

6.0. REFERENCES

- Abreu, M.T., Fukata, M. and Arditi, M. 2005. TLR Signaling in the Gut in Health and Disease. *J. Immunol.* **174**: 4453-4460.
- Akira, S., Uematsu, S. and Takeuchi, O. 2006. Pathogen recognition and innate immunity. *Cell.* **124**, 783–801.
- Aitman, T. J., Glazier, A. M. and Wallace, C. A. 1999. Identification of Cd36 (Fat) as an insulin resistance gene causing defective fatty acid and glucose metabolism in hypertensive rats. *Nat. Genet.* **21**, 76–83.
- Arend, W. P, Welgus, H. G and Thompson, R. C. 1990. Biological properties of recombinant human monocyte-derived interleukin-1 receptor antagonist. *J Clin. Invest.* **85**: 1694-1697.
- Barrett, L., Dai, C., Gamberg, J., Gallant, M. and Grant, M. 2007. Circulating CD14-CD36_ peripheral blood mononuclear cells constitutively produce interleukin-10. *J. Leukoc. Biol.* **82**: 152-160
- Bartoccioni, E., Scuderi, F., Marino M. and Provenzano, C. 2003. IL-6, monocyte infiltration and parenchymal cells. *Trends Immunol.* **24**: 299-300
- Beier, R and Gebert, A. 1998. Kinetics of particle uptake in the domes of Peyer's patches, *Am. J. Physiol.* **275**: G130–G137.
- Bellomo G, Mangiagle A, Nicastro L. and Frigerio, G. 1980. A controlled double blind study of SF68 strain as new biological preparation for the treatment of diarrhea in pediatrics. *Curr Ther Res.* **28**:927-6
- Benyacoub J, Czarnecki-Maulden, G. L, Cavadini, C., Sauthier, T., Anderson, R. E, Schiffrian, E. J. and von der Weid, T. 2003. Supplementation of food with *Enterococcus faecium* (SF68) stimulates immune functions in young dogs. *J Nutr.* **133**:1158-1162.
- Benyacoub, J., Perez, P.F., Rochat, F., Saudan, K.Y., Reuteler, G., Antille, N., Humen, M., De Antoni, G.L., Cavadini, C., Blum, S. and Schiffrian, E.J. 2005. *Enterococcus faecium* SF68 enhances the immune response to *Giardia intestinalis* in mice. *J Nutr.* **135**:1171-1176.
- Bertelsen, L. S., Paesold, G., Eckmann, L. and Barrett, K. E. 2003. *Salmonella* infection Induces a Hypersecretory Phenotype in Human Intestinal Xenografts by Inducing Cyclooxygenase 2. *Inf. and Immun.* **71** (4): 2102–2109
- Beubler, E., R. Schuligoj, A. K. Chopra, D. A. Ribardo and B. A. Peskar. 2001. Cholera toxin induces prostaglandin synthesis via post-transcriptional activation of cyclooxygenase-2 in the rat jejunum. *J. Pharmacol. Exp. Ther.* **297**:940–945.

- Bhalla, D. K. and Owen, R. L. 1982. Cell renewal and migration in lymphoid follicles of Peyer's patches and caecum-an autoradiographic study in mice. *Gastroenterology* **82** (2): 232-42.
- Bielenberg, D. R. Fidler, I. J. and Bucana, C. D. 1998. Constitutive expression of interferon beta in differentiated epithelial cells exposed to environmental stimuli. *Cancer Biother Radiopharm.* **13** (5):375-82.
- Blair, J. B., Ostrander, G. K., Miller, M. R. and Hinton, D. E. 1995. Isolation and characterization of biliary epithelial cells from rainbow trout liver. *In Vitro Cell. Dev. Biol. Anim.* **31**: 780-789
- Blum, S. Haller, D., and Pfeifer, A. and Schiffrian, J. 2002. Probiotics and Immune Response. *Clin. Rev. Allergy Immun.* **22**: 287-309.
- Blom, H. and Helander, H. F. 1981. Quantitative ultrastructural studies on parietal cell regeneration in experimental ulcers in rat gastric mucosa. *Gastroenterology*. **80**(2):334-43.
- Botić, T., Danø', T., Klingberg, Weingartl, H. and Cencič, A. 2007. A novel eukaryotic cell culture model to study antiviral activity of potential probiotic bacteria. *Int. J. Food Microbiol.* **115**: 227-234.
- Boucheix, C., Benoit, P., Frachet, P., Billard, M., Worthington, R.E., Gagnon, J., Uzan, G. 1991. Molecular cloning of the CD9 antigen. A new family of cell surface proteins. *J biol Chem.* **266**:117–122.
- Boucheix, C. and Rubinstein, E. 2001. Tetraspanins. *Cell. Mol. Life Sci.* **58**:1189-1205.
- Brandtzaeg, P. and Pabst, R. 2004. Let's go mucosal: communication on slippery ground. *Trends Immunol.* **25** (11): 571-577.
- Bye, W. A., Allan, C.H. and Trier, J. S. 1984. Structure, distribution and origin of M cells in Peyer's patches of mous ileum. *Gastroenterology*. **86**: 789-801.
- Bzowska, M., Guzik, K., Barczyk, K., Ernst, M., Flad, H. D. and Pryjma, J. 2002. Increased IL-10 production during spontaneous apoptosis of monocytes. *Eur. J. Immunol.* **32**, 2011–2020.
- Cepica, A. and Derbyshire, J. B. 1984. The effect of adoptive transfer of mononuclear leukocytes from an adult donor on spontaneous cell-mediated cytotoxicity and resistance to transmissible gastroenteritis in neonatal piglets. *Can J Comp Med.* **48**(4): 360–364.

- Cencic, A. and Bonnardi  re, C. L. 2002 Trophoblastic interferon-gamma: current knowledge and possible role(s) in early pig pregnancy. *Vet. Res.* **33**: 139–157.
- Chang, T. L.Y, Chang C. H, Simpson, D. A. , Xu, Q., Martin, P. K., Lagenaar, L. A., Schoolnik, G. K., Ho, D.D., Hillier, S. L., Holodniy, M., Lewicki, J. A., Le, E. 2003. Inhibition of HIV infectivity by a natural human isolate of *Lactobacillus jensenii* engineered to express functional two-domain CD4. *Proc Natl Acad Sci USA*. **100**: 11672-7.
- Cherayil, B. J. and Antos, D. 2001. Inducible nitric oxide synthase and *Salmonella* infection. *Mic. Infec.* **3**: 771–776.
- Chow, J. C., Young, D. W., Golenbock, D. T., Christi, W. J. and Gusovsky, F. 1999. Toll-like Receptor-4 Mediates Lipopolysaccharide-induced Signal Transduction The *J. Biol. Chem.* **274** (16): 10689–10692.
- Coconnier, M.H., Li  vin, V., Lorrot, M. and Servin, A. L. 2000. Antagonistic Activity of *Lactobacillus acidophilus* LB against Intracellular *Salmonella enterica* Serovar Typhimurium Infecting Human Enterocyte-Like Caco-2/TC-7 Cells. *Appl. Environ. Microbiol.* **66**: 1152-1157.
- Cox, E., Pensaert, M.B. and Callebaut, P. 1993. Intestinal protection against challenge with transmissible gastroenteritis virus of pigs immune after infection with the porcine respiratory coronavirus. *Vaccine* **11**: 267-272.
- Cross, M.L., 2002. Immunoregulation by probiotic lactobacilli: pro-Th1 signals and their relevance to human health. *Clin. Appl. Immunol. Rev.* **3**: 115–125.
- Cunningham-Rundles, S., Ahrne, S., Bengmark, S., Johann-Liang, R., Marshall, F., Metakis, L., Califano, C., Dunn, A.M., Grassey, C., Hinds, G. and Cervia, J., 2000. Probiotics and immune response. *American Journal of Gastroenterology* **95**: S22–S25.
- Dahan, S., Roth-Walter, F., Arnaboldi, P., Agarwal, S. and Mayer, L. 2007. Epithelia: lymphocyte interactions in the gut. *Immunol. Rev.* **215**: 243–253.
- De Groote, M. A., Testerman, T. and Xu, Y. 1996. Homocysteine antagonism of nitric oxide-related cytostasis in *Salmonella typhimurium*. *Science*. **272**: 414–17
- Delcenserie, V., Martel, D., Lamoureux, M., Amiot, J., Boutin, Y. and Roy, D. 2008. Immunomodulatory effects of probiotics in the intestinal tract. *Curr. Issues Mol. Biol.* **10**: 37-54.
- Delmas, B., Gelfi, J. and L'Haridon, R. 1990. Aminopeptidase N is a major receptor for the enteropathogenic coronavirus TGEV. *Nature* **357**: 417–420.

- Di Giacinto, C., Marinaro, M., Sanchez, M., Strober, W., Boirivant, M. 2005. Probiotics ameliorate recurrent Th1-mediated murine colitis by inducing IL-10 and IL-10-dependent TGF-beta-bearing regulatory cells. *J. Immunol.* **174**(6): 3237-46.
- Dinarello, C. A and Thompson, R. C. 1991. Blocking IL-1: Interleukin 1 receptor antagonist *in vivo* and *in vitro*. *Immunol. Today.* **12**: 404-410.
- Dotan, I. and Mayer, L. 2003. Intestinal Immunity: Microbial pathogenesis and the intestinal epithelial cell, ed. By Hecht, G. ASM Press, Washington D.C. 1-42.
- Doyle, L. P. and Hutchins, L. M. 1995. Transmissible gastroenteritis in pigs. *J. Am. Vet. Assoc.* **108**: 257.
- Dubois, C. M., Ruscetti, F. W. and Palaszynski, E. W. 1990. Transforming growth factor- β is a potent inhibitor of interleukin 1 (IL-1) receptor expression: Proposed mechanism of inhibition of IL-1 action. *J. Exp. Med.* **172**: 737-744.
- Eckmann, L., Jung, H. C., Schurer-Maly, C., Panja, A., Morzycka-Wroblewska, E. and Kagnoff, M. F. 1993. Differential cytokine expression by human intestinal epithelial cell lines: regulated expression of interleukin 8. *Gastroenterology* **105**: 1689–1697.
- Eckmann, L. and Kagnoff, M. F. 2005. Intestinal mucosal responses to microbial infection. *Springer Semin Immunopathol.* **27**(2):181-96.
- Eckmann, L., Kagnoff, M. F. and Fierer, J. 1995. Intestinal epithelial cells as watchdogs for the natural immune system. *Trends Microbiol.* **3**: 118-120.
- Edmondson, J. M., Armstrong, L. S. and Martinez, A.O. 1988. A rapid and simple MTT-based spectrophotometric assay for determining drug sensitivity in monolayer cultures. *J. Tiss Cult Meth.* **11**(1): 15–17.
- Elewaut, D., Didonato, J. A., Kim, J. M., Truong, F., Eckmann, L. and Kagnoff, M. F. 1999. NF- κ B is a central regulator of the intestinal epithelial cell innate immune response induced by infection with enteroinvasive bacteria. *J Immunol.* **163**: 1457–1466.
- Enjuanes, L., Smerdou, C., Castilla, J., Anton, I. M., Torres, J. M., Sola, I., Golvano, J., Sanchez, J. M., and Pintado, B. 1995. Development of protection against coronavirus induced diseases. *Adv Exp Med Bio.*, **380**: 197-211.
- Erickson, K. L. and Hubbard, N. E. 2000. Probiotic Immunomodulation in Health and Disease. *Symposium: Probiotic Bacteria:Implications for Human Health. J. Nutr.* **130**: 403S–409S, 2000.
- Ewaschuk, J. B., Backer, J. L. and Churchill, T.A., Obermeier, F., Krause, D. O. and Madsen, K. L. 2007. Surface expression of Toll-like receptor 9 is upregulated on

- intestinal epithelial cells in response to pathogenic bacterial DNA. *Infect Immun.* **75** (5): 2572–2579.
- Fang, F. C., DeGroote, M. A. and Foster, J. W. 1999. Virulent *Salmonella typhimurium* has two periplasmic Cu, Zn-superoxide dismutases. *Proc. Natl. Acad. Sci. USA* **96**: 7502–7
- Fedorka-Cray, P. J., Bailey, J. S., Stern, N. J., Cox, N. A., Ladely, S. R. and Musgrove, M. 2000. Mucosal competitive exclusion to reduce *Salmonella* in swine. *J. Food protec.* **62**(12):1376-80.
- Fedorka-Cray, P. J., Ladely, S. R., Bailey, J. S. and Stern, N. J. 2001. Colonization of broiler chicks by *Salmonella typhimurium* definitive phage type 104. *J. Food protec.* **64**(11):1698-704.
- Forte, P., Dykhuizen, R. S., Milne, E., McKenzie, A., Smith, C.,C., Benjamin, N. 1999. Nitric oxide synthase in patients with infective gastroenteritis. *Gut* **45**: 355–361.
- García-Galaz, A., R. Pérez-Morales, M. Díaz-Cinco, E. Acedo-Félix. 2004. Resistance of *Enterococcus* strains isolated from pigs to gastrointestinal tract and antagonistic effect against *Escherichia coli* K88. *Rev Latinoam Microbiol.* **46**: 5-11.
- Garssen, J., Herreilers, M., Van Loveren, H., Vos, J. and Opperhuizen, A. 2003. Immunomodulation by probiotics: a literature survey. RIVM report 340320001
- Gebert, A., Rothkotter, H. J., Pabst, R. 1994. Cytokeratin 18 is an M-cell marker in porcine Peyer's patches. *Cell Tissue Res.* **276**:213–221.
- Gill, H. S., Shu, Q., Lin, H., Rutherford, K.J. and Cross, M.L. 2001. Protection against translocating *Salmonella typhimurium* infection in mice by feeding the immunoenhancing probiotic *Lactobacillus rhamnosus* strain HN001, *Med. Microbiol. Immunol.* **190**: 97–104.
- Goldin B.R. 1998. Health benefits of probiotics. *Brit. J. Nutrition* **80**: S203-S207
- Gordon-Alonso M, Yanez-Mo M, Barreiro O, Alvarez S, Munoz-Fernandez MA, et al.2006. Tetraspanins CD9 and CD81 modulate HIV-1-induced membrane fusion. *J Immunol.* **177**: 5129-5137.
- Groisman, E. A, Ochman, H. 1996. Pathogenicity islands: bacterial evolution in quantum leaps. *Cell* **87**: 791–94
- Ha, C. T., Waterhouse, R., Wessells, J., Wu, J. A. and Dveksler, G. S. 2005. Binding of pregnancy-specific glycoprotein 17 to CD9 on macrophages induces secretion of IL-10, IL-6, PGE₂, and TGF-β₁. *J. Leukoc. Biol.* **77**:948-957

- Harada, A., Mukaida, N. and Matsushima, K. 1996. Interleukin-8 as a novel target for intervention therapy in acute inflammatory diseases. *Mol Med Today.* **2:** 482–489.
- Hayward, R. D. and Koronakis, V. 1999. Direct nucleation and bundling of actin by the SipC protein of invasive *Salmonella*. *EMBO J.* **18:**4926–34.
- Hemmi, H., Takeuchi, O., Kawai, T., Kaisho, T., Sato, S., Sanjo, H., Matsumoto, M., Hoshino, K., Wagner, H., Takeda, K. and Akira, S. 2000. A Toll-like receptor recognizes bacterial DNA. *Nature* **408:** 740-745.
- Higashiyama, M., Doi, O., Kodoma, K., Yokouchi, H., Adachi, M., Huang, C. L., Taki, T., Kasugai, T., Ishiguro, S., Nakamori, S. and Miyake, M. 1997. Immunohistochemically detected expression of motility-related protein-1 (MRP-1/CD9) in lung adenocarcinoma and its relation to prognosis. *Int J Cancer* **74:**205–211.
- Hong, H. A., Duc, L. H. and Cutting, S. M. 2005. The use of bacterial spore formers as probiotics. *FEMS Microbiol. Rev.* **29** (4): 813-835
- Hosie, M. J., Willett, B. J., Durnsford, T. H., Jarret, O. and Neil, J. C. 1993. A monoclonal antibody which blocks infection with feline immunodeficiency virus identifies a possible non-CD4 receptor. *J. Virol.* **67:**1667–1671.
- Huang, Z., Fasco, M. J. and Kaminsky, L. S. 1996. Optimization of Dnase I removal of contaminating DNA from RNA for use in quantitative RNA-PCR. *Biotechniques* **20** 1012–1014.
- Hueck, C. J. 1998. Type III protein secretion systems in bacterial pathogens of animals and plants. *Microbiol. Mol. Biol. Rev.* **62:** 379–433.
- Hundorfefan, G., Zimmer, K. P., Strobel, S., Gebert, A., Ludwig, D. and Büning, J. 2007. Luminal antigens access late endosomes of intestinal epithelial cells enriched in MHC I and MHC II molecules: in vivo study in Crohn's ileitis. *Am J Physiol Gastrointest Liver Physiol.* **293:** G798-G808.
- Hurd, H.S. 2004. Salmonellosis in livestock. In: McGraw-Hill Yearbook of Science and Technology. New York, NY: McGraw Hill. p. 297-299.
- Jackson, L.M., K C Wu, Y R Mahida, D Jenkins and C J Hawkey. 2000. Cyclooxygenase (COX) 1 and 2 in normal, inflamed, and ulcerated human gastric mucosa. *Gut* **47:** 762-770.
- Jing-Gang, L., Cruickshank, S. M., Carmelina, J. 2005. Different cytokine response of primary colonic epithelial cells to commensal bacteria. *World J Gastroenterol.* **11:** 3375–3384.

- Jung, H. C., Eckmann, L., Yang, S .K., Panja, A., Fierer, J., Morzycka-Wroblewska, E. and Kagnoff, M. F. 1995. A distinct array of proinflammatory cytokines is expressed in human colon epithelial cells in response to bacterial invasion. *J. Clin Invest.* **95**: 55–65.
- Kaplanski, G., Marin, V., Montero-Julian, F., Mantovani, A. and Farnarier, C. 2003. IL-6: a regulator of the transition from neutrophil to monocyte recruitment during inflammation *Trends Immunol.* **24**: 25-29
- Kato, T, 1990. A study of secretory immunoglobulin A on membranous epithelial cells (M cells) and adjacent absorptive cells of rabbit Peyer's patches. *Gastroenterol Jpn.* **25**:15-23.
- Kato, T. and Owen, R. L. 2005. Structure and function of intestinal mucosal epithelium. Chapter 8: 131-147. In *Mucosal Immunology*, 3rd edition (Eds. Mestecky, J., Bienenstock, J., Lamm, M.E., Mayer, L., Strober, W., McGhee, J.R.) Academic Press/Elsevier, San Diego.
- Katsikis, P. D, Chu, C. Q. and Brennan, F. M. 1994. Immunoregulatory role of interleukin 10 in rheumatoid arthritis. *J. Exp. Med.* **179**:1517-1527.
- Kemeny, L. J., Wiltsey, V. L. and Riley, J. L. 1975. Upper respiratory infection of lactating sows with transmissible gastroenteritis virus following contact exposure to infected piglets. *Cornell Vet.* **65**: 352-362.
- Keshav, s., lawson, l., chung, p., stein, m., perry, v. h. and gordon, s. 1990. Tumor necrosis factor mRNA localised to Paneth cells of normal murine intestinal epithelium by *in situ* hybridisation. *J. Exp. Med.* **171**: 327-332.
- Kirschning, C. J., Wesche, H., Ayres, T. M. and Rothe, M. 1998. Human Toll-like Receptor 2 Confers Responsiveness to Bacterial Lipopolysaccharide. *J. Exp. Med.* **188** (11): 2091–2097
- Kitani, A., Fuss, I., Nakamura, K., Kumaki, F., Usui, T. and Strober, W. 2003. Transforming growth factor (TGF)- β 1-producing regulatory T cells induce Smad-mediated interleukin 10 secretion that facilitates coordinated immunoregulatory activity and amelioration of TGF- β 1-mediated fibrosis *J. Exp. Med.* **198**:1179-1188
- Ko, J. S., Yang, H. R. and Chang, J. Y. 2007. *Lactobacillus plantarum* inhibits epithelial barrier dysfunction and interleukin-8 secretion induced by tumor necrosis factor-alpha. *World J Gastroenterol.* **7**:1962–1975.

- Kokkinos, M. I., Wafai, R., Wong, M. K., Newgreen, D. F., Thompson, E. W. and Waltham, M. 2007. Vimentin and Epithelial-Mesenchymal Transition in Human Breast Cancer – Observations *in vitro* and *in vivo*. *Cells Tissues Organs.* **185**:191–203
- Koshil, R., Mustafa, Y. and Perry, M. E. 2001. Vimentin, cytokeratin 8 and cytokeratin 18 are not specific markers for M-cells in human palatine tonsils. *J. Anat.* **199**: 663-674
- Langkamp-Henken, B., Glezer, J.A. and Kudsk, K. A. 1992. Immunologic structure and function of the gastrointestinal tract. *Nutr. Clin. Pract.* **7**: 100–108.
- Lanza, F., Wolf, D., Fox, C. F., Keffer, N., Seyer, J. M., Fried, V. A., Coughlin, S. R., Phillips, D. R., Jennings, L. K. 1991. cDNA cloning and expression of platelet p24/CD9. Evidence for a new family of multiple membranespanning proteins. *J biol Chem.* **266**:10638–10645.
- Lin, X. P., Almqvist, N and Telemo, E. 2005. Human small intestinal epithelial cells constitutively express the key elements for antigen processing and the production of exosomes. *Blood Cells, Molecules and Diseases* **35**: 122 – 128.
- Löffler, S., Lttspeich, F., Lanza, F., Azorsa, D. O., Meulen, V. T. and Schneider-Schaulies, J. 1997. CD9, a Tetraspan Transmembrane Protein, Renders Cells Susceptible to Canine Distemper Virus. *J. virol.* **71**: 42-49
- Lundberg, U., Vinatzer, U., Berdnik, D., von Gabain, A., Baccarini, M., 1999. Growth phase-regulated induction of Salmonellainduced macrophage apoptosis correlates with transient expression of SPI-1 genes. *J. Bacteriol.* **181**: 3433–3437.
- Ma, D., Forsythe, P. and Bienenstock, J. 2004. Live *Lactobacillus reuteri* is essential for the inhibitory effect on tumor necrosis factor alpha-induced interleukin-8 expression, *Infect. Immun.* **72**: 5308–5314.
- Maaser, C. and Kagnoff, M. F. 2002. Role of the intestinal epithelium in orchestrating innate and adaptive mucosal immunity. *Z. Gastroenterol.* **40**:525–529
- Macha, M., Taras, D., Vahjen, W., Arini, A. and Simon, O. 2004. Specific enumeration of the probiotic strain *Enterococcus faecium* NCIMB 10415 in the intestinal tract and in faeces of piglets and sows. *Arch. Anim. Nutr.* **58**: 443-452.
- Madara, J. L. 1982. Cup cells: structure and distribution of a unique class of epithelial cells in guinea pig, rabbit, and monkey small intestine. *Gastroenterology* **83**: 981–994
- Madry, H., Cucchiari, M., Stein, U., Remberger, K., Menger, M. D., Kohn, D. and Trippel, B. 2003. Sustained transgene expression in cartilage defects transplantation of articular chondrocytes modified by lipid gel suspension delivery system *J Gene Med.* **5**: 502-509.

- Madsen, K. 2006. Probiotics and the immune response. *J. Clin. Gastroenterol.* **40** (3): 232-234.
- Madsen, K., Cornish, A. Soper, P. McKaigney, C. Jijon, H., Yachimec, V., Doyle, J., Jewell, L. and De Simone, C. 2001. Probiotic bacteria enhance murine and human intestinal epithelial barrier function. *Gastroenterology* **121**: 580-591.
- Maia, O. B., Duarte, R., Silva, A. M., Cara, D. C. and Nicoli, J. R. 2001. Evaluation of the components of a commercial probiotic in gnotobiotic mice experimentally challenged with *Salmonella enterica* subsp. Enterica ser. Typhimurium. *Vet. Microbiol.* **79**: 183-189.
- Männer, K. and Spieler, A. 1997. Probiotics in piglets- an alternative to traditional growth promoters. *Microecol. Ther.* **26**: 243-256
- Manzano, M., Abadia-Molina, A. C., Garcia-Olivares, E. G., Gil, A. and Rueda, R. 2002. Absolute counts and distribution of lymphocyte subsets in small intestine of BALB/c Mice change during weaning. *J. Nutr.* **132**: 2757-2762.
- Mankertz, J., Tavalali, S., Schmitz, H., Mankertz, A., Riecken, E. O., Fromm, M. and Schulzke, J. D. 2000. Expression from the human occludin promoter is affected by tumor necrosis factor alpha and interferon gamma. *J Cell Sci.* **113**: 2085-90.
- Marcelo, P. and Lefèvre, F. 2004. IFN- γ Gene Expression in Epithelial Trophectoderm Cells Is Linked to Downregulation of the p44/p42 MAP Kinase Pathway. *J. Interf. Cyt. Res.* **24**(1): 29-36.
- Marteau, P. R., Vrese de, M., Cellier, C. J. and Schrezenmeir, J. 2001. Protection from gastrointestinal diseases with the use of probiotics. *Am J Clin Nutr.* **73**: 430S-6S
- Mastroeni, P., Chabalgoity, J. A., Dunstan, S. J. Maskell, D. J. and Dougan, G. 2000. *Salmonella*: Immune Responses and Vaccines. *Vet. J.* **161**: 132-164
- Mastroeni, P., Vazquez-Torres, A. and Fang, F. 2000. Antimicrobial actions of the nadph phagocyte oxidase and inducible nitric oxide synthase in experimental salmonellosis. II. Effects of microbial proliferation and host survival in vivo. *J. Exp. Med.* **192**: 237-47.
- Mead, P. S., Slutsker, L. Dietz, V. McCraig, L. F. Bresee, J. S. Shapiro, C. Griffin, P. M. and Tauxe, R. V. 1999. Food-related illness and death in the United States. *Emerging Infect. Dis.* **5**: 607-625.
- Meydani, S. N. and Ha, W. K. 2000. Immunologic effects of yogurt. *Am J Clin Nutr.* **71**: 861-72.

- Miller, M. D. and Krangel, M. S. 1992. Biology and biochemistry of the chemokines: a family of chemotactic and inflammatory cytokines. *Crit. Rev. Immunol.* **12**(1-2): 17-46.
- Miossec, P. 1993. Acting on the cytokine balance to control auto-immunity and chronic inflammation. *Eur Cytokine Netw.* **4**: 245-251.
- Miyado, K., G., Yamada, S., Yamada, H., Hasuwa, Y., Nakamura, F., Ryu, K., Kosai, S., Inoue, K. and Ogura, A. 2000. Requirement of CD9 on the egg plasma membrane for fertilization. *Science*. **287**:321–324.
- Moon, H. W., Norman, J. O. and Lambert, G. 1973. Age dependent resistance to TGE of swine. I. Clinical signs and some mucosal dimensions in the small intestine. *Can. J. Comp. Med.* **37**: 157–166.
- Mosmann, T. 1983. Rapid colorimetric assay for cellular growth and survival: application to proliferation and cytotoxicity assays, *J. Immunol. Meth.* **65**: 55–63.
- Moore, K. W., de Waal Malefyt, R., Coffman, R. L. and O'Garra, A. 2001. Interleukin-10 and the interleukin-10 receptor. *Annu. Rev. Immunol.* **19**, 683–765.
- Müller, C. A., Autenrieth, I. B. and Peschel, A. 2005. Innate defenses of the intestinal epithelial barrier. *Cell. Mol. Life* **62**: 1297-1307.
- Nagura, H., Ohtani, T., Masuda, T., Kimura, M. and Nakamura, S. 1991. HLA-DR expression on M cells overlying Peyer's patches is a common feature of human small intestine. *Acta Pathol. Jpn.* **41**:818-823.
- Nava, G. M., Bielke, L. R. Callaway, T. R. and Castañeda, M. P. 2005. Probiotic alternatives to reduce gastrointestinal infections: The poultry experience. *Anim. Health Res. Rev.* **6**:105–118.
- Neish, A. S., Gewirtz, A. T., Zeng, H., Young, A. N., Hobert, M. E., Karmali, V., Rao, A. S. and Madara, J. L. 2000. Prokaryotic regulation of epithelial responses by inhibition of I κ B- α ubiquitination. *Science* **289**: 1560-1563.
- Nemcová, R. 1997. Criteria for selection of lactobacilli for probiotic use. *Vet. Med.* **42**: 19-27.
- Nemeth, E., Fajdiga, S., Malago, J., Koninkx, J., Tooten, P. and van Dijk, J. 2006. Inhibition of *Salmonella*-induced IL-8 synthesis and expression of Hsp70 in enterocyte-like Caco-2 cells after exposure to non-starter lactobacilli. *Int. J. Food Microbiol.* **112**: 266–274.
- Neutra, M. R., Mantis, N. J., Frey, A. and Giannasca, P. J. 1999. The composition and function of M cell apical membranes: implications for microbial pathogenesis. *Semin. Immunol.* **11**: 171–181.

- Nickel, R., Schummer, A. and Seiferle, E. 1987. Lehrbuch der Anatomie der Haustiere, Band II, Paul Parey, Philadelphia.
- Norris, F. A., Wilson, M. P. and Wallis, T. S. 1998. SopB, a protein required for virulence of *Salmonella dublin*, is an inositol phosphate phosphatase. *Proc. Natl. Acad. Sci. USA.* **95**:14057–59.
- O'Hara, A. M., O'Regan, P. and Fanning, A. 2006. Functional modulation of human intestinal epithelial cell responses by *Bifidobacterium infantis* and *Lactoba cillus salivarius*. *Immunology* **118**: 202–215.
- OIE, 2001. Transmissible gastroenteritis http://www.oie.int/fr/normes/mmanual/A_00098.htm
- Ohl, M. E. and Miller, S. I. 2001. *Salmonella*: A model for bacterial pathogenesis. *Ann. Rev. Med.* **52**: 259-74.
- Oliver, M., Berthon, P. and Salmon, H. 1994. Immunohistochemical localization in the intestine of swine of the cellular and humeral components of the immune response. *Vet Res.* **25**(1): 57-65.
- Oswald, I.P. 2006. Role of intestinal epithelial cells in the innate immune defence of the pig intestine. *Vet. Res.* **37**: 359–368
- Ovalle, S., Gutiérrez-López, M. D., Monjas, A. And Cabañas, C. 2007. Implication of the tetraspanin CD9 in the immune system and cancer. *Inmunología*. **26** (2): 65-72.
- Owen, R. L., Pierce, N. F., Apple, R. T. and Cray, W. C. 1986. M cell transport of *Vibrio cholerae* from the intestinal lumen into Peyer's patches: a mechanism for antigen sampling and for microbial transepithelial migration. *J. Infect. Dis.* **153**:1108.
- Ozawa, K., Yabu-Ochi, K., Yamanaka, K., Yamashita, Y., Nomura, S. and Oku, I. 1983. Effect of *Streptococcus faecalis* BIO-4R on intestinal flora of weanling piglets and calves. *Appl. Environ. Microbiol.* **45**: 1513–1518.
- Panja, A., Siden, E. and Mayer, L. 1995. Synthesis and regulation of accessory/proinflammatory cytokines by intestinal epithelial cells. *Clin Exp Immunol.* **100**(2): 298–305.
- Paton, D. J. and Brown, I. H. 1990. Sows infected in pregnancy with porcine respiratory coronavirus show no evidence of protecting their sucking piglets against transmissible gastroenteritis. *Virology* **14**(4): 329-337.
- Pollmann, M., Nordhoff, M., Pospischil, A., Tedin, K. and Wieler, L. H. 2005. Effects of a probiotic strain of *Enterococcus faecium* on the rate of natular Chlamydia infection in swine. *Infect. Immun.* **73**: 4346-4353.

- Rachmilewitz, D., Katakura, K., Karmeli, F., Hayashi, T., Reinus, C., Rudensky, B., Akiram, S., Takeda, K., Lee, J., Takabayashi, K., Raz, E. 2004. Toll-like receptor 9 signaling mediates the anti-inflammatory effects of probiotics in murine experimental colitis. *Gastroenterology* **126** (2): 520-528.
- Raqib R., Mia, S. M. S., Qadri, F., Alam, T. I., Alam, N. H., Chowdhury, A. K., Mathan, M. and Andersson, M. 2000. Innate immune responses in children and adults with shigellosis. *Infect. Immun.* **68**: 3620–3629.
- Regoli, M., Bertelli, E., Borghesi, C. and Nicoletti, C. 1995. Three-dimensional (3D-) reconstruction of M cells in rabbit Peyer's patches: Definition of the intraepithelial compartment of the follicle-associated epithelium. *Anat. Rec.* **243**:19–26.
- Reid, G. and Burton, J. 2002. Use of *Lactobacillus* to prevent infection by pathogenic bacteria. *Microbes and infection. Institut Pasteur*: **4**(3):319-24.
- Rothkötter, H. J. 2009. Anatomical particularities of the porcine immune system. *Dev. Comp. Immunol.* **33**: 267-272.
- Rouabchia,M., Ross, G., Pagé,N. and Chakir, J. 2002. Interleukin-18 and Gamma Interferon Production by Oral Epithelial Cells in Response to Exposure to Candida albicans or Lipopolysaccharide Stimulation. *Inf. Immun.* **70** (12): 7073-7080
- Ruiz, P. A., Hoffmann, M. and Szcesny, S. 2005. Innate mechanisms for Bifidobacter ium lactis to activate transient pro-inflammatory host responses in intestinal epithelial cells after the colonization of germ-free rats. *Immunology*. **115**: 441–450.
- Saalmüller, A., Reddehase, M. J. Bühring, H. J. Jonjic, S. and Koszinowski, U. H. 1987. Simultaneous expression of CD4 and CD8 antigens by a substantial proportion of resting porcine T lymphocytes. *Eur. J. Immunol.* **17**: 1297–1301.
- Saif, L. J. 2004. Animal coronaviruses: what can they teach us about the severe acute respiratory syndrome? *Rev. Sci. Technol.* **23**:643-660.
- Saif, L.J. and Wesley, R.D. 1992. Transmissible gastroenteritis. In: Leman, A.D., Strauss, B.E., Mengeling, W.L., D'Allaire, S. and Taylor, D.J., Editors, 1992. *Diseases of Swine* (7th ed.), Iowa State University Press, Ames, IA, pp. 362–386.
- Sakai, S., Mantani, N., Kogure, T., Ochiai, H., Shimada, Y. and Terasawa, K. 2002. Gene expression of cell surface antigens in the early phase of murine influenza pneumonia determined by a cDNA expression array technique.: *Med. Inflamm.* **11** (6): 359-361.
- Sakata, T., Kojima, T., Fujieda, M., Takahashi, M. and Michibata, T. 2003. Influence of probiotic bacteria on organic acid production by pig caecal bacteria *in vitro*. *Proc. Nutr. Soc.* **62** (1): 73-80.

- Scharek, L., Altherr, B.J., Tolke, C. and Schmidt, M. F. 2007. Influence of the probiotic *Bacillus cereus* var. *toyoi* on the intestinal immunity of piglets, *Vet. Immunol. Immunopathol.* **120**: 136–147.
- Scharek, L., Guth, J., Reiter, K., Weyrauch, K. D., Taras, D., Schwerk, P., Schierack, P., Schmidt, M. F., Wieler, L. H., Tedin, K. 2005. Influence of a probiotic *Enterococcus faecium* strain on the development of the immune system of sows and piglets. *Vet. Immunol. Immunopathol.* **105** (1-2): 151-161.
- Schierack, P., Nordhoff, M. Pollmann, M., Weyrauch, K. D., Amasheh, S. Lodemann, U., Jores, J., Tachu, B. Kleta, S., Blikslager, A. Tedin, K and Wieler, L. H. 2006. Characterization of a porcine intestinal epithelial cell line for in vitro studies of microbial pathogenesis in swine. *Histochem Cell Biol.* **125**: 293–305
- Schneeberger, E. E. and Lynch, R. D. 2004. The tight junction: a multifunctional complex. *Am. J. Physiol. Cell Physiol.* **286**: C1213–C1228.
- Shaykhiev, R. and Bals, R. 2007. Interactions between epithelial cells and leukocytes in immunity and tissue homeostasis. *J. Leukoc. Biol.* **82**: 1-15.
- Skjolaas, K. A. Burkey, T. E. Dritz, S. S. and Minton, J. E. 2006. Effects of *Salmonella enterica* serovars Typhimurium (ST) and Choleraesuis (SC) on chemokine and cytokine expression in swine ileum and jejunal epithelial cells. *Vet Immunol Immunopathol.* **111**:199–209.
- Solano-Aguilar, G. I., Vengroski, K.G., Beshah, E. and Lunney, J. K. 2000. Isolation and purification of lymphocyte subsets from gut-associated lymphoid tissue in neonatal swine, *J. Immunol. Methods* **241**: 185–199.
- Somaja Louis, M. S., John, J. and O'Brien, M. D. 2004. Inhibitory effects of genistein on cytokine expression in colonic epithelial cell line. *South. Med. J.* **97**(10): S14(1).
- Stokes., C. R., Bailey, M. and wilson, A. D. 1994. Immunology of the porcine gastrointestinal tract. *Vet. Immunol. Immunopathol.* **43**: 143-150
- Stratagene, 2004. Introduction to quantitative PCR: Methods and application guide.
www.stratagene.com
- Suzuki, M., Tachibana, I., Takeda, Y. He, P., Minami, S., Iwasaki, T. Kida, H., Goya, S., Kijima, T., Yoshida, M., Kumagai, T., Osaki, T. and Kawase, I. 2009. Tetraspanin CD9 Negatively Regulates Lipopolysaccharide-Induced Macrophage Activation and Lung Inflammation. *J. Immunol.* **182**: 6485-6493.
- Szabó, I., Wieler, L. H., Tedin, K., Tedin, L. S., Taras, D., Hensel, A., Appel, B. and Nöckler, K. 2009. Influence of a Probiotic Strain of *Enterococcus faecium* on *Salmonella*

- enterica* Serovar Typhimurium DT104 Infection in a Porcine Animal Infection Model. *Appl. Environ. Microbiol.* **75** (9): 2621-2628.
- Tachibana, I. and Hemler, M.E. 1999. Role of transmembrane 4 superfamily (TM4SF) proteins CD9 and CD81 in muscle cell fusion and myotube maintenance. *J. Cell Biol.* **146**: 893–904.
- Takabayashi, K., Corr, M., Hayashi, T., Redecke, V., Beck, L., Guiney, D., Sheppard, D., Raz, E. 2006. Induction of a homeostatic circuit in lung tissue by microbial compounds. *Immunity* **24**: 475–487.
- Takano, M., Nishimura, H., Kimura, Y., Washizu, J., Mokuno, Y., Nimura, Y. and Yoshikai, Y. 1998. Prostaglandin E2 protects against liver injury after *Escherichia coli* infection but hampers the resolution of the infection in mice. *J. Immunol.* **161**:3019–3025.
- Takeda, Y., Tachibana, I., Miyado, K., Kobayashi, M., Miyazaki, T., Funakoshi, T., Kimura, H., Yamane, H., Saito, Y., Goto, H., Yoneda, T., Yoshida, M., Kumagai, T., Osaki, T., Hayashi, S., Kawase, I. and Mekada, E. 2003. Tetraspanins CD9 and CD81 function to prevent the fusion of mononuclear phagocytes. *J. Cell Biol.* **161**(5): 945–956
- Taras, D., Vahjen, W., Macha, M. and Simon, O. 2006. Performance, diarrhea incidence, and occurrence of *Escherichia coli* virulence genes during long-term administration of a probiotic *Enterococcus faecium* strain to sows and piglets. *J. Anim. Sci.* **84**: 608-617.
- Tao, 30.1. 2004. <http://hivworkshop.com/may04-3-1.htm>.
- Todoriki, K., Mukai, T., Sato, S. and Toba, T. 2001. Inhibition of adhesion of food-borne pathogens to Caco-2 cells by *Lactobacillus* strains. *J. Appl. Microbiol.* **91**: 154–159.
- Töttemeyer, S., Kaiser, P., Maskell, D. J. and Bryant, C. E. 2005. Sublethal Infection of C57BL/6 Mice with *Salmonella enterica* Serovar Typhimurium Leads to an Increase in Levels of Toll-Like Receptor 1 (TLR1), TLR2, and TLR9 mRNA as Well as a Decrease in Levels of TLR6 mRNA in Infected Organs. *Infect. Immun.* **73** (3): 1873–1878.
- Turner, J. R. 2003. Functional morphology of the intestinal mucosae: from crypts to tips in Microbial pathogenesis and the intestinal epithelial cell, ed. By Hecht, G. ASM Press, Washington D.C. 1-42.
- Uchiya, K.I. and Nikai, T. 2004. *Salmonella enterica* Serovar Typhimurium infection induces cyclooxygenase 2 expression in macrophages: involvement of *Salmonella* pathogenicity island 2. *Infect. Immun.* **72**(12): 6860–6869.

- Ukena, S. N., Westendorf, A. M. and Hansen, W. 2005. The host response to the probiotic *Escherichia coli* strain Nissle 1917: specific up-regulation of the proinflammatory chemokine MCP-1. *BMC Med Genet.* **6:** 43.
- Vahjen W. and Männer, K. 2003. The effect of a probiotic *Enterococcus faecium* product in diets of healthy dogs on bacteriological counts of *Salmonella* spp., *Campylobacter* spp. and *Clostridium* spp. in faeces. *Arch Tierernahr.* **57:** 229-33.
- Vahjen, W., Taras, D. and Simon, O. 2007. Effect of the probiotic *Enterococcus faecium* NCIMB10415 on cell numbers of total *Enterococcus* spp., *E. faecium* and *E. faecalis* in the intestine of piglets. *Curr. Iss. Int. Microbiol.* **8:** 1–8.
- Valeur, N., Engel, P., Carbalal, N., Connolly, E. and Ladefoged, K. 2004. Colonization and immunomodulation by *Lactobacillus reuteri* ATCC 55730 in the human gastrointestinal tract, *Appl. Env. Microbiol.* **70:** 1176–1181.
- Van Cott, J. L., Brim, T.A., Lunney, J.K. and Saif, L.J. 1994. Contribution of antibody-secreting cells induced in mucosal lymphoid tissues of pigs inoculated with respiratory or enteric strains of coronavirus to immunity against enteric coronavirus challenge. *J. Immunol.* **152:** 3980-90.
- Van Nieuwstadt, A.P., Zetstra, T. and Boonstra, J. 1989. Infection with porcine respiratory coronavirus does not fully protect pigs against intestinal transmissible gastroenteritis virus. *Vet. Rec.* **125:** 58-60
- Wagner, J.E., Beamer, P.D. and Ristic, M. 1973. Electron microscopy of intestinal epithelial cells of piglets infected with a transmissible gastroenteritis virus. *Can. J. Comp. Med.* **37:** 177-188.
- Watthana, T, Koichi, O. and Toshiyuki, M. 2006. Inhibitory effects of *Enterococcus* strains obtained from a probiotic product on in vitro growth of *Salmonella* enterica serovar enteritidis strain IFO3313. *J. Food Prot.* **69:** 2258-2262.
- Weckmann, A. L. and Varela, J. A. 1996. Cytokine Inhibitors in Autoimmune Disease. *Semin Arthritis Rheum.* **126** (2): 539-557.
- Weingartl, H. M. and Derbyshire, J. B. 1993. Binding of porcine transmissible gastroenteritis virus by enterocytes from newborn and weaned piglets. *Vet. Microbiol.* **35:** 23-32.
- Weiss, E., Mamelak, A. J., La Morgia, S., Wang, B., Feliciani, C., Tulli, A., Sauder, D. N. 2004. The role of interleukin 10 in the pathogenesis and potential treatment of skin diseases. *J. Am. Acad. Dermatol.* **50:** 657–675.

- Weiss, S. R. and Martin, S. N. 2005. Coronavirus pathogenesis and the emerging pathogen severe acute respiratory syndrome coronavirus. *Microbiol. Mol. Biol. Rev.* **69**(4): 635–664.
- Willet, B. J., Hosie, M. J., Jarrett, O. and Neil, J. C. 1994. Identification of a putative cellular receptor for feline immunodeficiency virus as the feline homologue of CD9. *Mol. Immunol.* **32**: 417–423.
- Witthoft, T., Eckmann, L., Kim, J. M., Kagnoff, M. F. 1998. Enteroinvasive bacteria directly activate expression of iNOS and NO production in human colon epithelial cells. *Am. J. Physiol.* **275**: G564–G571.
- Wood, R.L. Pospischil, A. and Rose, R. 1989. Distribution of persistent *Salmonella typhimurium* infection in internal organs of swine. *Am. J. Vet. Res.* **50**: 1015–1021.
- Yubero, N., Jiménez-Marin, A., Yerle, M., Morera, L., Barbancho, M. J., Llanes, D. and Garrido, J. J. 2003. Molecular cloning, expression pattern and chromosomal mapping of pig CD9 antigen. *Cytogenet. Genome Res.* **101**:143–146.
- Yuan, Q. and Walker, W. A. 2004. Innate immunity of the gut: mucosal defense in health and disease. *Gastroenterol. Nutr.* **38**:463–473.