

REFERENCES CHAPTER 50

- (1) Baerwald CG, Panayi GS, Lanchbury JS. Corticotropin releasing hormone promoter region polymorphisms in rheumatoid arthritis. *J Rheumatol* 1997;24:215-6.
- (2) Takagi H, Ishiguro N, Iwata H, Kanamono T. Genetic association between rheumatoid arthritis and estrogen receptor microsatellite polymorphism. *J Rheumatol* 2000;27:1638-42.
- (3) Cutolo M, Straub RH, Bijlsma JW. Neuroendocrine-immune interactions in synovitis. *Nat Clin Pract Rheumatol* 2007;3:627-34.
- (4) Straub RH. Complexity of the bi-directional neuroimmune junction in the spleen. *Trends Pharmacol Sci* 2004;25:640-6.
- (5) Elenkov IJ, Wilder RL, Chrousos GP, Vizi ES. The sympathetic nervous system - an integrative interface between two supersystems: the brain and the immune system. *Pharmacol Rev* 2000;52:595-638.
- (6) Tracey KJ. Physiology and immunology of the cholinergic antiinflammatory pathway. *J Clin Invest* 2007;117:289-96.
- (7) Sanders VM, Straub RH. Norepinephrine, the beta-Adrenergic Receptor, and Immunity. *Brain Behav Immun* 2002;16:290-332.
- (8) Schaible HG, Grubb BD. Afferent and spinal mechanisms of joint pain. *Pain* 1993;55:5-54.
- (9) Ader R. Psychoneuroimmunology. San Diego, Ca: Elsevier - Academic Press; 2007.
- (10) Straub RH. Lehrbuch der klinischen Pathophysiologie komplexer chronischer Erkrankungen in zwei Bänden. Göttingen: Vandenhoeck & Ruprecht; 2006.
- (11) Lockshin MD. Sex ratio and rheumatic disease. *Autoimmun Rev* 2002;1:162-7.
- (12) Magalhaes R, Stiehl P, Morawietz L, Berek C, Krenn V. Morphological and molecular pathology of the B cell response in synovitis of rheumatoid arthritis. *Virchows Arch* 2002;441:415-27.
- (13) Lucchinetti C, Bruck W, Parisi J, Scheithauer B, Rodriguez M, Lassmann H. Heterogeneity of multiple sclerosis lesions: implications for the pathogenesis of demyelination. *Ann Neurol* 2000;47:707-17.
- (14) Straub RH. The complex role of estrogens in inflammation. *Endocr Rev* 2007;28:521-74.
- (15) Magliozzi R, Howell O, Vora A, Serafini B, Nicholas R, Puopolo M et al. Meningeal B-cell follicles in secondary progressive multiple sclerosis associate with early onset of disease and severe cortical pathology. *Brain* 2007;130:1089-104.
- (16) Masi AT, Aldag JC, Jacobs JW. Rheumatoid arthritis: neuroendocrine immune integrated physiopathogenetic perspectives and therapy. *Rheum Dis Clin North Am* 2005;31:131-60.
- (17) Tsigos C, Papanicolaou DA, Defensor R, Mitsiadis CS, Kyrou I, Chrousos GP. Dose effects of recombinant human interleukin-6 on pituitary hormone secretion and energy expenditure. *Neuroendocrinology* 1997;66:54-62.
- (18) Späth-Schwalbe E, Born J, Schrezenmeier H, Bornstein SR, Stromeyer P, Drechsler S et al. Interleukin-6 stimulates the hypothalamus-pituitary-adrenocortical axis in man. *J Clin Endocrinol Metab* 1994;79:1212-4.

- (19) Mastorakos G, Chrousos GP, Weber JS. Recombinant interleukin-6 activates the hypothalamic-pituitary-adrenal axis in humans. *J Clin Endocrinol Metab* 1993;77:1690-4.
- (20) Straub RH, Härle P, Sarzi-Puttini P, Cutolo M. Tumor necrosis factor-neutralizing therapies improve altered hormone axes: an alternative mode of antiinflammatory action. *Arthritis Rheum* 2006;54:2039-46.
- (21) Crofford LJ, Kalogeras KT, Mastorakos G, Magiakou MA, Wells J, Kanik KS et al. Circadian relationships between interleukin (IL)-6 and hypothalamic- pituitary-adrenal axis hormones: failure of IL-6 to cause sustained hypercortisolism in patients with early untreated rheumatoid arthritis. *J Clin Endocrinol Metab* 1997;82:1279-83.
- (22) Schmidt M, Weidler C, Naumann H, Anders S, Scholmerich J, Straub RH. Reduced capacity for the reactivation of glucocorticoids in rheumatoid arthritis synovial cells: Possible role of the sympathetic nervous system? *Arthritis Rheum* 2005;52:1711-20.
- (23) Soares PM, Borba EF, Bonfa E, Hallak J, Correa AL, Silva CA. Gonad evaluation in male systemic lupus erythematosus. *Arthritis Rheum* 2007;56:2352-61.
- (24) Weidler C, Struharova S, Schmidt M, Ugele B, Schölmerich J, Straub RH. TNF inhibits dehydroepiandrosterone (DHEA) sulfate to DHEA conversion in rheumatoid arthritis synovial cells - a prerequisite for local androgen deficiency. *Arthritis Rheum* 2005;in press:
- (25) Dulos J, van der Vleuten MA, Kavelaars A, Heijnen CJ, Boots AM. CYP7B expression and activity in fibroblast-like synoviocytes from patients with rheumatoid arthritis: regulation by proinflammatory cytokines. *Arthritis Rheum* 2005;52:770-8.
- (26) Castagnetta LA, Cutolo M, Granata OM, Di Falco M, Bellavia V, Carruba G. Endocrine end-points in rheumatoid arthritis. *Ann N Y Acad Sci* 1999;876:180-91.
- (27) Schmidt M, Weidler C, Naumann H, Schölmerich J, Straub RH. Androgen conversion in osteoarthritis and rheumatoid arthritis synoviocytes - androstenedione and testosterone inhibit estrogen formation and favor production of more potent 5alpha-reduced androgens. *Arthritis Research & Therapy* 2005;7:R938-R948.
- (28) Tengstrand B, Carlstrom K, Fellander-Tsai L, Hafstrom I. Abnormal levels of serum dehydroepiandrosterone, estrone, and estradiol in men with rheumatoid arthritis: high correlation between serum estradiol and current degree of inflammation. *J Rheumatol* 2003;30:2338-43.
- (29) Weidler C, Härle P, Schedel J, Schmidt M, Schölmerich J, Straub RH. Patients with rheumatoid arthritis and systemic lupus erythematosus have increased renal excretion of mitogenic estrogens in relation to endogenous antiestrogens. *J Rheumatol* 2004;31:489-94.
- (30) Cutolo M, Maestroni GJ. The melatonin-cytokine connection in rheumatoid arthritis. *Ann Rheum Dis* 2005;64:1109-11.
- (31) Walker SE, Jacobson JD. Roles of prolactin and gonadotropin-releasing hormone in rheumatic diseases. *Rheum Dis Clin North Am* 2000;26:713-36.
- (32) Matera L. Endocrine, paracrine and autocrine actions of prolactin on immune cells. *Life Sci* 1996;59:599-614.
- (33) Lange T, Dimitrov S, Fehm HL, Westermann J, Born J. Shift of monocyte function toward cellular immunity during sleep. *Arch Intern Med* 2006;166:1695-700.
- (34) Cutolo M, Maestroni GJ, Otsa K, Aakre O, Villaggio B, Capellino S et al. Circadian melatonin and cortisol levels in rheumatoid arthritis patients in winter time: a north and south Europe comparison. *Ann Rheum Dis* 2005;64:212-6.

- (35) Otero M, Lago R, Gomez R, Dieguez C, Lago F, Gomez-Reino J et al. Towards a pro-inflammatory and immunomodulatory emerging role of leptin. *Rheumatology (Oxford)* 2006;:
- (36) Härle P, Pongratz G, Weidler C, Büttner R, Schölmerich J, Straub RH. Possible role of leptin in hypoandrogenicity in patients with systemic lupus erythematosus and rheumatoid arthritis. *Ann Rheum Dis* 2004;63:809-16.
- (37) Ehling A, Schaffler A, Herfarth H, Tarner IH, Anders S, Distler O et al. The potential of adiponectin in driving arthritis. *J Immunol* 2006;176:4468-78.
- (38) Lago F, Dieguez C, Gomez-Reino J, Gualillo O. Adipokines as emerging mediators of immune response and inflammation. *Nat Clin Pract Rheumatol* 2007;3:716-24.
- (39) Straub RH, Cutolo M. Circadian rhythms in rheumatoid arthritis: implications for pathophysiology and therapeutic management. *Arthritis Rheum* 2007;56:399-408.
- (40) Arvidson NG, Gudbjornsson B, Larsson A, Hallgren R. The timing of glucocorticoid administration in rheumatoid arthritis. *Ann Rheum Dis* 1997;56:27-31.
- (41) Buttgereit F, Doering G, Schaeffler A, Witte S, Sierakowski S, Gromnica-Ihle E et al. Efficacy of modified-release versus standard prednisone to reduce duration of morning stiffness of the joints in rheumatoid arthritis (CAPRA-1): a double-blind, randomised controlled trial. *Lancet* 2008;371:205-14.
- (42) Hasko G, Cronstein BN. Adenosine: an endogenous regulator of innate immunity. *Trends Immunol* 2004;25:33-9.
- (43) Härle P, Mobius D, Carr DJ, Schölmerich J, Straub RH. An opposing time-dependent immune-modulating effect of the sympathetic nervous system conferred by altering the cytokine profile in the local lymph nodes and spleen of mice with type II collagen-induced arthritis. *Arthritis Rheum* 2005;52:1305-13.
- (44) Straub RH, Grum F, Strauch UG, Capellino S, Bataille F, Bleich A et al. Anti-inflammatory role of sympathetic nerves in chronic intestinal inflammation. *Gut* 2008;in press:
- (45) Baerwald C, Graefe C, Muhl C, von Wichert P, Krause A. Beta2-adrenergic receptors on peripheral blood mononuclear cells in patient with rheumatic diseases. *Akt Rheumatol* 1995;20:43-8.
- (46) Heijnen CJ, Rouppe vd, V, Wulffraat N, van der NJ, Kuis W, Kavelaars A. Functional alpha 1-adrenergic receptors on leukocytes of patients with polyarticular juvenile rheumatoid arthritis. *J Neuroimmunol* 1996;71:223-6.
- (47) Straub RH, Günzler C, Miller LE, Cutolo M, Schölmerich J, Schill S. Anti-inflammatory cooperativity of corticosteroids and norepinephrine in rheumatoid arthritis synovial tissue in vivo and in vitro. *FASEB J* 2002;16:993-1000.
- (48) Kuis W, Jong-de Vos v, Sinnema G, Kavelaars A, Prakken B, Helders PM et al. The autonomic nervous system and the immune system in juvenile rheumatoid arthritis. *Brain Behav Immun* 1996;10:387-98.
- (49) Dekkers JC, Geenen R, Godaert GL, Bijlsma JW, Doornen LJP. Sympathetic and parasympathetic nervous system activity at night in patients with recently diagnosed rheumatoid arthritis. In: JC Dekkers, editor. *Thesis: Psychophysiological responsiveness in recently diagnosed patients with rheumatoid arthritis*. Dordrecht: Dekkers; 2003. p. 55-74.
- (50) Straub RH, Herfarth H, Falk W, Andus T, Schölmerich J. Uncoupling of the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis in inflammatory bowel disease? *J Neuroimmunol* 2002;126:116-25.

- (51) Härle P, Straub RH, Wiest R, Maier A, Schölmerich J, Atzeni F et al. Increase of sympathetic outflow measured by NPY and decrease of the hypothalamic-pituitary-adrenal axis tone in patients with SLE and RA - Another example of uncoupling of response systems. *Ann Rheum Dis* 2005;65:51-6.
- (52) Harbuz MS, Rees RG, Eckland D, Jessop DS, Brewerton D, Lightman SL. Paradoxical responses of hypothalamic corticotropin-releasing factor (CRF) messenger ribonucleic acid (mRNA) and CRF-41 peptide and adenohipophysial proopiomelanocortin mRNA during chronic inflammatory stress. *Endocrinology* 1992;130:1394-400.
- (53) Stein C, Schafer M, Machelska H. Attacking pain at its source: new perspectives on opioids. *Nat Med* 2003;9:1003-8.
- (54) Li Z, Proud D, Zhang C, Wiehler S, McDougall JJ. Chronic arthritis down-regulates peripheral mu-opioid receptor expression with concomitant loss of endomorphin 1 antinociception. *Arthritis Rheum* 2005;52:3210-9.
- (55) Shen H, Aeschlimann A, Reisch N, Gay RE, Simmen BR, Michel BA et al. Kappa and delta opioid receptors are expressed but down-regulated in fibroblast-like synoviocytes of patients with rheumatoid arthritis and osteoarthritis. *Arthritis Rheum* 2005;52:1402-10.
- (56) Straub RH, Wolff C, Fassold A, Hofbauer R, Chover-Gonzalez A, Richards LJ et al. Antiinflammatory role of endomorphins in osteoarthritis, rheumatoid arthritis, and adjuvant-induced polyarthritis. *Arthritis Rheum* 2008;58:456-66.
- (57) Delgado M, Toscano MG, Benabdellah K, Cobo M, O'Valle F, Gonzalez-Rey E et al. In vivo delivery of lentiviral vectors expressing vasoactive intestinal peptide complementary DNA as gene therapy for collagen-induced arthritis. *Arthritis Rheum* 2008;58:1026-37.
- (58) Delgado M, Abad C, Martinez C, Leceta J, Gomariz RP. Vasoactive intestinal peptide prevents experimental arthritis by downregulating both autoimmune and inflammatory components of the disease. *Nat Med* 2001;7:563-8.
- (59) Juarranz MG, Santiago B, Torroba M, Gutierrez-Canas I, Palao G, Galindo M et al. Vasoactive intestinal peptide modulates proinflammatory mediator synthesis in osteoarthritic and rheumatoid synovial cells. *Rheumatology (Oxford)* 2004;43:416-22.
- (60) Juarranz Y, Gutierrez-Canas I, Santiago B, Carrion M, Pablos JL, Gomariz RP. Differential expression of vasoactive intestinal peptide and its functional receptors in human osteoarthritic and rheumatoid synovial fibroblasts. *Arthritis Rheum* 2008;58:1086-95.
- (61) Lundberg JM, Anggard A, Pernow J, Hokfelt T. Neuropeptide Y-, substance P- and VIP-immunoreactive nerves in cat spleen in relation to autonomic vascular and volume control. *Cell Tissue Res* 1985;239:9-18.
- (62) Fried G, Terenius L, Brodin E, Efendic S, Dockray G, Fahrenkrug J et al. Neuropeptide Y, enkephalin and noradrenaline coexist in sympathetic neurons innervating the bovine spleen. *Cell Tissue Res* 1986;243:495-508.
- (63) Borovikova LV, Ivanova S, Zhang M, Yang H, Botchkina GI, Watkins LR et al. Vagus nerve stimulation attenuates the systemic inflammatory response to endotoxin. *Nature* 2000;405:458-62.
- (64) Wang H, Yu M, Ochani M, Amella CA, Tanovic M, Susarla S et al. Nicotinic acetylcholine receptor alpha7 subunit is an essential regulator of inflammation. *Nature* 2003;421:384-8.

- (65) Carlens C, Brandt L, Klareskog L, Lampa J, Askling J. The inflammatory reflex and risk for rheumatoid arthritis: a case-control study of human vagotomy. *Ann Rheum Dis* 2007;66:414-6.
- (66) Weidler C, Holzer C, Harbuz M, Hofbauer R, Angele P, Scholmerich J et al. Low density of sympathetic nerve fibres and increased density of brain derived neurotrophic factor positive cells in RA synovium. *Ann Rheum Dis* 2005;64:13-20.
- (67) Dirmeier M, Capellino S, Schubert T, Angele P, Anders S, Straub RH. Lower density of synovial nerve fibres positive for calcitonin gene-related peptide relative to substance P in rheumatoid arthritis but not in osteoarthritis. *Rheumatology (Oxford)* 2008;47:36-40.
- (68) von Banchet GS, Kiehl M, Schaible HG. Acute and long-term effects of IL-6 on cultured dorsal root ganglion neurones from adult rat. *J Neurochem* 2005;94:238-48.
- (69) Brenn D, Richter F, Schaible HG. Sensitization of unmyelinated sensory fibers of the joint nerve to mechanical stimuli by interleukin-6 in the rat: An inflammatory mechanism of joint pain. *Arthritis Rheum* 2006;56:351-9.
- (70) Hendiani JA, Westlund KN, Lawand N, Goel N, Lisse J, McNearney T. Mechanical sensation and pain thresholds in patients with chronic arthropathies. *J Pain* 2003;4:203-11.
- (71) Rygh LJ, Svendsen F, Fiska A, Haugan F, Hole K, Tjolsen A. Long-term potentiation in spinal nociceptive systems--how acute pain may become chronic. *Psychoneuroendocrinology* 2005;30:959-64.
- (72) Watkins LR, Maier SF. Beyond neurons: evidence that immune and glial cells contribute to pathological pain states. *Physiol Rev* 2002;82:981-1011.
- (73) Segond von Banchet GG, Petrow PK, Brauer R, Schaible HG. Monoarticular antigen-induced arthritis leads to pronounced bilateral upregulation of the expression of neurokinin 1 and bradykinin 2 receptors in dorsal root ganglion neurons of rats. *Arthritis Res* 2000;2:424-7.
- (74) Herrmann M, Schölmerich J, Straub RH. Stress and rheumatic diseases. *Rheum Dis Clin North Am* 2000;26:8-1-8-27.
- (75) Straub RH, Dhabhar FS, Bijlsma JW, Cutolo M. How psychological stress via hormones and nerve fibers may exacerbate rheumatoid arthritis. *Arthritis Rheum* 2005;52:16-26.
- (76) Dekkers JC, Geenen R, Godaert GL, Glaudemans KA, Lafeber FP, van Doornen LJ et al. Experimentally challenged reactivity of the hypothalamic pituitary adrenal axis in patients with recently diagnosed rheumatoid arthritis. *J Rheumatol* 2001;28:1496-504.
- (77) Imrich R, Rovensky J, Malis F, Zlnay M, Killinger Z, Kvetnansky R et al. Low levels of dehydroepiandrosterone sulphate in plasma, and reduced sympathoadrenal response to hypoglycaemia in premenopausal women with rheumatoid arthritis. *Ann Rheum Dis* 2005;64:202-6.
- (78) Hirano D, Nagashima M, Ogawa R, Yoshino S. Serum levels of interleukin 6 and stress related substances indicate mental stress condition in patients with rheumatoid arthritis. *J Rheumatol* 2001;28:490-5.
- (79) Roupe van der Voort C, Heijnen CJ, Wulffraat N, Kuis W, Kavelaars A. Stress induces increases in IL-6 production by leucocytes of patients with the chronic inflammatory disease juvenile rheumatoid arthritis: a putative role for alpha(1)-adrenergic receptors. *J Neuroimmunol* 2000;110:223-9.

- (80) Straub RH, Pongratz G, Hirvonen H, Pohjolainen T, Mikkelsson M, Leirisalo-Repo M. Acute cold stress in rheumatoid arthritis inadequately activates stress responses and induces an increase of interleukin-6. *Ann Rheum Dis* 2008;in press:
- (81) Kittner JM, Jacobs R, Pawlak CR, Heijnen CJ, Schedlowski M, Schmidt RE. Adrenaline-induced immunological changes are altered in patients with rheumatoid arthritis. *Rheumatology (Oxford)* 2002;41:1031-9.
- (82) Motivala SJ, Khanna D, FitzGerald J, Irwin MR. Stress activation of cellular markers of inflammation in rheumatoid arthritis: protective effects of tumor necrosis factor alpha antagonists. *Arthritis Rheum* 2008;58:376-83.
- (83) Wolfe F, Michaud K. Fatigue, rheumatoid arthritis, and anti-tumor necrosis factor therapy: an investigation in 24,831 patients. *J Rheumatol* 2004;31:2115-20.
- (84) Rupp I, Boshuizen HC, Jacobi CE, Dinant HJ, van den Bos GA. Impact of fatigue on health-related quality of life in rheumatoid arthritis. *Arthritis Rheum* 2004;51:578-85.
- (85) Dickens C, Creed F. The burden of depression in patients with rheumatoid arthritis. *Rheumatology (Oxford)* 2001;40:1327-30.
- (86) Dantzer R, Wollman EE, Yirmiya R. *Brain Behavior and Immunity: Special issue of on cytokines and depression*. San Diego: Academic Press; 2002.
- (87) Reichenberg A, Yirmiya R, Schuld A, Kraus T, Haack M, Morag A et al. Cytokine-associated emotional and cognitive disturbances in humans. *Arch Gen Psychiatry* 2001;58:445-52.
- (88) Cohen O, Reichenberg A, Perry C, Ginzberg D, Pollmacher T, Soreq H et al. Endotoxin-induced changes in human working and declarative memory associate with cleavage of plasma "readthrough" acetylcholinesterase. *J Mol Neurosci* 2003;21:199-212.
- (89) Vgontzas AN, Zoumakis E, Lin HM, Bixler EO, Trakada G, Chrousos GP. Marked decrease in sleepiness in patients with sleep apnea by etanercept, a tumor necrosis factor-alpha antagonist. *J Clin Endocrinol Metab* 2004;89:4409-13.
- (90) Moreland LW, Genovese MC, Sato R, Singh A. Effect of etanercept on fatigue in patients with recent or established rheumatoid arthritis. *Arthritis Rheum* 2006;55:287-93.
- (91) Cutolo M. Vitamin D or hormone D deficiency in autoimmune rheumatic diseases including undifferentiated connective tissue disease. *Arthritis Res & Ther* 2008 (in press)
- (92) Cutolo M: Vitamin D and autoimmune rheumatic diseases. *Rheumatology* 2008 [Epub ahead of print].
- (93) Cutolo M, Otsa K, Laas K, Yprus M, Lehtme R, Secchi ME, Sulli A, Paolino S, Seriola B: Circannual vitamin D serum levels and disease activity in rheumatoid arthritis: Northern versus Southern Europe. *Clin Exp Rheumatol* 2006, 24:702-704.
- (94) Adorini A, Penna G: Control of autoimmune diseases by the vitamin D endocrine system. *Nat Clin Pract Rheumatol* 2008, 4:404-412.
- (95) Adams JS, Hewison M: Unexpected actions of vitamin D: new perspectives on the regulation of innate and adaptive immunity. *Nat Clin Pract Endocrinol Metab* 2008, 4:80-90.
- (96) Chen S, Sims GP, Chen XX, Gu YY, Chen S, Lipsky PE: Modulatory effects of 1,25-dihydroxyvitamin D3 on human B cell differentiation. *J Immunol* 2007, 179:1634-1647.