

REFERENCES

- Adachi O, Kawai T, Takeda K, Matsumoto M, Tsutsui H, Sakagami M, Nakanishi K and Akira S. (1998) Targeted disruption of the MyD88 gene results in loss of IL-1- and IL-18-mediated function. *Immunity*. **9** 143-150.
- Aksoy E, Zouain CS, Vanhoutte F, Fontaine J, Pavelka N, Thieblemont N, Willems F, Ricciardi-Castagnoli P, Goldman M, Capron M, Ryffel B and Trottein F. (2005) Double-stranded RNAs from the helminth parasite *Schistosoma* activate TLR3 in dendritic cells. *J Biol Chem*. **280** 277-283.
- Albelda SM, Smith CW and Ward PA. (1994) Adhesion molecules and inflammatory injury. *FASEB J*. **8** 504-512.
- Allen JE, Loke P. (2001) Divergent roles for macrophages in lymphatic filariasis. *Parasite Immunol*. **23** 345-352.
- Andrade MA, Siles-Lucas M, Lopez-Aban J, Carranza C, Perez-Arellano JL and Muro A. (2005a) Antigens from *Ascaris suum* trigger *in vitro* macrophage NO production. *Parasite Immunol*. **27** 235-242.
- Andrade MA, Siles-Lucas M, Lopez-Aban J, Perez-Arellano JL, Velez ID and Muro A. (2005b) Lung-migrating digenean parasites: *in vitro* influence on nitric oxide production from normal rat pulmonary macrophages. *Exp Parasitol*. **109** 171-175.
- Andrade MA, Siles-Lucas M, Perez Arellano JL, Pou Barreto C, Valladares B, Espinoza E and Muro A. (2005c) Increased rat alveolar macrophage expression of functional iNOS induced by a *Dirofilaria immitis* immunoglobulin superfamily protein. *Nitric Oxide*. **13** 217-225.

Angeli V, Faveeuw C, Roye O, Fontaine J, Teissier E, Capron A, Wolowczuk I, Capron M and Trottein F. (2001) Role of the parasite-derived prostaglandin D2 in the inhibition of epidermal Langerhans cell migration during *schistosomiasis* infection. *J. Exp. Med.* **193** 1135–1147.

Arizono N, Nishida M, Uchikawa R, Yamada M, Matsuda S, Tegoshi T, Kitamura Y and Sasabe M. (1996) Lung granulomatous response induced by infection with the intestinal nematode *Nippostrongylus brasiliensis* is suppressed in mast cell-deficient Ws/Ws rats. *Clin Exp Immunol* **106** 55-61.

Armstrong PB. (2001) The contribution of proteinase inhibitors to immune defense. *Trends Immunol.* **22** 47-52.

Artis D, Kane CM, Fiore J, Zaph C, Shapira S, Joyce K, Macdonald A, Hunter C, Scott P and Pearce EJ. (2005) Dendritic cell-intrinsic expression of NF-kappa B1 is required to promote optimal Th2 cell differentiation. *J Immunol.* **174** 7154-7159.

Artis D, Shapira S, Mason N, Speirs KM, Goldschmidt M, Caamaño J, Liou HC, Hunter CA and Scott P. (2002) Differential requirement for NF-kappa B family members in control of helminth infection and intestinal inflammation. *J Immunol.* **169** 4481-4487.

Awasthi S, Bundy DAP and Savioli L. (2003) Helminth infections. *BMJ.* **327** 431-433.

Babu S, Blauvelt CP, Kumaraswami V and Nutman TB. (2006) Cutting edge: diminished T cell TLR expression and function modulates the immune response in human filarial infection. *J Immunol.* **176** 3885-3889.

- Baeuerle PA and Henkel T. (1994) Function and activation of NF-kappa B in the immune system. *Annu Rev Immunol.* **12** 141-179.
- Baldassare JJ, Bi Y, Bellone CJ. (1999) May. The role of p38 mitogen-activated protein kinase in IL-1 beta transcription. *J Immunol* **162** 5367-5373.
- Balic A, Harcus Y, Holland MJ and Maizels RM. (2004) Selective maturation of dendritic cells by *Nippostrongylus brasiliensis*-secreted proteins drives Th2 immune responses. *Eur J Immunol.* **34** 3047-3059.
- Ball G, Selkirk ME and Knox DP. (2007) The effect of vaccination with a recombinant *Nippostrongylus brasiliensis* acetylcholinesterase on infection outcome in the rat. *Vaccine.* **25** 3365-3372.
- Bancroft AJ, McKenzie AN and Grencis RK. (1998) A critical role for IL-13 in resistance to intestinal nematode infection. *J Immunol.* **160** 3453-3461.
- Bank U and Ansorge S. (2001) More than destructive: neutrophil-derived serine proteases in cytokine bioactivity control. *J Leukoc Biol.* **69** 197-206.
- Barnes PJ and Liew FY. (1995) Nitric oxide and asthmatic inflammation. *Immunol Today.* **16** 128-130.
- Barnes PJ, Shapiro SD and Pauwels RA. (2003) Chronic obstructive pulmonary disease: molecular and cellular mechanisms. *Eur Respir J.* **22** 672-688.
- Baron, S. (1996) Medical microbiology. (4th ed) Galveston, The University of Texas Medical Branch at Galveston.
- Bashir ME, Andersen P, Fuss IJ, Shi HN and Nagler-Anderson C. (2002) An enteric helminth infection protects against an allergic response to dietary antigen. *J Immunol.* **169** 3284-3292.

Bass DA and Szejda P. (1979) Mechanisms of killing of newborn larvae of *Trichinella spiralis* by neutrophils and eosinophils. Killing by generators of hydrogen peroxide in vitro. *J Clin Invest.* **64** 1558-1564.

Batra S, Srivastava JK, Gupta S, Katiyar JC and Srivastava VM. (1993) Role of reactive oxygen species in expulsion of *Nippostrongylus brasiliensis* from rats. *Parasitology* **106** 185-192.

Beckman JS and Koppenol WH. (1996) Nitric oxide, superoxide, and peroxynitrite: the good, the bad, and ugly. *Am J Physiol.* **271** C1424-1437.

Beck-Schimmer B, Schimmer RC, Warner RL, Schmal H, Nordblom G, Flory CM, Lesch ME, Friedl HP, Schrier DJ and Ward PA. (1997) Expression of lung vascular and airway ICAM-1 after exposure to bacterial lipopolysaccharide. *Am J Respir Cell Mol Biol.* **17** 344-352.

Benbernou N, Matsiota-Bernard P, Jolivet C, Ougen P and Guenounou M. (1992) Tumour necrosis factor, IL-1 and IL-6 in bronchoalveolar washings and their in vitro production during *Nippostrongylus brasiliensis* infection. *Clin Exp Immunol.* **88** 264-268.

Bennion BJ and Daggett V. (2004) Counteraction of urea-induced protein denaturation by trimethylamine N-oxide: a chemical chaperone at atomic resolution. *Proc Natl Acad Sci U S A.* **101** 6433-6438

Berger RB, Blackwell NM, Lass JH, Diaconu E and Pearlman E. (2002) IL-4 and IL-13 regulation of ICAM-1 expression and eosinophil recruitment in *Onchocerca volvulus* keratitis. *Invest Ophthalmol Vis Sci.* **43** 2992-2997.

Beutler B, Hoebe K, Du X and Ulevitch RJ. (2003) How we detect microbes and respond to them: the Toll-like receptors and their transducers. *J Leukoc Biol* **74** 479-485.

Bi Y, Liu G and Yang R. (2007) Th17 cell induction and immune regulatory effects. *J Cell Physiol.* **211** 273-278.

Black RA, Kronheim SR and Sleath PR. (1989). Activation of interleukin-1 beta by a co-induced protease. *FEES Lett* **247** 386-390.

Blackburn CC and Selkirk ME. (1992) Characterisation of the secretory acetylcholinesterases from adult *Nippostrongylus brasiliensis*. *Mol Biochem Parasitol.* **53** 79-88.

Blackburn CC and Selkirk ME. (1992) Inactivation of platelet-activating factor by a putative acetylhydrolase from the gastrointestinal nematode parasite *Nippostrongylus brasiliensis*. *Immunology.* **75** 41–46.

Bochner BS, Klunk DA, Sterbinsky SA, Coffman RL and Schleimer RP. (1995) IL-13 selectively induces vascular cell adhesion molecule-1 expression in human endothelial cells. *J Immunol.* **154** 799-803.

Bogdan C and Nathan C. (1993) Modulation of macrophage function by transforming growth factor beta, interleukin-4, and interleukin-10. *Ann N Y Acad Sci.* **685** 713-739.

Boucher JL, Moali C and Tenu JP. (1999) Nitric oxide biosynthesis, nitric oxide synthase inhibitors and arginase competition for L-arginine utilization. *Cell Mol Life Sci.* **55** 1015-1128.

Boutard V, Havouis R, Fouqueray B, Philippe C, Moulinoux JP and Baud L. (1995) Transforming growth factor-beta stimulates arginase activity in macrophages. Implications for the regulation of macrophage cytotoxicity. *J Immunol.* **155** 2077-2084

Bradford MM. (1976) A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. *Anal Biochem.* **72** 248-254.

Britton C, Knox DP and Kennedy MW. (1994) Superoxide dismutase (SOD) activity of *Dictyocaulus viviparus* and its inhibition by antibody from infected and vaccinated bovine hosts. *Parasitol.* **109** 257-263.

Brophy PM, Patterson LH and Pritchard DL. (1995) Secretory nematode SOD--offensive or defensive? *Int J Parasitol.* **25** 865-866.

Brown A, Girod N, Billett EE and Pritchard DI. (1999) *Necator americanus* (human hookworm) aspartyl proteinases and digestion of skin macromolecules during skin penetration. *Am J Trop Med Hyg.* **60** 840-847.

Brunet LR, Beall M, Dunne DW and Pearce EJ. (1999) Nitric oxide and the Th2 response combine to prevent severe hepatic damage during *Schistosoma mansoni* infection. *J Immunol.* **163** 4976-4984.

Bruschi F, Solfanelli S and Binaghi RA. (1992) *Trichinella spiralis*: modifications of the cuticle of the newborn larva during passage through the lung. *Exp Parasitol.* **75** 1-9.

Bruschi F. (1992) The significance of the 'lung phase' in host-helminth relations. *Parassitologia.* **34** 23-30.

Burns AR, Smith CW and Walker DC. (2003) Unique structural features that influence neutrophil emigration into the lung. *Physiol Rev.* **83** 309-336.

Caamano J and Hunter CA. (2002) NF-kappaB family of transcription factors: central regulators of innate and adaptive immune functions. *Clin Microbiol Rev.* **15** 14-29.

Caffrey CR and Ryan MF. (1994) Characterisation of proteolytic activity of excretory-secretory products from adult *Strongylus vulgaris*. *Vet Parasitol.* **52** 285-296.

Cantin AM, Fells GA, Hubbard RC and Crystal RG. (1990) Antioxidant macromolecules in the epithelial lining fluid of the normal human lower respiratory tract. *J Clin Invest.* **86** 962-971.

Carlos TM and Harlan JM. (1994) Leukocyte-endothelial adhesion molecules. *Blood.* **84** 2068-2101.

Casaravilla C, Malgor R and Carmona C. (2003) Characterization of carbohydrates of adult *Echinococcus granulosus* by lectin-binding analysis. *J Parasitol.* **89** 57-61.

Caspersen C, Pedersen PS and Treiman M. (2000) The sarco-endoplasmic reticulum calcium-ATPase 2b is an endoplasmic reticulum stress-inducible protein. *J Biol Chem.* **275** 22363-22372.

Chandrashekar R, Rao UR, Parab PB and Subrahmanyam D. (1986) *Brugia malayi*: rat cell interactions with infective larvae mediated by complement. *Exp Parasitol.* **62** 362-369.

Charmoy M, Megnekou R, Allenbach C, Zweifel C, Perez C, Monnat K, Breton M, Ronet C, Launois P and Tacchini-Cottier F. (2007) *Leishmania major* induces distinct neutrophil phenotypes in mice that are resistant or susceptible to infection. *J Leukoc Biol.* **82** 288-299.

Chen CC, Rosenbloom CL, Anderson DC and Manning AM. (1995) Selective inhibition of E-selectin, vascular cell adhesion molecule-1, and intercellular adhesion molecule-1 expression by inhibitors of I kappa B-alpha phosphorylation. *J Immunol.* **155** 3538-3545.

Chensue SW, Ruth JH, Warmington K, Lincoln P and Kunkel SL. (1995) *In vivo* regulation of macrophage IL-12 production during type 1 and type 2 cytokine-mediated granuloma formation. *J Immunol.* **155** 3546-3551.

Coimbra R, Melbostad H, Loomis W, Porcides RD, Wolf P, Tobar M and Hoyt DB. (2006) LPS-induced acute lung injury is attenuated by phosphodiesterase inhibition: effects on proinflammatory mediators, metalloproteinases, NF-kappaB, and ICAM-1 expression. *J Trauma.* **60** 115-125.

Colley DG, LoVerde PT and Savioli L. (2001) Medical Helminthology in the 21st Century. *Science.* **293** 1437-1438.

Compton SJ and Jones CG.(1985) Mechanism of dye response and interference in the Bradford protein assay. *Anal Biochem.* **151** 369-374.

Cooke A, Zaccane P, Raine T and Phillips JM. (2004). Infection and autoimmunity: are we winning the war, only to lose the peace? *Trends in Parasitology.* **20** 316-321.

- Corraliza IM, Soler G, Eichmann K and Modolell M. (1995) Arginase induction by suppressors of nitric oxide synthesis (IL-4, IL-10 and PGE2) in murine bone-marrow-derived macrophages. *Biochem Biophys Res Commun.* **206** 667-673.
- Cox FEG. (2002) History of human parasitology. *Clin. Microbiol Rev.* **15** 595-612.
- Cox GN, Kusch M and Edgar RS. (1981) Cuticle of *Caenorhabditis elegans*: its isolation and partial characterization. *J Cell Biol.* **90** 7-17.
- Croese J, O'neil J, Masson J, Cooke S, Melrose W, Pritchard D and Speare R. (2006) A proof of concept study establishing *Necator americanus* in Crohn's patients and reservoir donors. *Gut.* **55** 136-137.
- D'Acquisto F and Ianaro A. (2006) From willow bark to peptides: the ever widening spectrum of NF-kappaB inhibitors. *Curr Opin Pharmacol.* **6** 387-392.
- Dainichi T, Maekawa Y, Ishii K and Himeno K. (2001a). Molecular cloning of a cystatin from parasitic intestinal nematode, *Nippostrongylus brasiliensis*. *J Med Invest.* **48** 81-87.
- Dainichi T, Maekawa Y, Ishii K, Zhang T, Nashed BF, Sakai T, Takashima M and Himeno K. (2001b) Nippocystatin, a cysteine protease inhibitor from *Nippostrongylus brasiliensis*, inhibits antigen processing and modulates antigen-specific immune response. *Infect Immun.* **69** 7380-7386.
- Daly CM, Mayrhofer G and Dent LA. (1999) Trapping and immobilization of *Nippostrongylus brasiliensis* larvae at the site of inoculation in primary infections of interleukin-5 transgenic mice. *Infect Immun.* **67** 5315-5323.

Davies SJ, Shoemaker CB and Pearce EJ. (1998) A divergent member of the transforming growth factor b receptor family from *Schistosoma mansoni* is expressed on the parasite surface membrane. *J Biol Chem* **273** 11234-11240.

de Haas CJ, van der Tol ME, Van Kessel KPM, Verhoef J, and Van Strijp JAG. (1998) A synthetic lipopolysaccharide-binding peptide based on amino acids 27–39 of serum amyloid P component inhibits lipopolysaccharide-induced responses in human blood. *J Immunol.* **161** 3607-3615.

de Jong EC, Vieira PL, Kalinski P, Schuitemaker JH, Tanaka Y, Wierenga EA, Yazdanbakhsh M and Kapsenberg ML. (2002) Microbial compounds selectively induce TH1 cell-promoting or TH2 cell-promoting dendritic cells *in vitro* with diverse TH cell-polarizing signals. *J Immunol.* **168** 1704-1709.

de Moraes Neto AH, Lanfredi RM and de Souza W. (2002) Deep-etched view of the cuticle of adults of *Litomosoides chagasi* (Nematoda: Filarioidea). *Parasitol Res.* **88** 849-854.

Del VM, Bajetta E, Canova S, Lotze MT, Wesa A, Parmiani G and Anichini A. (2007) Interleukin-12: biological properties and clinical application. *Clin Cancer Res* **13** 4677-4685.

Dell A, Haslam SM, Morris HR and Khoo K-H. (1999) Immunogenic glycoconjugates implicated in parasitic nematode diseases. *Biochim Biophys Acta.* **1455** 353-362.

Denicola DB, Rebar AH and Henderson RF. (1981). Early damage indicators in the lung. V. Biochemical and cytological response to NO₂ inhalation. *Toxicol. Appl. Pharmacol.* **60** 301-303.

Dent LA, Daly CM, Mayrhofer G, Zimmerman T, Hallett A, Bignold LP, Creaney J and Parsons JC. (1999) Interleukin-5 transgenic mice show enhanced resistance to primary infections with *Nippostrongylus brasiliensis* but not primary infections with *Toxocara canis*. *Infect Immun.* **67** 989-993.

Diamond MS, Staunton DE, Marlin SD and Springer TA. (1991) Binding of the integrin Mac-1 (CD11b/CD18) to the third immunoglobulin-like domain of ICAM-1 (CD54) and its regulation by glycosylation. *Cell.* **65** 961-971.

Dinarello CA. (1988) Biology of interleukin-1. *FASEB j.* **2** 108-115.

Dinarello CA. (1994) The interleukin-1 family: 10 years of discovery. *FASEB j.* **8** 1314.

Dinarello CA. (1996) Biologic Basis for Interleukin-1 in Disease. *Blood.* **87** 2095-2147.

Dirgahayu P, Fukumoto S, Miura K and Hirai K. (2002) Excretory/secretory products from plerocercoids of *Spirometra erinaceieuropaei* suppress the TNF- α gene expression by reducing phosphorylation of ERK1/2 and p38 MAPK in macrophages. *Int J Parasitol.* **32** 1155-1162.

Dirgahayu P, Fukumoto S, Tademoto S, Kina Y and Hirai K. (2004) Excretory/secretory products from plerocercoids of *Spirometra erinaceieuropaei* suppress interleukin-1 β gene expression in murine macrophages. *Int J Parasitol* **34** 577-584.

Doherty TM, Kastelein R, Menon S, Andrade S and Coffman RL. (1993) Modulation of murine macrophage function by IL-13. *J Immunol.* **151** 7151-7160.

Downey GP, Worthen GS, Henson PM and Hyde DM. (1993) Neutrophil sequestration and migration in localized pulmonary inflammation. Capillary localization and migration across the interalveolar septum. *Am Rev Respir Dis.* **147** 168-176.

Doz E, Rose S, Nigou J, Gilleron M, Puzo G, Erard F, Ryffel B and Quesniaux VF. (2007) Acylation determines the toll-like receptor (TLR)-dependent positive versus TLR2-, mannose receptor-, and SIGNR1-independent negative regulation of pro-inflammatory cytokines by mycobacterial lipomannan. *J Biol Chem.* **282** 26014-26025.

Drapier JC, Wietzerbin J and Hibbs JB Jr. (1988) Interferon-gamma and tumor necrosis factor induce the L-arginine-dependent cytotoxic effector mechanism in murine macrophages. *Eur J Immunol.* **18** 1587-1592.

Driscoll KE, Hassenbein DG, Howard BW, Isfort RJ, Cody D, Tindal MH, Suchanek M and Carter JM. (1995) Cloning, expression, and functional characterization of rat MIP-2: a neutrophil chemoattractant and epithelial cell mitogen. *J Leukoc Biol.* **58** 359-364.

Dunne A and O'Neill LA. (2003) The interleukin-1 receptor/Toll-Like receptor superfamily: signal transduction during inflammation and host defense. *Sci STKE.* **171** re3.

Dzik JM, Gołos B, Jagielska E, Kapała A and Wałajtys-Rode E. (2002) Early response of guinea-pig lungs to *Trichinella spiralis* infection. *Parasite Immunol.* **24** 369-379.

Edwards AJ, Burt JS and Ogilvie BM. (1971) The effect of immunity upon some enzymes of the parasitic nematode, *Nippostrongylus brasiliensis*. *Parasitol.* **62** 339-347.

Egwang TG, Befus AD and Gauldie J. (1985) Activation of alveolar macrophages following infection with the parasitic nematode *Nippostrongylus brasiliensis*. *Immunol.* **54** 581-588.

Egwang TG, Gauldie J and Befus D. (1984) Broncho-alveolar leukocyte responses during primary and secondary *Nippostrongylus brasiliensis* infection in the rat. *Parasite Immunol.* **6** 191-201.

Ehrenberg L, Fedorcsak I and Solymosy F. (1976) Diethyl pyrocarbonate in nucleic acid research. *Prog Nucleic Acid Res Mol Biol.* **16** 189-262.

Elliott DE, Li J, Blum A, Metwali A, Qadir K, Urban JF Jr and Weinstock JV. (2003) Exposure to schistosome eggs protects mice from TNBS-induced colitis. *Am J Physiol Gastrointest Liver Physiol.* **284** G385-G391.

Elliott DE, Setiawan T, Metwali A, Blum A, Urban JF Jr and Weinstock JV. (2004) *Heligmosomoides polygyrus* inhibits established colitis in IL-10-deficient mice. *Eur J Immunol.* **34** 2690-2698.

Espinoza E, Muro A, Martin MM, Casanueva P and Perez-Arellano JL. (2002a) *Toxocara canis* antigens stimulate the production of nitric oxide and prostaglandin E2 by rat alveolar macrophages. *Parasite Immunol.* **24** 311-319.

Espinoza E, Perez-Arellano JL, Vicente B and Muro A. (2002b) Cytoplasmic signalling pathways in alveolar macrophages involved in the production of nitric oxide after stimulation with excretory/secretory antigens of *Toxocara canis*. *Parasite Immunol.* **24** 535-544.

Esterre P, Raobelison A, Ramarokoto CE, Ravaoalimalala VE, Boisier P and Roux J. (1998) Serum concentrations of sICAM-1, sE-, sP- and sL-selectins in patients with *Schistosoma mansoni* infection and association with disease severity. *Parasite Immunol.* **20** 369-76.

Falcone FH and Pritchard DI. (2005) Parasite role reversal: worms on trial. *Trends Parasitol.* **21** 157-160.

Feldmann M, Brennan FM and Maini RN. (1996) Role of cytokines in rheumatoid arthritis. *Annu. Rev. Immunol.* **14** 397-440.

Ferens WA, Arai HP and Befus AD. (1994) Bronchoalveolar leucocyte responses to trickle infections with *Nippostrongylus brasiliensis* in rats. *J Parasitol.* **80** 654-656.

Finkelman FD, Madden KB, Cheever AW, Katona IM, Morris SC, Gately MK, Hubbard BR, Gause WC and Urban JF Jr. (1994) Effects of interleukin 12 on immune responses and host protection in mice infected with intestinal nematode parasites. *J Exp Med.* **179** 1563-1572.

Finkelman FD, Shea-Donohue T, Goldhill J, Sullivan CA, Morris SC, Madden KB, Gause WC and Urban JF Jr. (1997) Cytokine regulation of host defense against parasitic gastrointestinal nematodes: lessons from studies with rodent models. *Ann Rev Immunol.* **15** 505-533.

Finkelman FD, Shea-Donohue T, Morris SC, Gildea L, Strait R, Madden KB, Schopf L and Urban JF Jr. (2004) Interleukin-4- and interleukin-13-mediated host protection against intestinal nematode parasites. *Immunol Rev.* **201** 139-155.

Flynn RJ and Mulcahy G. (2008) Possible role for Toll-like receptors in interaction of *Fasciola hepatica* excretory/secretory products with bovine macrophages. *Infect Immun.* **76** 678-684.

Freudenberg MA, Tchapchet S, Keck S, Fejer G, Huber M, Schütze N, Beutler B and Galanos C. (2008) Lipopolysaccharide sensing an important factor in the innate immune response to Gram-negative bacterial infections: benefits and hazards of LPS hypersensitivity. *Immunobiol.* **213** 193-203.

Freudenstein-Dan A, Gold D and Fishelson Z. (2003) Killing of schistosomes by elastase and hydrogen peroxide: implications for leukocyte-mediated schistosome killing. *J Parasitol.* **89** 1129-1135.

Frydas S, Papaioannou N, Reale M, Barbacane RC and Conti P. (2002) MCP-1 and MIP-2 response in *Trichinella spiralis* infected mice treated with 4-deoxypyridoxine (4-DPD). *Immunol Lett.* **83** 31-37.

Fukumoto S, Hirai K, Tanihata T, Ohmori Y, Stuehr DJ and Hamilton TA. (1997) Excretory/secretory products from plerocercoids of *Spirometra erinacei* reduce iNOS and chemokine mRNA levels in peritoneal macrophages stimulated with cytokines and/or LPS. *Parasite Immunol.* **19** 325-332.

Galanos C and Freudenberg MA. (1993) Mechanisms of endotoxin shock and endotoxin hypersensitivity. *Immunobiology.* **187** 346-356.

Galanos C, Lüderitz O, Rietschel ET and Westphal O. (1977) Newer aspects of the chemistry and biology of bacterial lipopolysaccharides, with special reference to their lipid A component. University Park Press, Baltimore. **14** 239–335.

Gamble HR, Fetterer RH and Mansfield LS. (1996) Developmentally regulated zinc metalloproteinases from third- and fourth-stage larvae of the ovine nematode *Haemonchus contortus*. *J Parasitol.* **82** 197-202.

Ghosh S, May MJ and Kopp EB. (1998) NF-kappa B and Rel proteins: evolutionarily conserved mediators of immune responses. *Annu Rev Immunol.* **16** 225-260.

Giacomin PR, Gordon DL, Botto M, Daha MR, Sanderson SD, Taylor SM and Dent LA. (2008) The role of complement in innate, adaptive and eosinophil-dependent immunity to the nematode *Nippostrongylus brasiliensis*. *Mol Immunol.* **45** 446-455.

Giacomin PR, Wang H, Gordon DL, Botto M and Dent LA. (2005) Loss of complement activation and leukocyte adherence as *Nippostrongylus brasiliensis* develops within the murine host. *Infect Immun.* **73** 7442-7449.

Giacomin PR, Wang H, Gordon DL and Dent LA. (2004) Quantitation of complement and leukocyte binding to a parasitic helminth species. *J Immunol Methods.* **289** 201-210.

Gomez-Escobar N, Gregory WF and Maizels RM. (2000) Identification of Bm-tgh-2, a filarial nematode homolog of *C. elegans* daf-7 and human TGF- β , expressed in microfilarial and adult stages of *Brugia malayi*. *Infect. Immun.* **68** 6402-6410.

Gomez-Escobar N, Lewis E and Maizels RM. (1998) A novel member of the transforming growth factor- β (TGF- β) superfamily from the filarial nematodes *Brugia malayi* and *B. pahangi*. *Exp Parasitol.* **88** 200-209.

Goodridge HS, Marshall FA, Else KJ, Houston KM, Egan C, Al-Riyami L, Liew FY, Harnett W and Harnett MM. (2005) Immunomodulation via novel use of TLR4 by the filarial nematode phosphorylcholine-containing secreted product, ES-62. *J Immunol.* **174** 284-293.

Goodridge HS, Wilson EH, Harnett W, Campbell CC, Harnett MM and Liew FY. (2001) Modulation of macrophage cytokine production by ES-62, a secreted product of the filarial nematode *Acanthocheilonema viteae*. *J Immunol.* **167** 940-945.

Gopinath R, Ostrowski M, Justement SJ, Fauci AS and Nutman TB. (2000) Filarial infections increase susceptibility to human immunodeficiency virus infection in peripheral blood mononuclear cells *in vitro*. *J Infect Dis.* **182** 1804-1808.

Green L, Wagner D, Glogowski J, Skipper P, Wishnok J and Tannenbaum S. (1982) Analysis of nitrate, nitrite and [14N] nitrite in biological fluids. *Anal Biochem.* **126** 131-138.

Grigg ME, Tang L, Hussein AS and Selkirk ME. (1997) Purification and properties of monomeric (G1) forms of acetylcholinesterase secreted by *Nippostrongylus brasiliensis*. *Mol Biochem Parasitol.* **90** 513-524.

Gruden-Movsesijan A, Ilic N and Sofronic-Milosavljevic L. (2002) Lectin-blot analyses of *Trichinella spiralis* muscle larvae excretory-secretory components. *Parasitol Res.* **88** 1004-1007.

Gruden-Movsesijan A and Milosavljevic L. (2006) The involvement of the macrophage mannose receptor in the innate immune response to infection with parasite *Trichinella spiralis*. *Vet Immunol Immunopathol.* **109** 57-67.

Grzych JM, Dissous C, Capron M, Torres S, Lambert PH and Capron A. (1987) *Schistosoma mansoni* shares a protective carbohydrate epitope with keyhole limpet hemocyanin. *J Exp Med.* **165** 865-878.

Haley AJ. (1961) Biology of the rat nematode, *Nippostrongylus brasiliensis* (Travassos, 1914). II. Preparasitic stages and development in the laboratory rat. *J Parasitol.* **47** 727-732.

Haley AJ. (1962a) Biology of the rat nematode, *Nippostrongylus brasiliensis* (Travassos, 1914). II. Preparastic stages and development in the laboratory rat. *J Parasitol.* **48** 13-23.

Hall LR, Diaconu E, Patel R and Pearlman E. (2001) CXC chemokine receptor 2 but not C-C chemokine receptor 1 expression is essential for neutrophil recruitment to the cornea in helminth-mediated keratitis (river blindness). *J Immunol.* **166** 4035-4041.

Hamann KJ, Gleich GJ, Checkel JL, Loegering DA, McCall JW and Barker RL. (1990) *In vitro* killing of microfilariae of *Brugia pahangi* and *Brugia malayi* by eosinophil granule proteins. *J Immunol.* **144** 3166-3173.

Han Z, Boyle DL, Manning AM and Firestein GS. (1998) AP-1 and NF-kappaB regulation in rheumatoid arthritis and murine collagen-induced arthritis. *Autoimmunity.* **28** 197-208.

Harnett W and Harnett MM. (2006) Filarial nematode secreted product ES-62 is an anti-inflammatory agent: therapeutic potential of small molecule derivatives and ES-62 peptide mimetics. *Clin Exp Pharmacol Physiol.* **33** 511-518.

Hart PH, Vitti GF, Burgess DR, Whitty GA, Piccoli DS and Hamilton JA. (1989) Potential antiinflammatory effects of interleukin 4: suppression of human

monocyte tumor necrosis factor alpha, interleukin 1, and prostaglandin E2. *Proc Natl Acad Sci U S A.* **86** 3803-3807.

Hartner A, Veelken R, Wittmann M, Cordasic N and Hilgers KF. (2005) Effects of diabetes and hypertension on macrophage infiltration and matrix expansion in the rat kidney. *BMC Nephrol.* **6** 6-16.

Haslam SM, Houston KM, Harnett W, Reason AJ, Morris HR and Dell A. (1999) Structural studies of N-glycans of filarial parasites. Conservation of phosphorylcholine substituted glycans among species and discovery of novel chito-oligomers. *J Biol Chem.* **274** 20953-20960.

Hassanein H, Hanallah S, El-Ahwany E, Doughty B, El-Ghorab N, Badir B, Sharmy R and Zada S. (2001) Immunolocalization of intercellular adhesion molecule-1 and leukocyte functional associated antigen-1 in schistosomal soluble egg antigen-induced granulomatous hyporesponsiveness. *APMIS.* **109** 376-382.

Hayden MS and Ghosh S. (2004) Signaling to NF- κ B. *Genes & Dev.* **18** 2195-2224.

Healer J, Ashall F and Maizels RM. (1991) Characterization of proteolytic enzymes from larval and adult *Nippostrongylus brasiliensis*. *Parasitology.* **103** 305-314.

Helmke RJ, German VF and Mangos JA. (1989) A continuous alveolar macrophage cell line: Comparison with freshly derived alveolar macrophages. *In Vitro Cell Dev. Biol.* **25**, 44-48.

Henderson RF, Benson JM, Hahn FF, Hobbs CH, Jones RK, Mauderly JL, McClellan RO, and Pickrell JA. (1985) New approaches for the evaluation of

pulmonary toxicity: bronchoalveolar lavage fluid analysis. *Fundam Appl Toxicol.* **5** 451-458.

Henninger DD, Panes J, Eppihimer M, Russell J, Gerritsen M, Anderson DC and Granger DN. (1997) Cytokine-induced VCAM-1 and ICAM-1 expression in different organs of the mouse. *J Immunol.* **158** 1825-1832.

Herbein G and O'Brien W. (2000) Tumour necrosis factor (TNF)- α and TNF receptors in viral pathogenesis. *P.S.E.B.M.* **223** 241-258.

Herbert DR, Holscher C, Mohrs M, Arendse B, Schwegmann A, Radwanska M, Leeto M, Kirsch R, Hall P, Mossmann H, Claussen B, Forster I and Brombacher F. (2004) Alternative macrophage activation is essential for survival during schistosomiasis and downmodulates T helper 1 responses and immunopathology. *Immunity.* **20** 623-635.

Hibbs JB Jr, Taintor RR, Vavrin Z and Rachlin EM. (1988) Nitric oxide: a cytotoxic activated macrophage effector molecule. *Biochem Biophys Res Commun.* **157** 87-94.

Hissin PJ and Hilf R. (1976) A fluorometric method for determination of oxidized and reduced glutathione in tissues. *Anal Biochem.* **74** 214-226.

Holcomb IN, Kabakoff RC, Chan B, Baker TW, Gurney A, Henzel W, Nelson C, Lowman HB, Wright BD, Skelton NJ, Frantz GD, Tumas DB, Peale FV, Jr., Shelton DL and Hebert CC. (2000) FIZZ1, a novel cysteine-rich secreted protein associated with pulmonary inflammation, defines a new gene family. *EMBO J.* **19** 4046-4055.

Holland MJ, Hargus YM, Riches PL and Maizels RM. (2000) Proteins secreted by the parasitic nematode *Nippostrongylus brasiliensis* act as adjuvants for Th2 responses. *Eur J Immunol.* **30** 1977-1987.

Hong Z, LoVerde PT, Hammarö ML and Rekosh D. (1992) *Schistosoma mansoni*: cloning of a complementary DNA encoding a cytosolic Cu/Zn superoxide dismutase and high-yield expression of the enzymatically active gene product in *Escherichia coli*. *Exp Parasitol.* **75** 308-322.

Howard M, Farrar J, Hilfiker M, Johnson B, Takatsu K, Hamaoka T and Paul WE. (1982) Identification of a T cell derived B cell growth factor distinct from interleukin 2. *J. Exp. Med.* **155** 914-923.

Huang TJ, MacAry PA, Eynott P, Moussavi A, Daniel KC, Askenase PW, Kemeny DM and Chung KF. (2001) Allergen-specific Th1 cells counteract effector Th2 cell-dependent bronchial hyperresponsiveness and eosinophilic inflammation partly via IFN-gamma. *J Immunol.* **166** 207-217.

Hussein AS, Grigg ME and Selkirk ME. (1999) *Nippostrongylus brasiliensis*: characterisation of a somatic amphiphilic acetylcholinesterase with properties distinct from the secreted enzymes. *Exp Parasitol.* **91** 144-150.

Hussein AS, Harel M and Selkirk ME. (2002) A distinct family of acetylcholinesterases is secreted by *Nippostrongylus brasiliensis*. *Mol Biochem Parasitol.* **123** 125-134.

Jacobs W, Bogers JJ, Timmermans JP, Deelder AM and Van Marck EA. (1998) Adhesion molecules in intestinal *Schistosoma mansoni* infection. *Parasitol Res.* **84** 276-280.

Janeway CA Jr and Medzhitov R. (2002) Innate immune recognition. *Annu Rev Immunol.* **20** 197-216.

Jarrett EE, Jarrett WF and Urquhart GM. (1968) Immunological unresponsiveness to helminth parasites. I. The pattern of *Nippostrongylus brasiliensis* infection in young rats. *Exp Parasitol.* **23** 151-160.

Jenkins SJ, Hewitson JP, Ferret-Bernard S and Mountford AP. (2005) Schistosome larvae stimulate macrophage cytokine production through TLR4-dependent and -independent pathways. *Int Immunol.* **17** 1409-1418.

Jobin C and Sartor RB. (2000) NF-kappaB signaling proteins as therapeutic targets for inflammatory bowel diseases. *Inflamm Bowel Dis.* **6** 206-213.

Johnson EH, Lustigman S, Brotman B, Browne J and Prince AM. (1991) *Onchocerca volvulus*: in vitro killing of microfilaria by neutrophils and eosinophils from experimentally infected chimpanzees. *Trop Med Parasitol.* **42** 351-355.

Joseph GT, Huima T and Lustigman S. (1998) Characterization of an *Onchocerca volvulus* L3- specific larval antigen, Ov-ALT-1. *Mol. Biochem Parasitol.* **96** 177-183.

Kaifi JT, Diaconu E and Pearlman E. (2001) Distinct roles for PECAM-1, ICAM-1, and VCAM-1 in recruitment of neutrophils and eosinophils to the cornea in ocular onchocerciasis (river blindness). *J Immunol.* **166** 6795-6801.

Kamata I, Yamada M, Uchikawa R, Matsuda S and Arizono N. (1995) Cysteine protease of the nematode *Nippostrongylus brasiliensis* preferentially evokes an IgE/IgG1 antibody response in rats. *Clin Exp Immunol.* **102** 71-77.

Kane CM, Cervi L, Sun J, McKee AS, Masek KS, Shapira S, Hunter CA and Pearce EJ. (2004) Helminth antigens modulate TLR-initiated dendritic cell activation. *J Immunol.* **173** 7454-7461.

Kanno S , Shouji A , Tomizawa A, Hiura T, Osanai Y, Ujibe M , Obara Y , Nakahata N and Ishikawa M. (2006) Inhibitory effect of naringin on lipopolysaccharide (LPS)-induced endotoxin shock in mice and nitric oxide production in RAW 264.7 macrophages. *Life Sci.* **78** 673-681.

Kaplan MH, Schindler U, Smiley ST and Grusby MJ. (1996) Stat6 is required for mediating responses to IL-4 and for development of Th2 cells. *Immunity.* **4** 313-319.

Karin M. (1995) The regulation of AP-1 activity by mitogen-activated protein kinases. *J Biol Chem.* **270** 16483-16486.

Karp CL and Auwaerter PG. (2007) Coinfection with HIV and tropical infectious diseases. II. Helminthic, fungal, bacterial, and viral pathogens. *Clin Infect Dis.* **45** 1214-1220.

Karp CL and Neva FA. (1999) Tropical infectious diseases in human immunodeficiency virus-infected patients. *Clin Infect Dis.* **28** 947-965.

Kasuga-Aoki H, Tsuji N, Suzuki K, Isobe T and Yoshihara S. (2000) Identification of surface proteins and antigens from larval stages of *Ascaris suum* by two-dimensional electrophoresis. *Parasitology.* **121** 671-677.

Keegan AD, Nelms K, White M, Wang LW, Pierce JH and Paul WE. (1994) An IL-4 receptor region containing an insulin receptor motif is important for IL-4-mediated IRS-1 phosphorylation and cell growth. *Cell.* **76** 811-820.

- Keir PA. (2002) Early response in the pulmonary phase of *Nippostrongylus brasiliensis* infection. Napier University. PhD thesis.
- Keir PA, Brown DM, Clouter-Baker A, Harcus YM and Proudfoot L. (2004) Inhibition of neutrophil recruitment by ES of *Nippostrongylus brasiliensis*. *Parasite Immunol.* **26** 137-139.
- Kelly JJ and Alpers DH. (1973) Blood group antigenicity of purified human intestinal disaccharidases. *J Biol Chem.* **248** 8216-8221.
- Khan WI and Collins SW. (2004) Immune-mediated alteration in gut physiology and its role in host defence in nematode infection. *Parasite Immunol.* **26** 319-326.
- Khan WI, Blennerhasset PA, Varghese AK, Chowdhury SK, Omsted P, Deng Y and Collins SM. (2002) Intestinal nematode infection ameliorates experimental colitis in mice. *Infect Immun.* **70** 5931-5937.
- Kim TS, Jung Y, Na BK, Kim KS and Chung PR. (2000) Molecular cloning and expression of Cu/Zn-containing superoxide dismutase from *Fasciola hepatica*. *Infect Immun.* **68** 3941-3948.
- Kita Y, Takashi T, Iigo Y, Tamatani T, Miyasaka M and Horiuchi T. (1992) Sequence and expression of rat ICAM-I. *Biochim Biophys Acta.* **1131** 108-110.
- Knott ML, Matthaei KI, Giacomini PR, Wang H, Foster PS and Dent LA. (2007) Impaired resistance in early secondary *Nippostrongylus brasiliensis* infections in mice with defective eosinophilopoiesis. *Int J Parasitol.* **37** 1367-1378.

Knox DP and Jones DG. (1990) Studies on the presence and release of proteolytic enzymes (proteinases) in gastro-intestinal nematodes of ruminants. *Int J Parasitol.* **20** 243-249.

Knox DP and Jones DG. (1992) A comparison of superoxide dismutase (SOD, EC:1.15.1.1) distribution in gastro-intestinal nematodes. *Int J Parasitol.* **22** 209-214.

Knox DP. (2007) Protease inhibitors and helminth parasite infection. *Parasite Immunol.* **29** 57-71.

Knox MR and Steel JW. (1999) The effects of urea supplementation on production and parasitological responses of sheep infected with *Haemonchus contortus* and *Trichostrongylus colubriformis*. *Vet Parasitol.* **83** 123-135.

Kobayashi Y. (2006) Neutrophil infiltration and chemokines. *Crit Rev Immunol.* **26** 307-315.

Kollias G and Kontoyiannis D. (2002) Role of TNF/TNFR in autoimmunity: specific TNF receptor blockade may be advantageous to anti-TNF treatments. *Cytokine Growth Factor Rev.* **13** 315-321.

Kopf M, Le GG, Bachmann M, Lamers MC, Bluethmann H and Kohler G. (1993) Disruption of the murine IL-4 gene blocks Th2 cytokine responses. *Nature.* **362** 245-248.

Kringel H, Iburg T, Dawson H, Aasted B and Roepstorff A. (2006) A time course study of immunological responses in *Trichuris suis* infected pigs demonstrates induction of a local type 2 response associated with worm burden. *Int J Parasitol.* **36** 915-924.

- Krunkosky TM, Fischer BM, Martin LD, Jones N, Akley NJ and Adler KB. (2000) Effects of TNF-alpha on expression of ICAM-1 in human airway epithelial cells in vitro. Signaling pathways controlling surface and gene expression. *Am J Respir Cell Mol Biol.* **22** 685-692.
- Kuroda E, Yoshida Y, En Shan B and Yamashita U. (2001) Suppression of macrophage interleukin-12 and tumour necrosis factor-alpha production in mice infected with *Toxocara canis*. *Parasite Immunol.* **23** 305-311.
- La Flamme AC, Ruddenklau K and Backstrom BT. (2003) Schistosomiasis decreases central nervous system inflammation and alters the progression of experimental autoimmune encephalomyelitis. *Infect Immun.* **71** 4996-5004.
- Lawrence CE, Paterson JC, Wei XQ, Liew FY, Garside P and Kennedy MW. (2000) Nitric oxide mediates intestinal pathology but not immune expulsion during *Trichinella spiralis* infection in mice.. *J Immunol.* **164** 4229-4234.
- Lawrence RA, Gray C, Osborne J and Maizels RM. (1996) *Nippostrongylus brasiliensis*: Cytokine responses and nematode expulsion in normal and IL4-deficient mice. *Exp Parasitol.* **84** 65–73.
- Leeto M, Herbert DR, Marillier R, Schwegmann A, Fick L and Brombacher F. (2006) TH1-dominant granulomatous pathology does not inhibit fibrosis or cause lethality during murine schistosomiasis. *Am J Pathol.* **169** 1701-1712.
- Leid RW and McConnell LA. (1983) PGE2 generation and release by the larval stage of the cestode, *Taenia taeniaeformis*. *Prostaglandins Leukot. Med.* **11** 317-323.
- Lequin RM. (2005) Enzyme immunoassay (EIA)/enzyme-linked immunosorbent assay (ELISA). *Clin Chem.* **51** 2415-2418.

Leturcq DJ, Moriarty AM, Talbott G, Winn RK, Martin TR and Ulevitch RJ. (1996) Antibodies against CD14 protect primates from endotoxin-induced shock. *J Clin Invest.* **98** 1533-1538.

Levy DA and Frondoza C. (1983) Immunity to intestinal parasites: role of mast cells and goblet cells. *Fed Proc.* **42** 1750-1755.

Lewis R, Behnke JM, Cassidy JP, Stafford P, Murray N and Holland CV. (2007) The migration of *Ascaris suum* larvae, and the associated pulmonary inflammatory response in susceptible C57BL/6j and resistant CBA/Ca mice. *Parasitol.* **134** 1301-1314.

Li H, Sim TC and Alam R. (1996) IL-13 released by and localized in human basophils. *J Immunol.* **156** 4833-4838.

Li L, Xia Y, Nguyen A, Lai YH, Feng L, Mosmann TR and Lo D. (1999) Effects of Th2 cytokines on chemokine expression in the lung: IL-13 potently induces eotaxin expression by airway epithelial cells. *J Immunol.* **162** 2477-2487.

Li YH, Yan ZQ, Brauner A and Tullus K. (2002). Activation of macrophage nuclear factor-kappa B and induction of inducible nitric oxide synthase by LPS. *Respir Res.* **3** 23.

Liddell S and Knox DP. (1998) Extracellular and cytoplasmic Cu/Zn superoxide dismutases from *Haemonchus contortus*. *Parasitol.* **116** 383-394.

Liew FY, Millott S, Parkinson C, Palmer RM and Moncada S. (1990) Macrophage killing of Leishmania parasite *in vivo* is mediated by nitric oxide from L-arginine. *J Immunol.* **144** 4794-4797.

- Lin TJ, Hirji N, Stenton GR, Gilchrist M, Grill BJ, Schreiber AD and Befus AD. (2000) Activation of macrophage CD8: pharmacological studies of TNF and IL-1 β production. *J Immunol* **164** 1783-1792.
- Liu LM and Dubick MA. (2005) Hemorrhagic shock-induced vascular hyporeactivity in the rat: relationship to gene expression of nitric oxide synthase, endothelin-1, and select cytokines in corresponding organs. *J Surg Res.* **125** 128-136.
- Liu LX, Buhlmann JE and Weller PF. (1992) Release of prostaglandin E2 by microfilariae of *Wuchereria bancrofti* and *Brugia malayi*. *Am J Trop Me Hyg.* **46** 520-523.
- Liu Z, Liu Q, Pesce J, Whitmire J, Ekkens MJ, Foster A, VanNoy J, Sharpe AH, Urban JF Jr and Gause WC. (2002) *Nippostrongylus brasiliensis* can induce B7-independent antigen-specific development of IL-4-producing T cells from naive CD4 T cells *in vivo*. *J Immunol.* **169** 6959-6968.
- Loke P, MacDonald AS, Robb A, Maizels RM and Allen JE. (2000) Alternatively activated macrophages induced by nematode infection inhibit proliferation via cell-to-cell contact. *Eur J Immunol.* **30** 2669-2678.
- Loke P, Nair MG, Parkinson J, Guiliano D, Blaxter M and Allen JE. (2002) IL-4 dependent alternatively-activated macrophages have a distinctive *in vivo* gene expression phenotype. *BMC Immunol.* **3** 7.
- Loukas A and Maizels RM. (2000) Helminth C-type lectins and host-parasite interactions. *Parasitol Today.* **16** 333-339.
- Loukas A and Prociv P. (2001) Immune responses in hookworm infections. *Clin Microbiol Rev.* **14** 689-703.

Loukas AC, Doedens A, Hintz M and Maizels RM. (2000) Identification of a new C-type lectin, TES-70, secreted by infective larvae of *Toxocara canis*, which binds to host ligands. *Parasitol.* **121** 545-554.

Loukas AC, Mullin NP, Tetteh KKA, Moens L and Maizels RM. (1999) A novel C-type lectin secreted by a tissue-dwelling parasitic nematode. *Curr Biol.* **9** 825-828.

Ma J, Chen T, Mandelin J, Ceponis A, Miller NE, Hukkanen M, Ma GF and Konttinen YT.(2003) Regulation of macrophage activation. *Cell Mol Life Sci.* **60** 2334-2346.

MacDonald AS, Araujo MI, Pearce EJ. 2002 Feb. Immunology of parasitic helminth infections. *Infect Immun.* **70** 427-433.

MacDonald AS., Straw AD., Bauman B and Pearce EJ. (2001) CD8– dendritic cell activation status plays an integral role in influencing TH2 response development. *J. Immunol.* **167** 1982-1988.

Mackenzie CD, Jungery M, Taylor PM and Ogilvie BM. (1981) The in-vitro interaction of eosinophils, neutrophils, macrophages and mast cells with nematode surfaces in the presence of complement or antibodies. *J Pathol.* **133** 161-175.

Madden KB, Yeung KA, Zhao A, Gause WC, Finkelman FD, Katona IM, Urban JF Jr and Shea-Donohue T. (2004) Enteric nematodes induce stereotypic STAT6-dependent alterations in intestinal epithelial cell function. *J Immunol.* **172** 5616-5621.

Maelfait J, Vercammen E, Janssens S, Schotte P, Haegman M, Magez S and Beyaert R. (2008) Stimulation of Toll-like receptor 3 and 4 induces interleukin-1 β maturation by caspase-8. *J Exp Med.* **205** 1967-1973.

Magalhães PO, Lopes AM, Mazzola PG, Rangel-Yagui C, Penna TC and Pessoa A Jr. (2007) Methods of endotoxin removal from biological preparations: a review. *J Pharm Pharm Sci.* **10** 388-404.

Maizels RM and Yazdanbakhsh M. (2003) Immune regulation by helminth parasites: cellular and molecular mechanisms. *Nat Rev Immunol.* **3** 733-744.

Maizels RM, Balic A, Gomez-Escobar N, Nair M, Taylor MD and Allen JE. (2004) Helminth parasites – masters of regulation. *Immunol Rev.* **201** 89-116.

Maizels RM, Blaxter ML and Selkirk ME. (1993) Forms and functions of nematode surfaces. *Exp Parasitol.* **77** 380-384.

Malefyt RW, Abrams JS, Zurawski SM, Lecron J, Mohan-Peterson S, Sanjanwala B, Bennett B, Silver J, Vries JE, Yssel H and Terhorst C. (1995) Differential regulation of IL-13 and IL-4 production by human CD8⁺ and CD4⁺ T_h0, T_h1 and T_h2 T cell clones and EBV-transformed B cells. *International Immunol.* **7** 1405-1416.

Mangan NE, Fallon RE, Smith P, van Rooijen N, McKenzie AN and Fallon PG. (2004) Helminth infection protects mice from anaphylaxis via IL-10-producing B cells. *J Immunol.* **173** 6346-6356.

Manoury, B, Gregory WF, Maizels RM and Watts C. (2001) Bm-CPI-2, a cystatin homolog secreted by the filarial parasite *Brugia malayi*, inhibits class II MHC-restricted antigen processing. *Curr. Biol.* **11** 447-451.

Marshall RD and Neuberger A. (1970) Aspects of the structure and metabolism of glycoproteins. *Adv Carb Chem Biochem.* **25** 407-478.

Marsland BJ, Camberis M and Le GG. (2005) Secretory products from infective forms of *Nippostrongylus brasiliensis* induce a rapid allergic airway inflammatory response. *Immunol Cell Biol.* **83** 40-47.

Matsuda S, Tani Y, Yamada M, Yoshimura K and Arizono N. (2001) Type 2-biased expression of cytokine genes in lung granulomatous lesions induced by *Nippostrongylus brasiliensis* infection. *Parasite Immunol.* **23** 219-226.

Mauderly JL. (1977). Bronchopulmonary lavage of small laboratory animals. *Lab Anim Sci.* **27** 255-261.

Mayrhofer G. (1977) Sites of synthesis and localization of IgE in rats infested with *Nippostrongylus brasiliensis*. *Ciba Found Symp.* **46** 155-182.

McGuirk P and Mills KHG. (2002) Pathogen-specific regulatory T cells provoke a shift in the Th1/Th2 paradigm in immunity to infectious diseases. *Trends Immunol.* **23** 450-455.

McInnes IB, Leung BP, Harnett M, Gracie JA, Liew FY and Harnett W. (2003) A novel therapeutic approach targeting articular inflammation using the filarial nematode-derived phosphorylcholine-containing glycoprotein ES-62. *J Immunol.* **171** 2127-2133.

McKenzie GH, Emson CL, Bell SE, Anderson S, Fallon P, Zurawski G, Murray R, Grencis R and McKenzie ANJ. (1998) Impaired Development of Th2 Cells in IL-13-Deficient Mice. *Immunity.* **9** 423-432.

- McKenzie GJ, Bancroft A, Grencis RK and McKenzie AN. (1998) A distinct role for interleukin-13 in Th2-cell-mediated immune responses. *Curr Biol.* **8** 339-342.
- McNeil KS, Knox DP and Proudfoot L. (2002) Anti-inflammatory responses and oxidative stress in *Nippostrongylus brasiliensis*-induced pulmonary inflammation. *Parasite Immunol.* **24** 15-22.
- Meyer S, Tefsen B, Imberty A, Geyer R and van Die I. (2007) The C-type lectin L-SIGN differentially recognizes glycan antigens on egg glycosphingolipids and soluble egg glycoproteins from *Schistosoma mansoni*. *Glycobiol.* **17** 1104-1119.
- Miller KG, Emerson MD and Rand JB. (1999) Gqalpha and diacylglycerol kinase negatively regulate the Gqalpha pathway in *C. elegans*. *Neuron.* **24** 323-333.
- Milstone AM, Harrison LM, Bungiro RD, Kuzmic P and Cappello M. (2000) A broad spectrum Kunitz type serine protease inhibitor secreted by the hookworm *Ancylostoma ceylanicum*. *J Biol Chem.* **275** 29391-29399.
- Min DY, Lee YA, Ryu JS, Ahn MH, Chung YB, Sim S and Shin MH. (2004) Caspase-3-mediated apoptosis of human eosinophils by the tissue-invading helminth *Paragonimus westermani*. *Int Arch Allergy Immunol.* **133** 357-364.
- Mitchell LA, Wescott RB and Perryman LE. (1983) Kinetics of expulsion of the nematode, *Nippostrongylus brasiliensis*, in mast-cell deficient W/WV mice. *Parasite Immunol.* **5** 1-12.
- Miura K, Fukumoto S, Dirgahayu P and Hirai K. (2001) Excretory/secretory products from plerocercoids of *Spirometra erinaceieuropaei* suppress gene expressions and production of tumor necrosis factor-alpha in murine

macrophages stimulated with lipopolysaccharide or lipoteichoic acid. *Int J Parasitol.* **31** 39-47.

Mizgerd JP, Horwitz BH, Quillen HC, Scott ML and Doerschuk CM. (1999) Effects of CD18 deficiency on the emigration of murine neutrophils during pneumonia. *J Immunol.* **163** 995-999.

Mizgerd JP. (2002) Molecular mechanisms of neutrophil recruitment elicited by bacteria in the lungs. *Semin Immunol.* **14** 123-132.

Mohrs M, Shinkai K, Mohrs K and Locksley RM. (2001) Analysis of type 2 immunity *in vivo* with a bicistronic IL-4 reporter. *Immunity.* **15** 303–311.

Moyle M, Foster DL, McGrath DE, Brown SM, Laroche Y, De Meutter J, Stanssens P, Bogowitz CA, Fried VA, Ely JA, Soule HR and Vlasuk GP. (1994) A hookworm glycoprotein that inhibits neutrophil function is a ligand of the integrin CD11b/ 18. *J Biol Chem.* **269** 10008-10015.

Mpofu S, Fatima F and Moots RJ. (2005) Anti-TNF- α therapies: they are all the same (aren't they?) *Rheumatol.* **44** 271-273.

Muchamuel T, Menon S, Pisacane P, Howard MC and Cockayne DA. (1997) IL-13 protects mice from lipopolysaccharide-induced lethal endotoxemia: correlation with down-modulation of TNF- α , IFN- γ , and IL-12 production. *J Immunol.* **158** 2898-2903.

Mulligan MS, Vaporciyan AA, Miyasaka M, Tamatani T and Ward PA. (1993) Tumor necrosis factor α regulates *in vivo* intrapulmonary expression of ICAM-1. *Am J Pathol.* **142** 1739-1749.

Munder M, Eichmann K, Mora'n J, Centeno F, Soler G, and Modolell M. (1999) Th1/Th2-regulated expression of arginase isoforms in murine macrophages and dendritic cells. *J Immunol.* **163** 3771-3777.

Murphy CA, Langrish CL, Chen Y, Blumenschein W, McClanahan T, Kastelein RA, Sedgwick JD and Cua DJ. (2003) Divergent pro- and anti-inflammatory roles for IL-23 and IL-12 in joint autoimmune inflammation. *J Exp Med.* **198** 1951-1957.

Murray HW, Pépin J, Nutman TB, Hoffman SL. and Mahmoud AAF. (2000) Recent advances: Tropical medicine. *BMJ.* **320** 490-494.

Nagai Y, Akashi S, Nagafuku M, Ogata M, Iwakura Y, Akira S, Kitamura T, Kosugi A, Kimoto M and Miyake K. (2002) Essential role of MD-2 in LPS responsiveness and TLR4 distribution. *Nat Immunol.* **3** 667-72.

Nagayama Y, Watanabe K, Niwa M, McLachlan SM and Rapoport B. (2004) *Schistosoma mansoni* and alpha-galactosylceramide: prophylactic effect of Th1 immune suppression in a mouse model of Graves' hyperthyroidism. *J Immunol.* **173** 2167-2173.

Nair MG, Gallagher IJ, Taylor MD, Loke P, Coulson PS, Wilson RA, Maizels RM and Allen JE. (2005) Chitinase and Fizz family members are a generalized feature of nematode infection with selective upregulation of Ym1 and Fizz1 by antigen-presenting cells. *Infect Immun.* **73** 385-394.

Nathan C. (1992) Nitric oxide as a secretory product of mammalian cells. *FASEB J.* **6** 3051-3064.

- Newlands GF, Skuce PJ, Knox DP and Smith WD. (2001) Cloning and expression of cystatin, a potent cysteine protease inhibitor from the gut of *Haemonchus contortus*. *Parasitol.* **122** 371-378.
- Nishikawa T, Harada T, Hatano H, Ogawa H and Miyazaki H. (1975). Epidermal surface saccharides reactive with phytohemagglutinins and pemphigus antigen. *Acta Derm Venereol.* **55** 21-24.
- Noël W, Raes G, Hassanzadeh Ghassabeh G, De Baetselier P and Beschin A. (2004) Alternatively activated macrophages during parasite infections. *Trends Parasitol.* **20** 126-133.
- Nussler AK and Billiar TR. (1993) Inflammation, immunoregulation, and inducible nitric oxide synthase. *J Leukoc Biol.* **54** 171-178.
- Ogilvie BM and Jones VE. (1971) *Nippostrongylus brasiliensis*: A review of immunity and the host/parasite relationship in the rat. *Experimental parasitol.* **29** 138-177.
- Ogilvie BM, Rothwell TL, Bremner KC, Schnitzerling HJ, Nolan J and Keith RK. (1973) Acetylcholinesterase secretion by parasitic nematodes. I. Evidence for secretion of the enzyme by a number of species. *Int J Parasitol.* **3** 589-597.
- Okano M, Satoskar AR, Nishizaki K and Harn DA Jr. (2001) Lacto-N-fucopentaose III found on *Schistosoma mansoni* egg antigens functions as adjuvant for proteins by inducing Th2-type response. *J Immunol.* **167** 442–450.
- Oshiro TM, Macedo MS and edo-Soares MF. (2005) Anti-inflammatory activity of PAS-1, a protein component of *Ascaris suum*. *Inflamm Res.* **54** 17-21.

Oswald IP, Gazzinelli RT, Sher A and James SL. (1992) IL-10 synergizes with IL-4 and transforming growth factor-beta to inhibit macrophage cytotoxic activity. *J Immunol.* **148** 3578-3582.

Oswald IP, Wynn TA, Sher A and James SL. (1994) NO as an effector molecule of parasite killing: modulation of its synthesis by cytokines. *Comp Biochem Physiol Pharmacol Toxicol Endocrinol.* **108** 11-18.

Park MK, Hoffmann KF, Cheever AW, Amichay D, Wynn TA and Farber JM. (2001) Patterns of chemokine expression in models of *Schistosoma mansoni* inflammation and infection reveal relationships between type 1 and type 2 responses and chemokines *in vivo*. *Infect Immun.* **69** 6755-6768.

Patterson GI and Padgett RW. (2000) TGF- β -related pathways. Roles in *Caenorhabditis elegans* development. *Trends Genet.* **16** 27-33.

Pearce EJ, Kane CM and Sun J. (2006) Regulation of dendritic cell function by pathogen-derived molecules plays a key role in dictating the outcome of the adaptive immune response. *Chem Immunol Allergy.* **90** 82-90.

Philipp M, Parkhouse RM and Ogilvie BM. (1980) Changing proteins on the surface of a parasitic nematode. *Nature.* **287** 538-540.

Podlaski FJ, Nanduri VB, Hulmes JD, Pan YC, Levin W, Danho W, Chizzonite R, Gately MK and Stern AS. (1992) Molecular characterization of interleukin 12. *Arch Biochem Biophys.* **294** 230-237.

Podolsky DK. (2002) Inflammatory bowel disease. *N Engl J Med.* **347** 417-429.

Poltorak A, He X, Smirnova I, Liu MY, Van HC, Du X, Birdwell D, Alejos E, Silva M, Galanos C, Freudenberg M, Ricciardi-Castagnoli P, Layton B and

Beutler B. (1998) Defective LPS signaling in C3H/HeJ and C57BL/10ScCr mice: mutations in Tlr4 gene. *Science*. **282** 2085-2088.

Porthouse KH, Chirgwin SR, Coleman SU, Taylor HW and Klei TR. (2006) Inflammatory responses to migrating *Brugia pahangi* third-stage larvae. *Infect Immun*. **74** 2366-2372.

Proudfoot L, Kusel JR, Smith HV, Harnett W, Worms MJ and Kennedy MW. (1990) The surface lipid of parasitic nematodes: organization, and modifications during transition to the mammalian host environment. *Acta Trop*. **47** 323-330.

Proudfoot L, Kusel JR, Smith HV, Harnett W, Worms MJ and Kennedy MW. (1993) Rapid changes in the surface of parasitic nematodes during transition from pre- to post-parasitic forms. *Parasitology*. **107** 107-117.

Proudfoot L. (2004) Parasitic helminths tip the balance: potential anti-inflammatory therapies. *Immunology*. **113** 491-498.

Pugin J, Schurer-Maly CC, Leturcq D, Moriarty A, Ulevitch RJ and Tobias PS. (1993) Lipopolysaccharide activation of human endothelial and epithelial cells is mediated by lipopolysaccharide-binding protein and soluble CD14. *Proc Natl Acad Sci U S A*. **90** 2744-2748.

Quinn MT and Gauss KA. (2004) Structure and regulation of the neutrophil respiratory burst oxidase: comparison with nonphagocyte oxidases. *J Leukoc Biol*. **76** 760-781.

Rabinovich GA, Liu FT, Hirashima M and Anderson A. (2007) An emerging role for galectins in tuning the immune response: lessons from experimental models

of inflammatory disease, autoimmunity and cancer. *Scand J Immunol.* **66** 143-158.

Raes G, De Baetselier P, Noel W, Beschin A, Brombacher F and Hassanzadeh Gh G. (2002) Differential expression of FIZZ1 and Ym1 in alternatively versus classically activated macrophages. *J Leukoc Biol.* **71** 597-602.

Rahman I, Biswas SK, Jimenez LA, Torres M and Forman HJ. (2005) Glutathione, stress responses, and redox signaling in lung inflammation. *Antioxid Redox Signal.* **7** 42-59.

Rainbird MA, Macmillan D and Meeusen EN. (1998) Eosinophil-mediated killing of *Haemonchus contortus* larvae: effect of eosinophil activation and role of antibody, complement and interleukin-5. *Parasite Immunol.* **20** 93-103.

Ramaswamy K and Befus D. (1989) Pulmonary inflammation in parasitic infection: immunoglobulins in bronchoalveolar washings of rats infected with *Nippostrongylus brasiliensis*. *Parasite Immunol.* **11** 655-665.

Ramaswamy K and Befus D. (1993) Pulmonary inflammation and immune responses during the course of *Nippostrongylus brasiliensis* infection: lymphocyte subsets in bronchoalveolar lavage fluids of rats. *Parasite Immunol.* **15** 281-290.

Ramaswamy K, De Sanctis GT, Green F and Befus D. (1991) Pathology of pulmonary parasitic migration: morphological and bronchoalveolar cellular responses following *Nippostrongylus brasiliensis* infection in rats. *J Parasitol.* **77** 302-312.

Rausch S, Huehn J, Kirchhoff D, Rzepecka J, Schnoeller C, Pillai S, Loddenkemper C, Scheffold A, Hamann A, Lucius R and Hartmann S. (2008)

Functional analysis of effector and regulatory T cells in a parasitic nematode infection. *Infect Immun.* **76** 1908-1919

Rawlings ND, Tolle DP and Barrett AJ. (2004) Evolutionary families of peptidase inhibitors. *Biochem J.* **378** 705-716.

Read AF and Skorpung A. (1995) The evolution of tissue migration by parasitic nematode larvae. *Parasitol.* **111** 359-371.

Reason AJ, Ellis LA, J Appleton JA, Wisnewski N, Grieve RB, McNeil M, Wassom DL, Morris HR and Dell A. (1994) Novel tyvelose-containing tri- and tetra-antennary N-glycans in the immunodominant antigens of the intracellular parasite *Trichinella spiralis*. *Glycobiol.* **4** 593-603.

Reece JJ, Siracusa MC and Scott AL. (2006) Innate immune responses to lung-stage helminth infection induce alternatively activated alveolar macrophages. *Infect Immun.* **74** 4970-4981.

Reece JJ, Siracusa MC, Southard TL, Brayton CF, Urban JF Jr and Scott AL. (2008) Hookworm-induced persistent changes to the immunological environment of the lung. *Infect Immun.* **76** 3511-3524.

Remold-O'Donnell E. (1980) Macrophage component gp160, a major trypsin-sensitive surface glycoprotein. *J Exp Med.* **152** 1699-1708.

Rietschel ET, Kirikae T, Schade FU, Mamat U, Schmidt G, Loppnow H, Ulmer AJ, Zähringer U, Seydel U, Di Padova F, Schreier M and Brade H. (1994) Bacterial endotoxin: molecular relationships of structure to activity and function. *FASEB J.* **8** 217-225.

Ritter DM and McKerrow JH. Intercellular adhesion molecule 1 is the major adhesion molecule expressed during schistosome granuloma formation. *Infect Immun.* **64** 4706-4713.

Roberts LS and Fairbairn D. (1965) Metabolic studies on adult *Nippostrongylus brasiliensis* (Nematoda: Trichostrongyloidea). *J Parasitol.* **51** 129-138.

Rogers WP and Lazarus M. (1949) The development of the trichostrongyle, *Nippostrongylus muris*, in rats following ingestion of larvae. *J Wash Acad Sci.* **39** 245-250.

Rollins BJ.(1997) Chemokines. *Blood.* **90** 909-928

Romani L, Puccetti P and Bistoni F. (1997) Interleukin-12 in infectious diseases. *Clin Microbiol Rev.* **10** 611-636.

Rotman HL, Yutanawiboonchai W, Brigandi RA, Leon O, Gleich GJ, Nolan TJ, Schad GA and Abraham D. (1996) *Strongyloides stercoralis*: eosinophil-dependent immune-mediated killing of third stage larvae in BALB/cByJ mice. *Exp Parasitol.* **82** 267-278.

Ruitenbergh EJ, Buys J, Teppema JS and Elgersma A.(1983) Rat mononuclear cells and neutrophils are more effective than eosinophils in antibody-mediated stage-specific killing of *Trichinella spiralis* *in vitro*. *Parasitol Res.* **69** 807-815.

Ruyssers NE, De Winter BY, De Man JG, Loukas A, Herman AG, Pelckmans PA and Moreels TG. (2008) Worms and the treatment of inflammatory bowel disease: are molecules the answer? *Clin Dev Immunol.* **2008** 567314.

Sakwe AM and Titanji VP. (1997) Evidence for increased hydroxylation of pyrrolidone amino acid residues in the cuticle of mature *Onchocerca volvulus*. *Biochim Biophys Acta*. **1360** 196-202.

Salinas-Carmona MC, de la Cruz-Galicia G, Perez-Rivera I, Solis-Soto JM, Sandborn WJ and Hanauer SB. (1999) Antitumor necrosis factor therapy for inflammatory bowel disease: a review of agents, pharmacology, clinical results, and safety. *Inflamm Bowel Dis*. **5** 119-133.

Scales HE, Ierna MX and Lawrence CE. (2007) The role of IL-4, IL-13 and IL-4Ralpha in the development of protective and pathological responses to *Trichinella spiralis*. *Parasite Immunol*. **29** 81-91.

Schierack P, Lucius R, Sonnenburg B, Schilling K and Hartmann S. (2003) Parasite-specific immunomodulatory functions of filarial cystatin. *Infect Immun*. **71** 2422-2429.

Schönemeyer A, Lucius R, Sonnenburg B, Brattig N, Sabat R, Schilling K, Bradley J and Hartmann S. (2001) Modulation of human T cell responses and macrophage functions by onchocystatin, a secreted protein of the filarial nematode *Onchocerca volvulus*. *J. Immunol*. **167** 3207–3215.

Schroeder LL. (1985) An ELISA to detect antibody specific for surface antigens of parasitic nematodes. *J Immunol Methods*. **83** 135-139.

Schwartz LB, Austen KF. (1984) Structure and function of the chemical mediators of mast cells. *Prog Allergy*. **34** 271-321.

- Segoviano-Ramirez JC, Vazquez AV and Garza MA. (2009) Spontaneous arthritis in MRL/lpr mice is aggravated by *Staphylococcus aureus* and ameliorated by *Nippostrongylus brasiliensis* infections. *Autoimmunity*. **42** 25-32.
- Selkirk ME, Smith VP, Thomas GR and Gounaris K. (1998) Resistance of filarial nematode parasites to oxidative stress. *Int J Parasitol*. **28** 1315-1332.
- Sewell D, Qing Z, Reinke E, Elliot D, Weinstock J, Sandor M and Fabry Z. (2003) Immunomodulation of experimental autoimmune encephalomyelitis by helminth ova immunization. *Int Immunol* **15** 59-69.
- Shea-Donohue T, Sullivan C, Finkelman FD, Madden KB, Morris SC, Goldhill J, Piñeiro-Carrero V and Urban JF Jr.(2001) The role of IL-4 in *Heligmosomoides polygyrus*-induced alterations in murine intestinal epithelial cell function. *J Immunol*. **167** 2234-2239.
- Shin EH, Osada Y, Chai JY, Matsumoto N, Takatsu K and Kojima S. (1997) Protective roles of eosinophils in *Nippostrongylus brasiliensis* infection. *Int Arch Allergy Immunol*. **114** 45-50.
- Shin EH, Osada Y, Sagara H, Takatsu K and Kojima S. (2001) Involvement of complement and fibronectin in eosinophil-mediated damage to *Nippostrongylus brasiliensis* larvae. *Parasite Immunol*. **23** 27-37.
- Shinkai K, Mohrs M and Locksley RM. (2002) Helper T cells regulate type-2 innate immunity in vivo. *Nature*. **420** 825-829.
- Smith P, Fallon RE, Mangan NE, Walsh CM, Saraiva M, Sayers JR, McKenzie AN, Alami A and Fallon PG. (2005) *Schistosoma mansoni* secretes a chemokine binding protein with antiinflammatory activity. *J Exp Med*. **202** 1319-1325.

Smith PK, Krohn RI, Hermanson GT, Mallia AK, Gartner FH, Provenzano MD, Fujimoto EK, Goeke NM, Olson BJ and Klenk DC. (1985) Measurement of protein using bicinchoninic acid. *Anal Biochem.* **150** 76-85.

Solomon GB and Haley AJ. (1968) Development of rat and hamster strains of *Nippostrongylus brasiliensis* in gonadectomized male rats and hamsters. *Exp Parasitol.* **23** 319-322

Solomon KA, Covington MB, DeCicco CP and Newton RC. (1997) The fate of pro-TNF-alpha following inhibition of metalloprotease-dependent processing to soluble TNF-alpha in human monocytes. *J Immunol.* **159** 4524-4531.

Solymosy F, Fedorcsák I, Gulyás A, Farkas GL and Ehrenberg L. (1968) A new method based on the use of diethyl pyrocarbonate as a nuclease inhibitor for the extraction of undegraded nucleic acid from plant tissues. *Eur J Biochem.* **5** 520-527.

Spector EB, Jenkinson CP, Grigor MR, Kern RM and Cederbaum SD. (1994) Subcellular location and differential antibody specificity of arginase in tissue culture and whole animals. *Int J Dev Neurosci.* **12** 337-342.

Stadnyk AW, Dollard CD and Issekutz AC. (2000) Neutrophil migration stimulates rat intestinal epithelial cell cytokine expression during helminth infection. *J Leukoc Biol.* **68** 821-827.

Stahl PD, Rodman JS, Miller MJ and Schlesinger PH. (1978) Evidence for receptor-mediated binding of glycoproteins, glycoconjugates, and lysosomal glycosidases by alveolar macrophages. *Proc Natl Acad Sci USA.* **75** 1399-1403.

Staunton DE, Dustin ML, Erickson HP and Springer TA. (1990) The arrangement of the immunoglobulin-like domains of ICAM-I and the binding sites for LFA-I and rhinovirus. *Cell*. **61** 243-254.

Stephenson LS, Latham MC and Ottesen EA. (2000) Malnutrition and parasitic helminth infections. *Parasitol*. **121** S23-S38.

Strachan DP. (1989) Hay fever, hygiene, and household size. *BMJ*. **299** 1259–1260.

Strieter RM and Kunkel SL. (1994) Acute lung injury: the role of cytokines in the elicitation of neutrophils. *J Investig Med*. **42** 640-651.

Summers RW, Elliott DE, Qadir K, Urban JF Jr, Thompson R and Weinstock JV. (2003) *Trichuris suis* seems to be safe and possibly effective in the treatment of inflammatory bowel disease. *Am J Gastroenterol*. **98** 2034–2041.

Summers RW, Elliott DE, Urban JF Jr, Thompson R and Weinstock JV. (2005a) *Trichuris suis* therapy in Crohn's disease. *Gut*. **54** 87-90.

Summers RW, Elliott DE, Urban JF Jr, Thompson RA and Weinstock JV. (2005b) *Trichuris suis* therapy for active ulcerative colitis: a randomized controlled trial. *Gastroenterology*. **128** 825-832.

Swain SL, Weinberg AD, English M and Huston G. (1990) IL-4 directs the development of Th2-like helper effectors. *J. Immunol*. **145** 3796–3806.

Tak PP and Firestein GS. (2001) NF-kappaB: a key role in inflammatory diseases. *J Clin Invest*. **107** 7-11.

Takeda K, Kaisho T and Akira S. (2003) Toll-like receptors. *Annu Rev Immunol*. **21** 335–376.

Takeda K, Kamanaka M, Tanaka T and Akira S. (1996) Impaired IL-13-mediated functions of macrophages in STAT6-deficient mice. *J Immunol.* **157** 3220-3222.

Talaat KR, Bonawitz RE, Domenech P and Nutman TB. (2006) Preexposure to live *Brugia malayi* microfilariae alters the innate response of human dendritic cells to *Mycobacterium tuberculosis*. *J Infect Dis.* **193** 196-204.

Tang L, Ou X, Henkle-Dührsen K and Selkirk ME. (1994) Extracellular and cytoplasmic CuZn superoxide dismutases from *Brugia* lymphatic filarial nematode parasites. *Infect Immun.* **62** 961-967.

Tang L, Smith VP, Gounaris K and Selkirk ME. (1996) *Brugia pahangi*: the cuticular glutathione peroxidase (gp29) protects heterologous membranes from lipid peroxidation. *Exp Parasitol.* **82** 329-332.

Tawill S, Le Goff L, Ali F, Blaxter ML and Allen JE. (2004) Both free-living and parasitic nematodes induce a characteristic Th2 response that is dependent on the presence of intact glycans. *Infect Immun* **72** 398–407.

Taylor MD, Harris A, Nair MG, Maizels RM and Allen JE. (2006) F4/80+ alternatively activated macrophages control CD4+ T cell hyporesponsiveness at sites peripheral to filarial infection. *J Immunol.* **176** 6918-6927.

Taylor MJ, Cross HF and Bilo K. (2000) Inflammatory responses induced by the filarial nematode *Brugia malayi* are mediated by lipopolysaccharide-like activity from endosymbiotic Wolbachia bacteria. *J Exp Med.* **191** 1429-1436.

Taylor P. (1991) The cholinesterases. *J Biol Chem.* **266** 4025-4028.

Taylor PR, Martinez-Pomares L, Stacey M, Lin HH, Brown GD and Gordon S. (2005) Macrophage receptors and immune recognition. *Annu Rev Immunol.* **23** 901–944.

Tenor JL and Aballay A. (2007) A conserved Toll-like receptor is required for *Caenorhabditis elegans* innate immunity. *EMBO Rep.* **9** 103-109.

Thomas GR, McCrossan M and Selkirk ME. (1997) Cytostatic and cytotoxic effects of activated macrophages and nitric oxide donors on *Brugia malayi*. *Infect Immun.* **65** 2732-2739.

Thomas PG, Carter MR, Atochina O, Da'Dara AA, Piskorska D, McGuire E and Harn DA. (2003) Maturation of dendritic cell 2 phenotype by a helminth glycan uses a Toll-like receptor 4-dependent mechanism. *J Immunol.* **171** 5837-5841.

Thomas PG, Carter MR, Da'dara AA, DeSimone TM and Harn DA. (2005) A helminth glycan induces APC maturation via alternative NF-kappa B activation independent of I kappa B alpha degradation. *J Immunol.* **175** 2082-2090.

Tolouei Semnani R, Goel Venugopal P, Leifer CA, Mostbock S, Sabzevari H and Nutman TB. (2008) Inhibition of TLR3 and TLR4 function and expression in human dendritic cells by helminth parasites. *Blood.* **112** 1290-1298.

Tomiya N, Yamaguchi T, Awaya J, Kurono M, Endo S, Arata Y, Takahashi N, Ishihara H, Mori M and Tejima S. (1988) Structural analyses of asparagine-linked oligosaccharides of porcine pancreatic kallikrein. *Biochemistry.* **27** 7146-7154.

Trap C, Fu B, Le Guerhier F, Liu M, Le Rhun D, Romand T, Perret C, Blaga R and Boireau P. (2006) Cloning and analysis of a cDNA encoding a putative

serine protease comprising two trypsin-like domains of *Trichinella spiralis*. *Parasitol Res.* **98** 288-294.

Trottein F, Nutten S, Angeli V, Delerive P, Teissier E, Capron A, Staels B and Capron M. (1999) *Schistosoma mansoni* schistosomula reduce E-selectin and VCAM-1 expression in TNF-alpha-stimulated lung microvascular endothelial cells by interfering with the NF-kappaB pathway. *Eur J Immunol.* **29** 3691-3701.

Trujillo-Vargas CM, Werner-Klein M, Wohlleben G, Polte T, Hansen G, Ehlers S and Erb KJ. (2006) Helminth-derived products inhibit the development of allergic responses in mice. *Am J Respir Crit Care Med.* **175** 336-344.

Tsuda Y, Takahashi H, Kobayashi M, Hanafusa T, Herndon DN and Suzuki F. (2004) Three different neutrophil subsets exhibited in mice with different susceptibilities to infection by methicillin-resistant *Staphylococcus aureus*. *Immunity.* **21** 215-226.

Tux WC and Lai SC. (2006) Induction of tumour necrosis factor, interleukin-1beta and matrix metalloproteinases in pulmonary fibrosis of rats infected with *Angiostrongylus cantonensis*. *J Helminthol.* **80** 305-311.

Uematsu S and Akira S. (2006) Toll-like receptors and innate immunity. *J Mol Med.* **84** 712-725.

Ulevitch RJ and Tobias PS. (1995) Receptor-dependent mechanisms of cell stimulation by bacterial endotoxin. *Annu Rev Immunol.* **13** 437-457.

Ulich TR, Watson LR, Yin SM, Guo KZ, Wang P, Thang H and del Castillo J. (1991) The intratracheal administration of endotoxin and cytokines. I. Characterization of LPS-induced IL-1 and TNF mRNA expression and the LPS-, IL-1-, and TNF-induced inflammatory infiltrate. *Am J Pathol.* **138** 1485-1496.

University of Cambridge Teaching Server. 2008. *Pathology and helminths*.
[online] Available at http://teaching.path.cam.ac.uk/partIB_pract/P15/
[Accessed at 15 February, 2009]

Urban Jr JF, Noben-Trauth N, Donaldson DD, Madden KB, Morris SC, Collins M and Finkelman FD. (1998) IL-13, IL-4R α , and Stat6 are required for the expulsion of the gastrointestinal nematode parasite *Nippostrongylus brasiliensis*. *Cell Press*. **8** 255-264.

Vainer B. (2005) Intercellular adhesion molecule-1 (ICAM-1) in ulcerative colitis: presence, visualization, and significance. *Inflamm Res*. **54** 313-327.

Valko M, Leibfritz D, Moncol J, Cronin MT, Mazur M and Telser J. (2007) Free radicals and antioxidants in normal physiological functions and human disease. *Int J Biochem Cell Biol*. **39** 44-84.

Van Der Kleij D, van den Biggelaar AH, Kruize YC, Retra K, Fillie Y, Schmitz M, Kremsner PG, Tielens AG and Yazdanbakhsh M. (2004) Responses to Toll-like receptor ligands in children living in areas where schistosome infections are endemic. *J Infect Dis*. **189** 1044-1051.

Van Die I and Cummings R. (2006) Glycans modulate immune responses in helminth infections and allergy. *Chem Immunol Allergy*. **90** 91-112.

Van Die I, van Vliet SJ, Nyame AK, Cummings RD, Bank CM, Appelmelk B, Geijtenbeek TB and van Kooyk Y. (2003) The dendritic cell-specific C-type lectin DC-SIGN is a receptor for *Schistosoma mansoni* egg antigens and recognizes the glycan antigen Lewis x. *Glycobiology*. **13** 471-478.

van Riet E, Hartgers FC and Yazdanbakhsh M. (2007) Chronic helminth infections induce immunomodulation: consequences and mechanisms. *Immunobiol.* **212** 475-490.

Velupillai P and Harn DA. (1994) Oligosaccharidespecific induction of interleukin 10 production by B220⁺ cells from schistosome infected mice: a mechanism for regulation of CD4⁺ T-cell subsets. *Proc Natl Acad Sci USA.* **91** 18-22.

Velupillai P, Secor WE, Harauf AM and Harn DA. (1997) B-1 cell (CD5⁺B220⁺) outgrowth in murine schistosomiasis is genetically restricted and is largely due to activation by polylactosamine sugars. *J Immunol.* **158** 338-344.

Wagner JG and Roth RA. (2000) Neutrophil migration mechanisms, with an emphasis on the pulmonary vasculature. *Pharmacol Rev.* **52** 349-374.

Wang C, Eufemi M, Turano C and Giartosio A. (1996) Influence of the carbohydrate moiety on the stability of glycoproteins. *Biochemistry.* **35** 7299-7307.

Wang H, Tanihata T, Fukumoto S and Hirai K. (1997) Excretory/secretory products of plerocercoids of *Spirometra erinaceieuropaei* induce the expression of inducible nitric oxide synthase mRNA in murine hepatocytes. *Int J Parasitol.* **27** 367-375.

Watkins AD, Hatfield CA, Fidler SF, Winterrowd GE, Brashler JR, Sun FF, Taylor BM, Vonderfecht SL, Conder GA, Holgate ST, Chin JE and Richards IM. (1996) Phenotypic analysis of airway eosinophils and lymphocytes in a Th-2-driven murine model of pulmonary inflammation. *Am J Respir Cell Mol Biol.* **15** 20-34.

Wedrychowicz H, Maclean JM and Holmes PH. (1984) Secretory IgA responses in rats to antigens of various developmental stages of *Nippostrongylus brasiliensis*. *Parasitol.* **89** 145-157.

Welch JS, Escoubet-Lozach L, Sykes DB, Liddiard K, Greaves DR and Glass CK. (2002) TH2 cytokines and allergic challenge induce Ym1 expression in macrophages by a STAT6-dependent mechanism. *J Biol Chem.* **277** 42821-42829.

Williamson AL, Brindley PJ, Knox DP, Hotez PJ and Loukas A. (2003) Digestive proteases of blood-feeding nematodes. *Trends Parasitol.* **19** 417-423.

Wilson MS and Maizels RM. (2004) Regulation of allergy and autoimmunity in helminth infection. *Clin Rev Allergy Immunol.* **26** 35-50.

Wilson MS and Maizels RM. (2006) Regulatory T cells induced by parasites and the modulation of allergic responses. *Chem Immunol Allergy.* **90** 176-195.

Wingren AG, Parra E, Varga M, Kalland T, Sjogren HO, Hedlund G and Dohlsten M. (1995) T cell activation pathways: B7, LFA-3, and ICAM-1 shape unique T cell profiles. *Crit Rev Immunol.* **15** 235-253.

Winterburn PJ and Phelps CF. (1972) The significance of glycosylated proteins. *Nature.* **236** 147-151.

Wolpe SD and Cerami A. (1989) Macrophage inflammatory proteins 1 and 2: members of a novel superfamily of cytokines. *FASEB J.* **3** 2565-2573.

Woodbury RG, Miller HR, Huntley JF, Newlands GF, Palliser AC and Wakelin D. (1984) Mucosal mast cells are functionally active during spontaneous expulsion of intestinal nematode infections in rat. *Nature.* **312** 450-452.

Wormald MR and Dwek RA. (1999) Glycoproteins: glycan presentation and protein-fold stability. *Structure*. **7** R155-60.

Wright SD, Ramos RA, Hermanowski-Vosatka A, Rockwell P and Detmers PA. (1991) Activation of the adhesive capacity of CR3 on neutrophils by endotoxin: dependence on lipopolysaccharide binding protein and CD14. *J Exp Med*. **173** 1281-1286.

Wright SD, Ramos RA, Tobias PS, Ulevitch RJ, and Mathison JC. (1990) CD14, a receptor for complexes of lipopolysaccharide (LPS) and LPS binding protein. *Science*. **249** 1431 – 1433.

Wu WK, Mak CH and Ko RC. (2006) Cloning and characterization of the Cu/Zn superoxide dismutase of *Trichinella pseudospiralis*. *Parasitol Res*. **98** 281-287.

Wynn TA, Eltoun I, Oswald IP, Cheever AW and Sher A. (1994) Endogenous interleukin 12 (IL-12) regulates granuloma formation induced by eggs of *Schistosoma mansoni* and exogenous IL-12 both inhibits and prophylactically immunizes against egg pathology. *J Exp Med*. **179** 1551-1561.

Yazdanbakhsh M, Kremsner PG and van Ree R. (2002) Allergy, parasites, and the hygiene hypothesis. *Science*. **296** 490–494.

Yonekawa K and Harlan JM. (2005) Targeting leukocyte integrins in human diseases. *J. Leukoc. Biol*. **77** 129–140.

Zaccone P, Fehervari Z, Phillips JM, Dunne DW and Cooke A. (2006) Parasitic worms and inflammatory diseases. *Parasite Immunol*. **28** 515-523.

Zang X, Taylor P, Wang JM, Meyer DJ, Scott AL, Walkinshaw MD and Maizels RM. (2002) Homologues of human macrophage migration inhibitory factor from

a parasitic nematode. Gene cloning, protein activity, and crystal structure. *J Biol Chem.* **277** 44261-44267.

Zang X, Yazdanbakhsh M, Kiang H, Kanost MR and Maizels RM. (1999) A novel serpin expressed by the blood-borne microfilariae of the parasitic nematode *Brugia malayi* inhibits human neutrophil serine proteinases. *Blood.* **94** 1418–1428.

Zhang XW, Liu Q, Wang Y and Thorlacius H. (2001) CXC chemokines, MIP-2 and KC, induce P-selectin-dependent neutrophil rolling and extravascular migration *in vivo*. *Br J Pharmacol.* **133** 413-421.

Zhu J, Min B, Hu-Li J, Watson CJ, Grinberg A, Wang Q, Killeen N, Urban JF Jr, Guo L and Paul WE. (2004) Conditional deletion of Gata3 shows its essential function in T(H)1-T(H)2 responses. *Nat Immunol.* **5** 1157-1165.

Zweigner J, Gramm H, Singer OC, Wegscheider K, and Ralf R. Schumann. (2001) High concentrations of lipopolysaccharide-binding protein in serum of patients with severe sepsis or septic shock inhibit the lipopolysaccharides response in human monocytes. *Blood.* **98** 3800-3808.

APPENDIX

Zhao M, Brown DM, Maccallum J, Proudfoot L. (2009) Effect of *Nippostrongylus brasiliensis* L3 ES on inflammatory mediator gene transcription in lipopolysaccharide lung inflammation. *Parasite Immunol.* **31** 50-56.