58
- Jackson, G. J., Leclerc, J. E., Bier, J. W. and Madden, J. M. 1997. Cyclospora - still another new foodborne pathogen. *Food Technol*. 51(1):120
- Jacob, H. E., Forster, W. and Berg, H. 1981. Microbial implications of electric field effects. II. Inactivation of yeast cells and repair of their cell envelope. *Z Allg Microbial* 21(3):225-232

Jaenicke, R. 1981. Enzymes under extremes of physical conditions. *Ann Rev Biophys Bioeng.* 10:1-67

Jay, J. J. 1996. *Modern food microbiology.* Chapman Hall. New York.

Jayaram, S., Castle, G. S. P. and Margaritis, A. 1991. Effects of high electric field pulses on *Lactobacillus brevis* at elevated temperatures. *IEEE Industry Appl Society Annual Meeting.* 5:674-681

Jayaram, S., Castle, G. S. P. and Margaritis, A. 1992. Kinetics of sterilization of *Lactobacillus brevis* cells by the application of high voltage pulses. *Biotechnol Bioeng.* 40(11):1412-1420

Jeng, D. K. H., Balasky, G., Kaczmarek, K. A. and Woodworth, A. G. 1987. Mechanism of microwave sterilization in the dry state. *Appl Environ Microbiol.* 53(9):2133-2137

Jeppson, M. R. and Harper, J. C. 1967. Microwave heating substances under hydrostatic pressure. *Cryodry Corporation.* US Patent 3,335,253.

Jeyamkondan, S., Jayas, D. S. and Holley, R. A. 1999. Pulsed electric field processing of foods: a review. *J Food Protect.* 62(9):1088-1096.

Johnson, F. H. and Campbell, D. H. 1945. The retardation of protein denaturation by hydrostatic pressure. *Journal of Cell Comp Physiol.* 26:43-46

Johnson, F. H., Eyring, H., and Jones-Stover, B. 1974. *The theory of rate processes in biology and medicine.* p. 82. Wiley, New York.

Josephson, E.S. and Peterson, M.S.(Eds.) 1982. *Preservation of food by ionizing radiation.* I, II, III. CRC Press. Boca Raton, FL

Kakugawa, K., Okazaki, T., Yamauchi, S., Morimoto, K., Yoneda, T. and Suzuki, K. 1996. Thermal inactivating behavior of *Bacillus stearothermophilus* under high pressure. R. Hayashi and C. Balny. *High Pressure Bioscience and Biotechnology.* Amsterdam. Elsevier Science B. V. 171-174.

Kalchayanand, N., Sikes, T., Dunne, C. P. and Ray, B. 1994. Hydrostatic pressure and electroporation have increase bactericidal efficiency in combination with bacteriocins. *Applied and Environmental Microbiology.* 60:4174-4177

Kalchayanand, N., Sikes, A., Dunne, C. P. and Ray, B. 1998. Interaction of hydrostatic pressure, time and temperature of pressurization and pediocin AcH on inactivation of foodborne bacteria. *J Food Protect.* 61(4):425-431

Kasevich, R. S. 1998. Understand the potential of radiofrequency energy. *Chem Eng Progress.* 75-81

Katsuyama, A. M. 1993. The microbiology of sanitation. A. M. Katsuyama. Principles of Food Processing Sanitation. Washington, DC. The Food Processors Institute. 72-84. 2nd Edition.

Kazbekov, E. N. and Vyacheslavov, L. G. 1978. Effects of microwave irradiation on some membrane-related process in bacteria. *Gen Physiol Biophys.* 6:57-64

Keith, W. D., Harris, L. J., Hudson, L. and Griffiths, M. 1997. Pulsed electric fields as a processing alternative for microbial reduction in spice. *Food Res Int.* 30(3/4):185-191

Kenyon, E. M., Westcott, D. E., LaCasse, P. and Gould, J. 1971. A system for continuous processing of food pouches using microwave energy. *J Food Science.* 36(2):289-293

Khalaf, W. G. and Sastry, S. K. 1996. Effect of fluid viscosity on the ohmic heating rate of solid-liquid mixtures. *J Food Eng.* 27:145-158

Khalil, H. and Villota, R. 1988. Comparative study on injury and recovery of *Staphylococcus aureus* using microwaves and conventional heating. *J Food Protection.* 51(3):181-186

Khalil, H. and Villota, R. 1989a. A comparative study of the thermal inactivation of *B. stearothermophilus* spores in microwave and conventional heating. *Food Engineering and Process Applications.* New York, NY. Elsevier Applied Science Publishers. 1. 583-594

Khalil, H. and Villota, R. 1989b. The effect of microwave sublethal heating on the ribonucleic acids of *Staphylococcus aureus*. *J Food Protect.* 52(8):544-548

Kim, H.-J. and Taub, I. A. 1993. Intrinsic chemical markers for aseptic processing of particulate foods. *Food Technol.* 47(1):91-97, 99

Kim, H. J., Choi, Y.-M., Yang, T. C. S., Taub, I. A., Tempest, P., Tucker, G. and Parrott, D. L. 1996. Validation of ohmic heating for quality enhancement of foods products. *Food Technol.* 50(5):253-261

Kimball, G.C. 1937. The growth of yeast on a magnetic fields. *J. Bacteriol.* 35:109-122.

Kinosita, K. J. and Tsong, T. Y. 1977. Voltage induced pore formation and haemolysis erythrocytes. *Biochim Biophys Acta.* 471:227-242

Kinosita, K. J. and Tsong, T. Y. 1979. Voltage-induced conductance in human erythrocyte membranes. *Biochim Biophys Acta.* 554:479-497

Kinugasa, H., Takeo, T., Fukumoto, K. and Ishihara, M. 1992. Changes in tea components during processing and preservation of tea extract by hydrostatic pressure sterilization. *Nippon Nogeikagaku Kaishi.* 66(4):707-712

- Knorr, D., Geulen, M., Grahl, T. and Sitzmann, W. 1994. Food application of high electric field pulses. *Trends Food Sci Technol.* 5:71-75
- Knutson, K. M., Marth, E. H. and Wagner, M. K. 1987. Microwave Heating of Food. *Lebensm Wiss Technol.* 20:101-110
- Knutson, K. M., Marth, E. H. and Wagner, M. K. 1988. Use of microwave ovens to pasteurize milk. *J Food Protect.* 51(9):715-719
- Kozempel, M. F., Annous, B. A., Cook, R. D., Scullen, O. J. and Whiting, R. C. 1998. Inactivation of microorganisms with microwaves at reduced temperatures. *J Food Protect.* 61(5):582-585
- Kozempel, M., Cook, R. D., Scullen, O. J. and Annous, B. A. 2000. Development of a process for detecting non-thermal effects of a microwave energy on microorganisms at low temperature. *J Food Processing.* In print.
- KSU. 1999. KSU microbiologist uses microwave, acid treatments to kill pathogens, maintain color in meat. KSU Press Release. June 15, 1999
- Kudra, T., Van De Voort, F. R., Raghavan, G. S. V. and Ramaswamy, H. S. 1991. Heating characteristics of milk constituents in a microwave pasteurization system. *J Food Sci.* 56(4):931-934
- Kulshrestha, S. A. and Sastry, S. K. 1999. Low-frequency dielectric changes in vegetable tissue from ohmic heating. *IFT Annual Meeting: Book of Abstracts.* p. 211. Chicago, IL.
- Lagunas-Solar, M. C. 1997. Method of controlling insects and mites with pulsed ultraviolet light. Regents of the University of California. The Regents of the University of California. US Patent 5,607,711.
- Laidler, K. J. 1951. The Influence of pressure on rates of biological reaction. *Arch Biochem.* 30:226-240
- Larkin, J. and Reddy, N. R. 1999. Personal communication.
- Larsen, W. P., Hartzell, T. B. and Diehl, H. S. 1918. The effects of high pressure on bacteria. *J Inf Diseases.* 22:271-279
- Lau, M. H., Tang, J., Taub, I. A., Yang, T. C. S., Edwards, C. G. and Younce, F. L. 1998. Microwave heating uniformity of food during 915 MHz microwave sterilization process. *Proceedings of the 33rd Microwave Power Symposium.* 78-81
- Lau, M.H., Tang, J., Taub, I. A., Yang, T. C. S., Edwards, C. G. and Yang, A. P. P. 1999a. Application of chemical markers in assessing heating patterns produced by 915 and 2450 MHz microwaves. 1-19

- Lau, M. H., Tang, J., Taub, I. A., Yang, T. C. S., Edwards, C. G. and Younce, F. L. 1999b. HTST processing of food in microwave pouch using 915 MHz microwaves. AIChE Annual Meeting.
- Ledward, D. A., Johnston, D. E., Earnshaw, R. G. and Hasting, A. P. M. 1995. High Pressure Processing of Foods. Nottingham University Press. Leicestershire, UK.
- Lee, B. H., Kermasha, S. and Baker, B. E. 1989. Thermal, ultrasonic and ultraviolet inactivation of Salmonella in thin films of aqueous media and chocolate. Food Microbiol. 6:143-152
- Lee, C. H. and Yoon, S. W. 1999. Effect of ohmic heating on the structure and permeability of the cell membrane of *saccharomyces cerevisiae*. 1999 IFT Annual Meeting. Chicago. July 24-28 1999.
- Leistner, L. and Gorris, L. G. M. 1995. Food preservation by hurdle technology. Trends in Food Science & Technology. 6(2):41-46
- Lillard, H. S. 1993. Bactericidal effect of chlorine on attached salmonellae with and without sonification. J Food Protect. 56(8):716-717
- Lillard, H. S. 1994. Decontamination of poultry skin by sonication. Food Technol. 48(12):72-73
- Lin, W. and Sawyer, C. 1988. Bacterial survival and thermal responses of beef loaf after microwave processing. J Microwave Power Electromagnetic Energy. 23(3):183-194
- Line, J. E., Fain, A. R., Moran, A. B., Martin, L. M., Lechowich, R. V., Carosella, J. M. and Brown, W. L. 1991. Lethality of heat to *escherichia coli* O157:H7: D-value and z-value determinations in ground beef. J Food Protect. 54:762-766
- Linton, M., McClements, J. M. J. and Patterson, M. F. 1999. Inactivation of *Escherichia coli* O157:H7 in orange juice using a combination of high pressure and mild heat. J Food Protect. 62(3):277-279
- Liu, X., Yousef, A. E. and Chism, G. W. 1997. Inactivation of *Escherichia coli* O157:H7 by the combination of organic acids and pulsed electric field. J Food Safety. 16(4):287-299
- Lou, Y. and Yousef, A. E. 1997. Adaptation to sublethal environmental stresses protects *listeria monocytogenes* against lethal preservation factors. Appl Environ Microbiol. 63(4):1252-1255
- Love, P. 1998. Correlation of fourier transforms of pulsed electric field waveform and microorganism inactivation. IEEE Transactions on Dielectrics and Electrical Insulation. 5(1):142-147

- Lubicki, P. and Jayaram, S. 1997. High voltage pulse application for the destruction of the Gram-negative bacterium *Yersinia enterocolitica*. *Bioelectrochemistry and Bioenergetics*. 43:135-141
- Lüdemann, H.-D. 1992. Water and aqueous solutions under high pressure. C. Balny, R. Hayashi, K. Heremans and P. Masson. *High Pressure and Biotechnology*. London. Colloque INSERM/John Libby Eurotext Ltd. 224. 25-32.
- Ludwig, H., Bieler, D., Hallbauer, K. and Scigalla, W. 1992. Inactivation of microorganisms by hydrostatic pressure. C. Balny, R. Hayashi, K. Heremans and P. Masson. *High Pressure and Biotechnology*. London. Colloque INSERM/John Libby Eurotext Ltd. 224. 25-32.
- Ludwig, H., Van Almsick, G. and Sojka, B. 1996. High pressure inactivation of microorganisms. R. Hayashi and C. Balny. *High pressure Bioscience and Biotechnology*. Amsterdam. Elsevier Science B. V. 237.
- Ma, L., Chang, F. J. and Barbosa-Cánovas, G. V. 1997. Inactivation of *E. coli* in liquid whole eggs using pulsed electric fields technologies. *New frontiers in food engineering. Proceedings of the Fifth Conference of Food Engineering*. American Institute of Chemical Engineers. 216-221.
- MacGregor, S. J., Anderson, J. G., Fouracre, R. A., Farish, O., McIlvaney, L. and Rowan, N. J. 1998. Light inactivation of food-related pathogenic bacteria using a pulsed power source. *Lett Appl Microbiol*. 27:67-70
- Mackey, B. M., Forestiere, K. and Isaacs, N. 1995. Factors affecting the resistance of *Listeria monocytogenes* to high hydrostatic pressure. *Food Biotechnol*. 9:1-11
- Marquez, V. O., Mittal, G. S. and Griffiths, M. W. 1997. Destruction and inhibition of bacterial spores by high voltage pulsed electric field. *J Food Sci*. 62(2):399-401,409
- Marquis, R. E. and Bender, G. R. 1987. Barophysiology of prokaryotes and proton-translocating ATPases. H. W. Jannisch, R. E. Marquis and A. M. Zimmermann. *Current Perspectives in High Pressure Biology*. London. Academic Press, Ltd. 65-73.
- Martens, B. and Knorr, D. 1992. Developments of nonthermal processes for food preservation. *Food Technol*. 46(5):124, 126-133
- Martin-Belloso, O., Vega-Mercado, H., Qin, B.-L., Chang, F.-J., Barbosa-Cánovas, G. V. and Swanson, B. G. 1997a. Inactivation of *Escherichia coli* suspended in liquid egg using pulsed electric fields. *J Food Process Preserv*. 21(3):193-208
- Martin-Belloso, O., Qin, B. L., Chang, F. J., Barbosa-Cánovas, G. V. and Swanson, B. 1997b. Inactivation of *Escherichia coli* in skim milk by high intensity pulsed electric fields. *J Food Process Eng*. 20:317-336

Masuda, M., Saito, Y., Iwanami, T. and Hirai, Y. 1992. Effects of hydrostatic pressure on packaging materials for food. *High Pressure and Biotechnology*. London. Colloque INSERM/John Libby Eurotext Ltd. 224. 545-547.

Matsumoto, Y., Satake, T., Shioji, N. and Sakuma, A. 1991. Inactivation of microorganisms by pulsed high voltage applications. *Conference Record of IEEE Industrial Applications Society Annual Meeting*. 652-659.

Mazotta, A. S. 1999. Problems and solutions to development of pathogen resistance to thermal processing. *ISSI Meeting*.

McKinley, G. M. 1936. Short electric wave radiation in biology. B. M. Duggar. *Biological Effects of Radiation*. New York. McGraw-Hill. I. 541-558.

McLane, B. A. 1997. *Clostridium perfringens*. M. P. Doyle, L. R. Beauchat and T. J. Montville (Eds.). *Food Microbiology: Fundamentals and Frontiers*. Washington, DC. American Society for Microbiology.

Mead, P. S., Slutsker, L., Dietz, V., McCaig, L. F., Breese, J. S., Shapiro, C., Griffin, P. M. and Tauxe, R. V. 1999. Food-related illness and death in the United States. *Emerging Infectious Diseases*. 5:607-625

Metaxas, R. and Meredith, R. J. 1988. *Industrial microwave heating*. Peter Peregrinus. London. UK.

Metaxas, R. 1996. *Foundations of electroheat: a unified approach*. John Wiley & Sons. Chichester, UK.

Metrick, C., Hoover, D. G. and Farkas, D. F. 1989. Effects of high hydrostatic pressure on heat-resistant and heat-sensitive strains of *Salmonella*. *J Food Sci*. 54:1547-1564

Meyer, P. 2000. Ultra high pressure, high temperature, food preservation process. US 6,017,572.

Miller, J. F., Dower, W. J. and Tompkins, L. S. 1988. High-voltage electroporation of bacteria: Genetic transformation of *Camylobacter jejuni* with plasmid DNA. *Proc Natl Acad Sci*. 85:856-860

Miller, R., Jeffrey, W., Mitchell, D. and Elasmri, M. 1999. Bacterial responses to ultraviolet light. *Am Soc Microbiol*. 65(8):535-541

Minett, P. J. and Witt, J. A. 1976. Radio frequency and microwaves. *Food Processing Industry*. 36-37, 41

- Mittal, G. S. and Choundry, M. 1997. Pulsed electric field sterilization of waste brine solution. Proceedings of the Seventh International Congress on Engineering and Food. Brighton Center, UK. C13-C16.
- Miyakawa, H., Anjitsu, K., Ishibashi, N. and Shimanura, S. 1994. Effects of pressure on enzyme activities of *Lactobacillus helveticus* LHE-511. *Biosci Biotechnol Biochem.* 58(3):606-607
- Miyao, S., Shindoh, T., Miyamori, K. and Arita, T. 1993. Effects of high pressurization on the growth of bacteria derived from surimi (fish paste). *Nippon Shokuhin Kogyo Gakkaishi (Journal of the Japanese Society for Food Science and Technology).* 40(7):478-484
- Mizrach, A., Galilli, N. and Rosenhouse, G. 1994. Determining quality of fresh products by ultrasonic excitation. *Food Technol.* 48(12):68-71
- Mizuno, A. and Hori, Y. 1991. Destruction of living cells by pulsed high-voltage application. *IEEE Trans Ind Appl.* 24(3):387-394
- Mizuno, A. and Hori, Y. 1998. Destruction of living cells by pulsed high-voltage application. *IEEE Trans Ind Appl.* 24(3):387-394
- Moore, R.L. 1979. Biological effects of magnetic fields. Studies with microorganisms. *Can. J. Microbiol.*, 25:1145-1151.
- Moorman, J. E., Toledo, R. T. and Schmidt, K. 1996. High-pressure throttling (HPT) reduces microbial population, improves yogurt consistency and modifies rheological properties of ultrafiltered milk. IFT Annual Meeting: Book of Abstracts. 49.
- Mudgett, R. E. and Schwartzberg, H. G. 1982. Microwave food processing: Pasteurization and sterilization: A review. *AICHE Symposium Series.* 78(218):1-11
- Mudgett, R. E. 1994. Electrical Properties of Foods. M. A. Rao and S. S. H. Rizvi(eds.). *Engineering Properties of Foods.* New York. Marcel Dekker. 389-455.
- Mussa, D. M., Ramaswamy, H. S. and Smith, J. P. 1999. High-pressure destruction kinetics of *listeria monocytogenes* on pork. *J Food Protect.* 62(1):40-45
- Nakayama, A., Yano, Y., Kobayashi, S., Ishikawa, M. and Sakai, K. 1996. Comparison of pressure resistances of spores of six *Bacillus* strains with their heat resistances. *Appl Environ Microbiol.* 62(10):3897-3900
- National Canners Association 1968. Laboratory manual for food canners and processors. AVI Publishing Company. 1. 1-8, 94-100.

- Ng, H., Bayne, G. G. and Garibaldi, J. A. 1969. Heat resistance of Salmonella, the uniqueness of Salmonella senftenberg 775W. Appl Microbiol. 17:78-82
- Nishi, K., Kato, R. and Tomita, M. 1994. Activation of Bacillus spp. spores by hydrostatic pressure. Nippon Shokuhin Kogyo Gakkaishi (Journal of the Japanese Society for Food Science and Technology). 41(8):542-548
- Ohlsson, T. and Risman, P. O. 1978. Temperature distribution of microwave heating-spheres and cylinders. J Microwave Power. 13(4):303
- Ohlsson, T. 1991. Development and evaluation of a microwave sterilization process for plastic pouches. 8th World Congress of Food Science and Technology. Toronto, CA. Sept. 29-Oct. 4.
- Ohnishi, 1993. Pressurization of Trichinella spiralis. Japanese-only book of Japanese pressure consortium proceedings. Chapter 17.
- Okazaki, T., Yoneda, T. and Suzuki, K. 1994. Combined effects of temperature and pressure on sterilization of Bacillus subtilis spores. Nippon Shokuhin Kogyo Gakkaishi (Journal of the Japanese Society for Food Science and Technology). 41(8):536
- Okazaki, T., Kakugawa, K., Yamauchi, S., Yoneda, T. and Suzuki, K. 1996. Combined effects of temperature and pressure on inactivation of heat-resistant bacteria. R. Hayashi and C. Balny. High Pressure Bioscience and Biotechnology. Amsterdam. Elsevier Science B. V. 415-418.
- O'Meara, J. P., Farkas, D. F. and Wadsworth, C. K. 1977. Flexible pouch sterilization using a combined microwave-hot water hold simulator. Natick, MA. US Army Natick Reseach & Development Lab, Unpublish Report. (PN) DRYNM 77-120.
- Ordoñez, J. A., Sanz, B., Hernandez, P. E. and Lopez-Lorenzo, P. 1984. A note on the effect of combined ultrasonic and heat treatments on the survival of thermoduric streptococci. J Appl Bacteriol. 56:175-177
- Ordoñez, J. A., Aguilera, M. A., Garcia, M. L. and Sanz, B. 1987. Effect of combined ultrasonic and heat treatment (thermoultrasonication) on the survival of a strain of Staphylococcus aureus. J Dairy Res. 54:61-67
- Otake, T., Mori, H., Kawahata, T., Izumoto, Y., Nishimura, H., Oishi, I., Shigehisa, T. and Ohno, H. 1997. Effects of high hydrostatic pressure treatment of HIV infectivity. K. Heremans. High Pressure Research in the Biosciences and Biotechnology. Leuven. Leuven University Press. 223-236.
- Oxen, P. and Knorr, D. 1993. Baroprotective effects of high solute concentrations against inactivation of *Rhodotorula rubra*. Lebensmittel-Wissenschaft und Technologie. 26:220-223

Pagan, R., Esplugas, S., Gongora-Nieto, M. M., Barbosa-Cánovas, G. V. and Swanson, B. G. 1998. Inactivation of *Bacillus subtilis* spores using high intensity pulsed electric fields in combination with other food conservation technologies. *Food Scie Technol Int.* 4(1):33-44

Pagan, R. and Mackey, B. 1999. Membrane damage in pressure-treated cells of *Escherichia coli*. European Conference on Emerging Food Science and Technology, European Federation of Food Science and Technology. Tampere, Finland. November 22-24, 1999.

Pagan, R., Jordan, S., Benito, A. and Mackey, B. 1999. Enhanced acid sensitivity of pressure-damaged *Escherichia coli*. European Conference on Emerging Food Science and Technology, European Federation of Food Science and Technology. Tampere, Finland. November 22-24, 1999.

Palaniappan, S., Richter, E. R. and Sastry, S. K. 1990. Effects of electricity on microorganisms: A review. *J Food Process Preserv.* 14:393-414

Palaniappan, S. and Sastry, S. K. 1991a. Electrical conductivity of selected solid foods during ohmic heating. *J Food Process Eng.* 14:221-236

Palaniappan, S. and Sastry, S. K. 1991b. Electrical conductivity of selected juices: influences of temperature, solids content, applied voltage and particle size. *J Food Process Eng.* 14:247-260

Palaniappan, S. and Sastry, S. K. 1992. Effects of electroconductive heat treatment and electrical pretreatment on thermal death kinetics of selected microorganisms. *Biotechnol Bioeng.* 39(2):225-232

Palou, E., Lopez-Malo, A., Barbosa-Cánovas, G. V., Welti-Chanes, J. and Swanson, B. G. 1998. Oscillatory high hydrostatic pressure inactivation of *Zygosaccharomyces bailii*. *J Food Protect.* 61(9):1213-1215

Papineau, A. M., Hoover, D. G., Knorr, D. and Farkas, D. F. 1991. Antimicrobial effect of water-soluble chitosans with high hydrostatic pressure. *Food Biotechnol.* 5:45-47

Parish, M. E. 1998. High pressure inactivation of *Saccharomyces cerevisiae*, endogenous microflora and pectinmethylesterase in orange juice. *J Food Protect.* 18(1):57-65

Patterson, M. F., Quinn, M., Simpson, R. and Gilmour, A. 1995. Sensitivity of vegetative pathogens to high hydrostatic pressure treatment in phosphate buffered saline and foods. *J Food Protect.* 58(5):524-529

Patterson, M. F. and Kilpatrick, D. J. 1998. The combined effect of high hydrostatic pressure and mild heat on inactivation of pathogens in milk and poultry. *J Food Protect.* 61(4):432-436

Paul, P. L. and Morita, R. Y. 1971. Effects of hydrostatic pressure and temperature on the uptake and respiration of amino acids by a facultatively psychrophilic marine bacterium. *J Bacteriol.* 108:835-843

Paul, P., Chawala, S. P., Thomas, P. and Kesavan, P. C. 1997. Effect of high hydrostatic pressure, gamma-irradiation and combined treatments on the microbiological quality of lamb meat during chilled storage. *J Food Safety.* 16(4):263-271

Peleg, M. 1995. A model of microbial survival after exposure to pulse electric fields. *J Sci Food Agric.* 67(1):93-99

Peleg, M. and Cole, M. B. 1998. Reinterpretation of Microbial Survival Curves. *Crit Rev in Food Science.* 38(5):353-380

Perrier-Cornet, J. M., Marechal, P. A. and Gervais, P. 1995. A new design intended to relate high pressure treatment to yeast cell mass transfer. *J Biotechnol.* 41:49-58

Pierson, M. D. and Corlett, D. A. J. 1992. HACCP principles and applications. Van Nostrand Reinhold Publishing. New York.

Ponce, E., Pla, R., Mor-Mur, M., Gervilla, R. and Guamis, B. 1998. Inactivation of *Listeria innocua* inoculated in liquid whole egg by high hydrostatic pressure. *J Food Protect.* 61(1):119-122

Popper, L. and Knorr, D. 1990. Applications of high-pressure homogenization for food preservation. *Food Technol.* 44:84-89

Pothakamury, U.R., Barbosa-Cánovas, G.V., and Swanson, B.G. (1993). Magnetic-field inactivation of microorganisms and generation of biological changes. *Food Technol.* 47(12):85-93.

Pothakamury, U. R. 1995. High voltage pulsed electric field inactivation of *Bacillus subtilis* and *Lactobacillus delbrueckii*. *Rev Esp C T.* 35(1):101-107

Pothakamury, U. R., Monsalve-Gonzalez, A., Barbosa-Cánovas, G. V. and Swanson, B. G. 1995. Inactivation of *Escherichia coli* and *Staphylococcus aureus* in model foods by pulsed electric field technology. *Food Res Int.* 28(2):167-171

Pothakamury, U. R., Vega, H., Zhang, Q. H., Barbosa-Cánovas, G. V. and Swanson, B. G. 1996. Effect of growth stage and processing temperature on the inactivation of *E. coli* by pulsed electric fields. *J Food Protect.* 59(11):1167-1171

Prakash, A., Kim, H.-J. and Taub, I. A. 1997. Assessment of microwave sterilization of foods using intrinsic chemical markers. *J Microwave Power Electromagnetic Energy.* 32(1):50-57

Proctor, B. E. and Goldblith, S. A. 1951. Electromagnetic radiation fundamentals and their applications in food technology. *Advances in Food Research*. 3:120-196

Prosetya, H. and Datta, A. K. 1991. Batch microwave heating of liquids: an experimental study. *J Microwave Power Electromagnetic Energy*. 26(4):215-226

CoolPure® advanced sterilization, PurePulse Technologies. 1999. PureBright® decontamination and preservation technology for the food and food packaging industry. San Diego, CA. PurePulseTechnologies Inc. Brochure.
<http://www.packaging2000.com/purepulse/Purepulse.html>

Qin, B. L., Zhang, Q., Barbosa-Cánovas, G. V., Swanson, B. G. and Pedrow, P. D. 1994. Inactivation of microorganisms by pulsed electric fields with different voltage waveforms. *IEEE Trans Dielec Insul*. 1(6):1047-1057

Qin, B.-L. 1995. Nonthermal inactivation *Saccharomyces cerevisiae* in apple juice using pulsed electric fields. *Lebensm Wiss Technol*. 28(6):564-568

Qin, B.-L., Chang, F.-J., Barbosa-Canovas, G. V. and Swanson, B. G. 1995a. Nonthermal inactivation of *S. cerevisiae* in apple juice using pulsed electric fields. *LebensmWiss Technol*. 28(6):564-568

Qin, B., Pothakamury, U. R., Vega, H., Martin, O., Barbosa-Cánovas, G. V. and Swanson, B. G. 1995b. Food pasteurization using high intensity pulsed electric fields. *J Food Technol*. 49(12):55-60

Qin, B.-L., Zhang, Q. H., Barbosa-Cánovas, G. V., Swanson, B. G. and Pedrow, P. D. 1995c. Pulsed electric field treatment chamber design for liquid food pasteurization using a finite element method. *Transactions of the ASAE*. 38(2):557-565

Qin, B.-L., Barbosa-Cánovas, G. V., Swanson, B. G. and Pedrow, P. D. 1998. Inactivating microorganism using a pulsed electric field continuous treatment system. *IEEE Trans Indus Applic*. 34(1):43-49

Quass, D. W. 1997. Pulsed electric field processing in the food industry. A status report on PEF. Palo Alto, CA. Electric Power Research Institute. CR-109742.

Qui, X., Jia, M., Sharma, S., Tuhela, L. and Zhang, Q. H. 1998. An integrated PEF pilot plant for continuous nonthermal pasteurization of fresh orange juice. *American Society of Agricultural Engineers*. 41(4):1069-1074

Rahman, M. S. 1999. *Handbook of Food Preservation*. New York. Marcel Dekker, Inc.

Ramaswamy, H. S. and Pilletwill, T. 1992. Temperature distribution in microwave-heated food models. *J Food Quality*. 15(6):435-448

Ramaswamy, H., Koutchma, T. and Tajchakavit, S. 2000. Enhanced thermal effects under microwave heating conditions. International Conference of Engineering and Food [ICEF-8]. Puebla, MX.

Raso, J., Calderon, M. L., Gongora, M., Barbosa-Cánovas, G. V. and Swanson, B. G. 1998. Inactivation of *Zygosaccharomyces Bailii* in fruit juices by heat, high hydrostatic pressure and pulsed electric fields. *J Food Sci.* 63(6):1042-1044

Raso, J., Pagan, R., Condon, S. and Sala, F. J. 1998a. Influence of temperature and pressure on the lethality of ultrasound. *Appl Environ Microbiol.* 64(2):465-471

Raso, J., Palop, A., Pagan, R. and Condon, S. 1998b. Inactivation of *Bacillus subtilis* spores by combining ultrasonic waves under pressure and mild heat treatment. *J Appl Microbiol.* 85:849-854

Raso, J., Barbosa-Canovas, G. V. and Swanson, B. G. 1998c. Initiation of germination and inactivation by high hydrostatic pressure of *Bacillus cereus* sporulated at different temperatures. IFT Annual Meeting: Book of Abstracts. Atlanta, GA. 154.

Raso, J., Gongora, M., Barbosa-Canovas, G. V. and Swanson, B. G. 1998d. Effect of pH and water activity on the initiation of germination and inactivation of *Bacillus cereus* by high hydrostatic pressure. IFT Annual Meeting: Book of Abstracts. Atlanta, GA. 153.

Reddy, N. R., Solomon, H. M., Fingerhut, G., Balasubramaniam, V. M. and Rhodehamel, E. J. 1999. Inactivation of *Clostridium botulinum* types A and B spores by high-pressure processing. IFT Annual Meeting: Book of Abstracts. National Center for Food Safety and Technology, Illinois Inst of Technology. p. 33 Chicago, IL.

Reina, L. D., Jin, Z. T., Yousef, A. E. and Zhang, Q. H. 1998. Inactivation of *Listeria monocytogenes* in milk by pulsed electric field. *J Food Protect.* 61(9):1203-1206

Reznik, D. L. 1999. Personal communication. Raztek Corp, Sunnyvale, CA.

Roberts, C. M. and Hoover, D. G. 1996. Sensitivity of *Bacillus coagulans* spores to combinations of high hydrostatic pressure, heat acidity, and nisin. *J Applied Bacteriol.* 81:363-368

Rocourt, J. and Cossart, P. 1997. *Listeria monocytogenes*. M. P. Doyle, L. R. Beauchat and T. J. Montville(eds.). *Food Microbiology: Fundamentals and Frontiers*. Washington, D.C. American Society for Microbiology. 337-352.

Romine, A. and Barringer, S. A. 1998. Dielectric properties of ham as a function of temperature, moisture, and salt. Atlanta, GA.

Rose, J. B. and Slifko, T. R. 1999. *Giardia*, *Cryptosporidium* and *Cyclospora* and their impact on foods, a review. *J Food Protect.* 62:1059-1070

Rosen, C.-G. 1972. Effects of microwaves on food and related materials. *Food Technol.* 26(7):36-40, 55

Rosenbauer, G. 1997. Continuous induction heating of liquids. Research Institute for Food Technology and Utilization, Technical University of Munich. Unpublished.

Rosenberg, U. and Bögl, W. 1987. Microwave pasteurization, sterilization, blanching, and pest control in the food industry. *Food Technol.* 41(6):92-99

Roussy, G. and Pearce, J. 1995. Foundations and industrial applications of microwaves and radio frequency fields. New York. Wiley.

Rovere, P., Tosoratti, D. and Maggi, A. 1996a. Prove di sterilizzazione a 15.000 bar per ottenere la stabilita microbiologica ed enzimatica. *Industrie Alimentari.* XXXV:1062-1065

Rovere, P., Carpi, G., Dall'Aglio, G., Gola, S., Maggi, A., Miglioli, L. and Scaramuzza, N. 1996b. High-pressure heat treatments: Evaluation of the sterilizing effect and of thermal damage. *Industria Conserve.* 71:473-483

Ruan, R., Chen, P., Chang, K., Kim, H.-J. and Taub, I. A. 1999. Rapid food particle temperature mapping during ohmic heating using FLASH MRI. *J Food Sci.* 64(6):1024-1026

Russell, N. J., Evans, R. I., ter Steeg, P. F., Hellemons, J., Verheul, A. and Abee, T. 1995. Membranes as a target for stress adaptation. *Int J Food Microbiol.* 28:255-261

Ryynanen, S. and Ohlsson, T. 1996. Microwave heating uniformity of ready meals as affected by placement, composition, and geometry. *J Food Sci.* 61(3):620-624

Sale, A. J. H. and Hamilton, W. A. 1967. Effects of high electric fields on microorganisms I. Killing of bacteria and yeast. *Biochim Biophys Acta.* 148:781-788

Sale, A. J. H., Gould, G. W. and Hamilton, W. A. 1970. Inactivation of bacterial spores by hydrostatic pressure. *J Gen Microbiol.* 60:323-334

Sale, A. J. H. 1976. A review of microwave for food processing. *J Food Technol.* 11:319-329

Salengke, S. and Sastry, S. K. 1999. Comparative modeling study of ohmic heating of solid-liquid mixtures. 1999 IFT Annual Meeting. Chicago. July 24-28 1999.

Saltiel, C. and Datta, A. K. 1998. Heat and mass transfer in microwave processing. *Adv Heat Transfer.* 33:1-94

Sams, A. R. and Feria, R. 1991. Microbial effects of ultrasonication of broiler drumstick skin. *J Food Sci.* 56(1):247-248

San-Martin, M.F., Harte, F.M., Barbosa-Cánovas, G.V., and Swanson, B.G. 1999. Magnetic field as a potential non-thermal technology for the inactivation of microorganisms. Washington State University, Biological Systems Engineering, Pullman, WA., USA. (Unpublished).

Sastry, S. K. 1992. A model for heating of liquid-particle mixtures in a continuous flow ohmic heater. *J Food Process Eng.* 15:263-278

Sastry, S. K. and Palaniappan, S. 1992. Mathematical modeling and experimental studies on ohmic heating of liquid-particle mixtures in a static heater. *J Food Process Eng.* 15:241-261

Sastry, S. K. 1994. Ohmic heating. R. P. Singh and F. A. R. Oliveira. *Minimal Processing of Foods and Process Optimization: an Interface.* Boca Raton, FL. CRC Press, Inc. 17-33.

Sastry, S. K. and Li, Q. 1996. Modeling the ohmic heating of foods. *Food Technol.* 50(5):246-248

Sastry, S. K. and Salengke, S. 1998. Ohmic heating of solid-liquid mixtures: a comparison of mathematical models under worst-case heating conditions. *J Food Process Eng.* 21:441-458

Satomi, M., Yamaguchi, T., Okuzumi, M. and Fujii, T. 1995a. Effect of conditions on the barotolerance of *Escherichia coli*. *Shokuhin Eiseigaku Zasshi (J of Food Hyg Soc Japan).* 36(1):29-34

Satomi, M., Yamaguchi, T., Okuzumi, M. and Fujii, T. 1995b. Effect of several conditions on the recovery of pressure-injured bacteria. *Shokuhin Eiseigaku Zasshi (J of Food Hyg Soc Japan).* 36(3):344-351

Schlegel, W. 1992. Commercial pasteurization and sterilization of food products using microwave technology. *Food Technol.* 46(12):62-63

Schnepf, M. and Barbeau, W. E. 1989. Survival of *Salmonella typhimurium* in roasting chickens cooked in a microwave, convention microwave and conventional electric oven. *J Food Safety.* 9:245-252

Schoenbach, K. H., Peterkin, F. E., Alden, R. W. and Beebe, S. J. 1997. The effect of pulsed electric fields on biological cells: Experiments and applications. *IEEE Trans Plasma Sci.* 25(2):284-292

Sensoy, I., Zhang, Q. H. and Sastry, S. K. 1997. Inactivation kinetics of *Salmonella dublin* by pulsed electric field. *J Food Process Eng.* 20:367-381

Seyderhelm, I. and Knorr, D. 1992. Reduction of *Bacillus stearothermophilus* spores by combined high pressure and temperature treatments. *ZFL Eur Food Sci.* 43:17

Shigehisa, T., Ohmori, T., Saito, A., Taji, S. and Hayashi, R. 1991. Effects of high hydrostatic pressure on characteristics of pork slurries and inactivation of microorganisms associated with meat and meat products. *Int J Microbiol.* 12:207-216

Shigehisa, T., Nakagami, H., Ohno, H., Okate, T., Mori, H., Kawahata, T., Morimoto, M. and Ueba, N. 1996. Inactivation of HIV in bloodplasma by high hydrostatic pressure. R. Hayashi and C. Balny. *High pressure bioscience and biotechnology.* Elsevier Science B. V. 273-278.

Simpson, M. V., Barbosa-Cánovas, G. V. and Swanson, B. G. 1995. The Combined inhibitory effect of lysozyme and high voltage pulsed electric fields on the growth of *Bacillus subtilis* spores. *IFT Annual Meeting: Book of Abstracts.* 267.

Simpson, R. K. and Gilmour, A. 1997a. The effect of high hydrostatic pressure on *Listeria monocytogenes* in phosphate-buffered saline and model food systems. *J Appl Microbiol.* 83:181-188

Simpson, R. K. and Gilmour, A. 1997b. The effect of high hydrostatic pressure on the activity of intracellular enzymes of *Listeria monocytogenes*. *Let Appl Microbiol.* 25:48-53

Sitzmann, V. 1995. High voltage pulse techniques for food preservation. G. W. Gould. *New methods for food preservation.* London, UK. Blackie Academic and Professional. 236-252.

Skauen, D. 1976. A comparison of heat production and cavitation intensity in several ultrasonic cell disrupters. *Ultrasonics.* 14:173-176

Smelt, J. P. P. M., Rijke, A. G. F. and Hayhurst, A. 1994. Possible mechanism of high pressure inactivation of microorganisms. *High Press Res.* 12:199-203

Smelt, J. P. P. 1998. Recent advances in the microbiology of high pressure processing. *Trends Food Sci Technol.* 9:152-158

Smelt, J. P. P. M. and Hellemons, J. C. 1998. High pressure treatment in relation to quantitative risk assessment. *VTT Symposium.* Espoo: Technical Research Centre of Finland. 27-38.

Sonoike, K., Setoyama, K. and Kobayashi, S. 1992. Effect of pressure and temperature on the death rates of *Lactobacillus casei* and *Escherichia coli*. C. Balny, R. Hayashi, K. Heremans and P. Masson. *High Pressure and Biotechnology.* 224:297-301

Standsted. 2000. Personal communication. Standsted Fluid Power, Ltd. Standsted, Essex CM24 8HT, UK.

Stenstrom, L. A. 1974. Method and apparatus for treating heat-sensitive products. Alfa-Laval AB. US Patent 3,809,844.

Stewart, C. M., Jewett Jr., F. F., Dunne, C. P. and Hoover, D. G. 1997. Effect of concurrent high hydrostatic pressure, acidity and heat on the injury and destruction of *Listeria monocytogenes*. *J Food Safety*. 17:23-36

Stumpf, P. K., Green, D. E. and Smith, F. W. J. 1946. Ultrasonic disintegration as a method of extracting bacterial enzymes. *J Bacteriol*. 51:487-493

Styles, M. F., Hoover, D. G. and Farkas, D. F. 1991. Response of *Listeria monocytogenes* and *Vibrio parahaemolyticus* to high hydrostatic pressure. *J Food Sci*. 56(5):1404-1407

Suzuki, C. and Suzuki, K. 1962. The protein denaturation by high pressure. *J Biochem*. 52:67-71

Suzuki, K. and Taniguchi, T. 1972. Effect of pressure on biopolymers and model systems. M. A. Sleigh and A. G. Macdonald. *The Effect of Pressure on Living Organisms*. New York. Academic Press Inc. 103.

Sytnik, I. A. and Sytnik, I. A. 1967. The influence of electrohydraulic effect on microorganisms. *Tr Stavropolskogo sx in-ta*. 13:514-522.

Tajchakavit, S. and Ramaswamy, H. S. 1995. Continuous-flow microwave heating of orange juice: evidence of nonthermal effects. *International Microwave Power Institute*. 30(3):141-148

Tanaka, T. and Hatanaka, K. 1992. Application of hydrostatic pressure to yoghurt to prevent its after-acidification. *Nippon Shokuhin Kogyo Gakkaishi (J Japanese Society for Food Science and Technology)*. 39(2):173-177

Taub, I. A., Kaprielian, R. A., Halliday, J. W., Walker, J. E., Angelini, P. and Merritt Jr, C. 1979. Factors affecting radiolytic effects in food. *Radiated Physical Chemistry*. 14:639-653

Tauscher, B. K. 1998. Effect of high pressure treatment to nutritive substances and natural pigments. *Fresh Novel Foods by High Pressure*. VTT Symposium 186. Technical Research Centre of Finland. Helsinki, Finland.

Tauscher, B. 1999. High pressure and chemical reactions: effects on nutrients and pigments. *Emerging Food Science and Technology*. Tampere, Finland. November 22-24, 1999. 58.

- Teotia, J. S. and Miller, B. F. 1975. Destruction of salmonellae on poultry meat with lysozyme, EDTA, X-ray, microwave and chlorine. *Poul Sci.* 54:1388-1394
- Thompson, J. S. and Thompson, A. 1990. In-home pasteurization of raw goat's milk by microwave treatment. *International J Food Microbiol.* 10:59-64
- Thorne, S.(Ed.) 1991. *Food Irradiation.* Elsevier Applied Science. London.
- Timson, W. J. and Short, A. J. 1965. Resistance of microorganisms to hydrostatic pressure. *Biotechnol and Bioeng.* VII:139-159
- Ting, E. 1999. Personal Communication. Flow International, Kent, WA.
- Tops, R. 2000. Managing Director, Tops Foods, Lammerides 26, Olen, Belgium
Phone:00-32-(0)14.28.55.60 Fax: 00-32-(0)14.22.61.50.
- Tsong, T. Y. 1990. Electrical modulation of membrane proteins: Enforced conformational oscillations and biological energy signals. *Annu Rev Biophys Chem.* 19:83-106
- Tsuchiya, K., Nakamura, K., Okuno, K., Ano, T. and Shoda, M. 1996. Effect of homogeneous and inhomogeneous high magnetic fields on the growth of *Escherichia coli*. *J Ferment Bioeng* 81(4):343-346.
- van Boekel, M. A. J. S. 1996. Stastical aspects of kinetic modeling for food science problems. *J Food Sci.* 61:477-485
- Van Loey, A., Hendrickx, M., De Cordt, S., Haentjens, T. and Tobback, P. 1996. Quantative evaluation of thermal process using time temperature integrators. *Trends Food Sci Technol.* 7(1):16-26
- Van Nostran, F.E., Reynolds, R.J. and Hedrick, H.G. 1967. Effects of a high magnetic field at different osmotic pressures and temperatures on multiplication of *Saccharomyces cerevisiae*. *Appl Microbiol.* 15: 561-563.
- Varnam, A. H. and Evans, M. G. 1991. *Foodborne Pathogens: An Illustrated Text.* London. Wolfe Publishing, Ltd. 51-377.
- Vega-Mercado, H., Powers, J. R., Barbosa-Cánovas, G. V. and Swanson, B. G. 1995. Plasmin inactivation with pulsed electric fields. *J Food Sci.* 60(5):1143-1146
- Vega-Mercado, H., Martin-Belloso, O., Chang, F.-J., Barbosa-Canovas, G. V. and Swanson, B. G. 1996a. Inactivation of *Escherichia coli* and *Bacillus subtilis* suspended in pea soup using pulsed electric fields. *J Food Process Pres.* 20(6):501-510

Vega-Mercado, H., Pothakamury, U. R., Chang, F.-J., Barbosa-Cánovas, G. V. and Swanson, B. G. 1996b. Inactivation of *Escherichia coli* by combining pH, ionic strength and pulsed electric fields hurdles. *Food Res Int.* 29(2):117-121

Vega-Mercado, H. 1996c. Inactivation of proteolytic enzymes and selected microorganisms in foods using pulsed electric fields. *Biological Systems Engineering*. Pullman, WA. Washington State University.

Vega-Mercado, H., Martin-Belloso, O., Qin, B.-L., Chang, F.-J., Gongora-Nieto, M. M., Barbosa-Cánovas, G. V. and Swanson, B. G. 1997. Non-thermal food preservation: pulsed electric fields. *Trends Food Sci Technol.* 8(5):151-157

Vega-Mercado, H., Gongora-Nieto, M. M., Barbosa-Canovas, G. V. and Swanson, B. G. 1999. Nonthermal preservation of liquid foods using pulsed electric fields. *Handbook of Food Preservation*. M. S. Rahman. Marcel Dekker, Inc. New York.

Vela, G. R. and Wu, J. F. 1979. Mechanism of lethal action of 2,450-MHz radiation on microorganism. *Appl Environ Microbiol.* 37(3):550-553

Villamiel, M., LopezFandino, R. and Olano, A. 1997. Microwave pasteurization of milk in a continuous flow unit. Effects on the cheese-making properties of goat's milk. *Milchwissenschaft.* 52(1):29-32

Vollmer, A. C., Everbach, E. C., Halpern, M. and Kwakye, S. 1998. Bacterial stress responses to 1-megahertz pulsed ultrasound in the presence of microbubbles. *Appl Environl Microbiol.* 64(10):3927-3931

Wang, W.-C. 1995. Ohmic heating of foods: physical properties and applications. Columbus, OH. The Ohio State University.

Weemaes, C., Ooms, V., Indrawati, L., Ludikhuyze, I., Van den Broeck, A., van Loey, A. and Hendrickx, M. 1999. Pressure-temperature degradation of green color in broccoli juice. *J Food Sci.* 64:504-508

Wei, C. I., Balaban, M. O., Fernando, S. Y. and Peplow, A. J. 1991. Bacterial effect of high pressure CO₂ treatment of foods spiked with *Listeria* or *Salmonella*. *J Food Protect.* 54(3):189-193

Weiss, K. F. and Strong, D. H. 1967. Some properties of heat-resistant and heat-sensitive strains of *Clostridium perfringens*. I. Heat resistance and toxigenicity. *J Bacteriol.* 93:21-26

Welt, B. A. and Tong, C. H. 1993. Effect of microwave radiation on thiamin degradation kinetics. *J Microwave Power Electromagnetic Energy.* 28(4):187-195

Welt, B. A., Street, J. A., Tong, C. H., Rossen, J. L. and Lund, D. B. 1993. Utilization of microwaves in the study of reaction kinetics in liquid and semi-solid media. *Biotechnol Prog.* 9:481-487

Wesley, R. H. 1971. *Bacteria destruction methods.* USA 3,594,115.

Wig, T., Tang, J., Younce, F., Hallberg, L., Dunne, C. P. and Koral, T. 1999. Radio frequency sterilization of military group rations. AICHE Annual Meeting.

Wilson, D. C. 1974. High pressure sterilization. 34th Annual Meeting of the Institute of Food Technologists. New Orleans, LA. May 12-15.

Worobo, R. W., Churey, J. J. and Padilla-Zakour, O. 1998. Apple cider: treatment options to comply with new regulations. *J Assoc Food Drug Officials.* December:19-25

Worobo, R. W. 2000. Efficacy of the CiderSure 3500 ultraviolet light unit in apple cider. Ithaca, NY. Cornell University, Department of Food Science and Technology. 1-6.

Wouters, P. C., Glaasker, E. and Smelt, J. P. P. M. 1998. Effects of high pressure on inactivation kinetics and events related to proton efflux in *Lactobacillus plantarum*. *Appl Environ Microbiol.* 64(2):509-514

Wuytack, E. Y., Boven, S. and Michiels, C. W. 1998. Comparative study of pressure-induced germination of *Bacillus subtilis* spores at low and high pressure. *A Environ Microbiol.* 64:3220-3224

Wyslouzil, W. and Kashyap, S. C. 1976. Microwave sterilization of pea flour and pea protein concentrate. *J Microwave Power.* 11(2):212-213

Yano, Y., Nakayama, A., Kishihara, S. and Saito, H. 1998. Adaptive changes in membrane lipids of barophilic bacteria in response to changes in growth pressure. *Appl Environ Microbiol.* 64:479-485

Yin, Y., Zhang, Q. H. and Sastry, S. K. 1997. High voltage pulsed electric field treatment chambers for the preservation of liquid food products. Ohio State University. US Patent 5,690,978.

Yoshimura, N. 1989. Application of magnetic action for sterilization of food. *Shokukin Kihatsu* 24(3):46-48.

Zhang, L. and Fryer, P. J. 1993. Models for the electrical heating of solid-liquid mixtures. *Chem Eng Sci.* 48:633-643

Zhang, Q. H., Monsalve-Gonzalez, A., Barbosa-Cánovas, G. V. and Swanson, B. G. 1994a. Inactivation of *E. coli* and *S. cerevisiae* by pulsed electric fields under controlled temperature conditions. *Transactions of the ASAE.* 37(2):581-587

- Zhang, Q. H., Chang, F.-J. and Barbosa-Cánovas, G. V. 1994b. Inactivation of microorganisms in a semisolid model food using high voltage pulsed electric fields. *Lebensm Wiss Technol.* 27(6):538-543
- Zhang, Q. H., Qin, B.-L., Barbosa-Canovas, G. V. and Swanson, B. G. 1995a. Inactivation of *E. coli* for food pasteurization by high-strength pulsed electric fields. *J Food Process Pres.* 19(2):103-118
- Zhang, Q. H., Barbosa-Cánovas, G. V. and Swanson, B. G. 1995b. Engineering aspects of pulsed electric field pasteurization. *J Food Eng.* 25(2):261-281
- Zhang, Q. H., Qiu, X. and Sharma, S. K. 1997. Recent development in pulsed electric field processing. Washington, DC. National Food Processors Association. *New Technologies Yearbook.* 31-42.
- Zhang, H. and Datta, A. K. 1999. Coupled electromagnetic and thermal modeling of microwave oven heating of foods. *J Microwave Power Electromagnetic Energy.* 43
- Zhang, H., Datta, A. K., Taub, I. and Doona, C. 1999. Experimental and numerical investigation of microwave sterilization of solid foods. Accepted pending revision in *AIChE Journal.*
- Zhang, H. and Datta, A. K. 2000. Electromagnetics of Microwave Heating: Magnitude and Uniformity of Energy Absorption in an Oven. A. K. Datta and R.C. Anatheswaran(eds.). *Handbook of Microwave Technology For Food Applications.* New York. Marcel Dekker, Inc.
- Zimmermann, U. and Benz, R. 1980. Dependence of the electrical breakdown voltage on the charging time in *Valonia utricularis*. *J Membrane Biol.* 53:33-43
- Zimmermann, U. 1986. Electrical breakdown, electropermeabilization and electrofusion. *Rev Physiol Biochem Pharmacol.* 105:175-256
- Zimmermann, W. J. 1983. Evaluation of microwave cooking procedures and ovens for devitalizing trichinae in pork roasts. *J Food Sci.* 48:856-860, 899
- ZoBell, C. E. 1970. Pressure effects on morphology and life process of bacteria. A. M. Zimmermann(Ed.). *High pressure effects on cellular processes.* New York. Academic Press Inc. 85-130.
- Zook, C. D., Parish, M. E., Braddock, R. J. and Balaban, M. O. 1999. High pressure inactivation kinetics of *Saccharomyces cerevisiae* ascospores in orange and apple juice. *J Food Sci.* 64(3):533-535

[Table of Contents](#)

[Home](#) | [HACCP](#)

Hypertext updated by ear 2001-JAN-05