

## REFERENCES

- Adersson, J., Coutinho, A., Lernhardt, W., and Melchers, F. 1977. Clonal growth and maturation to immunoglobulin secretion *in vitro* of every growth-inducible B lymphocytes. Cell 10: 27-34.
- Afar, B., Engel, D., and Clark, E.A. 1992. Activated lymphocyte subsets in adult periodontitis. J. Periodont. Res. 27: 126-133.
- Aramaki, M., Nagasawa, T., Koseki, T., and Ishikawa, I. Presence of activated B-1 cells in chronic inflamed gingival tissue. (In press).
- Balkwill, F.R., and Burke, F. 1989. The cytokine network. Immunol. Today 9: 299-304.
- Bevilacqua, M.P., Pober, J.S., Whetter, M.E., Cotran, R.S., and Gimbrone, M.A. Jr. 1985. Interleukin 1 acts on cultured human vascular endothelium to increase the adhesion of polymorphonuclear leukocytes, monocytes, and related leukocytes cell lines. J. Clin. Invest. 76: 2003-2011.
- Bick, P.H., Carpenter, A.B., Holdeman, L.V., Miller, G.A., Ranney, R.R., Palcanis, K.G., and Tew, J.G. 1981. Polyclonal B-cell activation induced by extracts of Gram-negative bacteria isolated from periodontally diseased sites. Infect. Immun. 34: 43-49.
- Boyum, A. 1968. Isolation of leukocytes from human blood. Further observations. Scand. J. Clin. Lab. Invest. 97 (suppl.): 31-50.

- Bragd, L., Dahlen, G., Wikstrom, M., and Slots, J. 1987. The capability of *Actinobacillus actinomycetemcomitans*, *Bacteroides gingivalis* and *Bacteroides intermedius* to indicate progressive periodontitis; a retrospective study. J. Clin. Periodontol. 14: 95-99.
- Brandtzaeg, P. 1973. Immunology of inflammatory periodontal lesions. Int. Dent. J. 23: 438-454.
- Burastero, S.E., Casali, P., Wilder, R.L., and Notkins, A.L. 1988. Monoreactive high affinity and polyreactive low affinity rheumatoid factors are produced by CD5+ B cells from patients with rheumatoid arthritis. J. Exp. Med. 168: 1979-1992.
- Carpenter, A.B., Sully, E.C., Ranney, R.R., and Bick, P.H. 1984. T-cell regulation of polyclonal B-cell activation induced by extracts of oral bacteria associated with periodontal diseases. Infect. Immun. 43: 326-336.
- Casali, P., Butastero, S.E., Akamura, M., Inghirami, G., and Ins, A.L. 1987. Human lymphocytes making rheumatoid factor and antibody to ssDNA belong to Leu-1+ B cell subset. Science 236: 77-81.
- Casali, P., and Notkins, A.L. 1989. CD5+ B lymphocytes, polyreactive antibodies and the human B cell repertoire. Immunol. Today 10: 364-368.

- Caton, J. 1989. Periodontal diagnosis and diagnosis aids. In: Novins, M., Backer, W., Kornman, K., ed. Proceedings of the World Workshop in Clinical Periodontics. Princeton, Chicago: The American Academy of Periodontology: 11 - 122.
- Cohen, M.C., and Cohen, S. 1996. Cytokine function. A study in biologic diversity. Am. J. Clin. Pathol. 105: 589-598.
- Daly, C.G., Clancy, R.L., and Cripps, A.W. 1983a. Lymphocytes from chronically inflamed human gingiva. I. Cell recovery and characterization *in vitro*. J. Periodont. Res. 18: 67-74.
- Daly, C.G., Cripps, A.W and Clancy, R.L. 1983b. Lymphocytes from chronically inflamed human gingiva. II. Immunoglobulin production *in vitro*. J. Periodont. Res. 18: 132-138.
- Dauphinee, M., Tovar, N., and Talal, N. 1988. B cells expressing CD5 are increased in Sjogren's syndrome. Arthritis Rheum. 31: 642-647.
- Del Prete, G., DeCarli, M., Almerigogna, F., Giudizi, M.G., Biagiotti, R., and Romagnani, S. 1993. Human IL-10 is produced by both Type 1 helper (Th1) and Type 2 helper (Th2) T cell clones and inhibits their antigen-specific proliferation and cytokine production. J. Immunol. 150: 4754-4765.

De Waal Malefyt, R., Hannen, J., Splits, H., Roncarolo, M.G., te Velde, A., Figdor, C., Johnson, K., Kastelein, R., Yssel, H., and de Vries, J.E. 1991. Interleukin 10 (IL-10) and viral IL-10 strongly reduce antigen-specific human T cell proliferation by diminishing the antigen-presenting capacity of monocytes via down regulation of class II major histocompatibility complex expression. J. Exp. Med. 174: 915-924.

De Waal Malefyt, R., Yssel, H., Roncarolo, M.G., Splits, H., and de Vries, J.E. 1992. Interleukin-10. Curr. Opin. Immunol. 4: 314-320.

Dinarello, C.H. 1989. Interleukin-1 and its biologically related cytokines. Adv. Immunol. 44: 153-205.

Doherty, T.M., Seder, R.A., and Sher, A. 1996. Induction and regulation of IL-15 expression in murine macrophages. J. Immunol. 156: 735-741.

Donaldson, S.L., Bick, P.H., Moore, W.C., Ranney, R.R., Nurmeister, J.A., and Tew, J.G. 1982a. Polyclonal B-cell activating capacities of gram-positive bacteria frequently isolated from periodontally diseased sites. J. Periodont. Res. 17: 569-575.

Donaldson, S.L., Ranney, R.R., Burmeister, J.A., and Tew, J.G. 1982b. Blastogenic responses by lymphocytes from periodontally healthy populations induced by periodontitis-associated bacteria. J. Periodontol. 53: 743-751.

Duncan, M.J., Nakao, S., Skobe, Z., and Xie, H. 1993. Interactions of *Porphyromonas gingivalis* with epithelial cells. Infect. Immun. 61: 2260-2265.

Dzink, J.L., Socransky, S.S., and Haffajee, A.D. 1988. The predominant cultivable microbiota of active and inactive lesions of destructive periodontal diseases. J. Clin. Periodontol. 15: 316-323.

Ebersole, J.L., and Taubman, M.A. 1994. The protective nature of host responses in periodontal diseases. Periodontol. 2000 5: 112-141.

Falcone, M., Lee, J., Patstone, G., Yeung, B., and Sarvetnick, N. 1998. B lymphocytes are crucial antigen-presenting cells in the pathogenic autoimmune response to GAD65 antigen in nonobese diabetic mice. J. Immunol. 161: 1163-1168.

Ftis, A., Singh, G., and Dolby, A.E. 1986. Antibody to collagen type I in periodontal disease. J. Periodontol. 57: 693-698.

Fujihashi, K., Kono, Y., Yamamoto, M., McGhee, J.R., Beagley, K.W., Aicher, W.K., and Kiyono, H. 1991. Interleukin production by gingival mononuclear cells isolated from adult periodontitis patients. J. Dent. Res. 70: 550 (Abstr.2269).

Fujihashi, K., Beagley, K.W., Kono, Y., Aicher, W.K., Yamamoto, M., DiFabio, S., Xu-Amano, J., McGhee, J.R., and Kiyono, H. 1993a. Gingival mononuclear cells from chronic inflammatory periodontal tissues

produce interleukin (IL)-5 and IL-6 but not IL-2 and IL-4. Amer. J. Pathol. 142: 1239-1251.

Fujihashi, K., Kono, Y., Beagley, K.W., Yamamoto, M., McGhee, J.R., Mestecky, J., and Kiyono, H. 1993b. Cytokines and periodontal disease: immunopathological role of interleukins for B cell responses in chronic inflamed gingival tissues. J. Periodontol. 64 (Suppl.): 400-406.

Fujihashi, K., Yamamoto, M., Hiroi, T., Bamberg T.V., McGhee, J.R., and Kiyono, H. 1996. Selected Th1 and Th2 cytokine mRNA expression by CD4+ T cells isolated from inflamed human gingival tissues. Clin. Exp. Med. 103: 422-428.

Genco, R.J. 1996. Current view of risk factors for periodontal disease. J. Periodontol. 67 (Suppl.): 1041-1049.

Gemmell, E., Kjeldsen, M., Yamazaki, K., Nakajima, T., Aldred, M.J., and Seymour, G.J. 1995. Cytokines profiles of *Porphyromonas gingivalis* reactive T lymphocyte lines and clones derived from *Porphyromonas gingivalis*-infected subjects. Oral Diseases 1: 139-146.

Gemmell, E., Marshall, R.I., and Seymour, G.J. 1997. Cytokines and prostaglandins in immune homeostasis and tissue destruction in periodontal disease. Periodontol. 2000 14: 112-143.

- Gemmell, E., and Seymour, G.J. 1991. Phenotypic analysis of B-cells extracted from human periodontal disease tissue. Oral Microbiol. Immunol. 6: 356-362.
- Gemmell, E., and Seymour, G.J. 1993. Interleukin 1, interleukin 6 and transforming growth factor- $\beta$  production by human gingival mononuclear cells following stimulation with *Porphyromonas gingivalis* and *Fusobacterium nucleatum*. J. Periodont. Res. 28: 122-129.
- Gold, M.R., and Defranco, A.L. 1994. Biochemistry of B lymphocyte activation. Adv. Immunol. 55: 221-243.
- Goodson, J.M., Tanner, A.R., Haffajee, A.D., Sonnenberger, G.C., and Socransky, S.S. 1982. Patterns of progression and regression of advanced destructive periodontal disease. J. Clin. Periodontol. 9: 472-481.
- Guery, J.C., Ria, F., Galbiati, F., and Adorini L. 1997. Normal B cells fail to secrete interleukin-12. Eur. J. Immunol. 27: 1632-1639.
- Hardy, R.R., Hayakawa, K., Shimizu, M., Yamasaki, K., and Kishimoto, T. 1987. Rheumatoid factor secretion from human Leu-1 B cells. Science 236: 81-83.
- Hayakawa, K., Hardy, R.R., Honda, M., Herzenberg, L.A., Steinberg A.D., and Herzenberg, LA. 1984. Ly-1 B cells: Functionally distinct lymphocytes that secrete IgM autoantibody. Proc. Natl. Acad. Sci. USA 81: 2494-2498.

- Hirsch, H.Z., Tarkowski, A., Koopman, W.J., and Mestecky, J. 1988a. Rheumatoid factor production in adult periodontitis patients. Arthritis Rheum. 31: 592 (Abstr.).
- Hirsch, H.Z., Tarkowski, A., Miller, E.J., Gay, S., Koopman, W.J., and Mestecky, J. 1988b. Autoimmunity to collagen in adult periodontal disease. J. Oral Pathol. 17: 456-459.
- Hirschfeld, L.I., and Wasserman, B. 1978. A long-term survey of tooth loss in 600 treated periodontal patients. J. Periodontol. 49: 225- 237.
- Hodgkin, P.D., and Basten, A. 1995. B cell activation, tolerance and antigen-presenting function. Curr. Opin. Immunol. 7: 121-129.
- Honig, J., Rordorf-Adam, C., Sigmund, C., Wiedemann, W., and Erard, E. 1989. Interleukin-1 beta (IL-1 $\beta$ ) concentration in gingival tissue from periodontitis patients and healthy control subjects. J. Periodont. Res. 24: 362-367.
- Hughes, F.j., and Howells,G.L. 1993 Interleukin-6 inhibits bone formation *in vitro*. Bone Min. 21: 21-28.
- Ishii, T., Mahanonda, R., and Seymour, G.J. 1992. The establishment of human T-cell lines activated with specific periodontopathic bacteria. Oral Microbiol. Immunol. 7: 225-229.

- Ishikawa, I., Nakashima, K., Koseki, T., Nagasawa, T., Watanabe, H., Arakawa, S., Nitta, H., and Nishihara, T. 1997. Induction of the immune response to periodontopathic bacteria and its role in the pathogenesis of periodontitis. Periodontol. 2000 14: 79-111.
- Itoh, K., and Hirohata, S. 1995. The role of IL-10 in human B cell activation, proliferation, and differentiation. J. Immunol. 154: 4341-4350.
- Ivanyi, L., and Lehner, T. 1970. Stimulation of lymphocyte transformation by bacterial antigens in patients with periodontal disease. Arch. Oral Biol. 15: 1089-1096.
- Ivanyi, L., and Lehner, T. 1971. Lymphocyte transformation by sonicates of dental plaque in human periodontal disease. Arch. Oral Biol. 16:1117-1121.
- Jonsson, R., Pitts, A., Lue, C., Gay, S., and Mestecky, J. 1991. Immunoglobulin isotype distribution of locally produced autoantibodies to collagen type I in adult periodontitis. J. Clin. Periodontol. 18: 703-707.
- Kelso, A. 1990. Cytokines in infectious disease. Aust. Microbiol. 11: 374-379.
- Kornman, K.S., Page, R.C., and Tonetti, M.S. 1997. The host response to the microbial challenge in periodontitis: assembling the players. Periodontol. 2000 14: 33-53.

Laichalk, L.L., Danforth, J.M., and Standiford, T.J. 1996. Interleukin-10 inhibits neutrophil phagocytic and bactericidal activity. FEMS Immunol. Med. Microbiol. 15: 181-187.

Li, L., Young, D., Wolf, S.F., and Choi, Y.S. 1996. Interleukin-12 stimulates B cell growth by inducing IFN-gamma. Cell. Immunol. 168: 133-140.

Llorente, L., Richaud-Patin, Y., Wijdenes, J., Alcocer-Varela, J., Maillot, M.C., Durand-Gasselin, I., Fourrier, B.M., Galanaud, P., and Emilie, D. 1993. Spontaneous production of interleukin-10 by B lymphocytes and monocytes in systemic lupus erythematosus. Eur. Cytokine Netw. 4: 421-430.

Llorente, L., Richaud-Patin, Y., Fio, R., Alcocer-Varela, J., Wijdenes, J., Fourrier, B.M., Galanaud, P., and Emilie, D. 1994. *In vivo* production of interleukin-10 by non T cells in rheumatoid arthritis, Sjogren's syndrome, and systemic lupus erythematosus: a potential mechanism of B lymphocyte hyperactivity and autoimmunity. Arthritis Rheum. 37: 1647-1655.

Lopatin, D.E., and Blackburn, E. 1992. Avidity and titer of immunoglobulin G subclass to *Porphyromonas gingivalis* in adult periodontitis patients. Oral Microbiol. Immunol. 7: 332-337.

Macdonald, J.B., Sutten, R.M., Knoll, M.L., Madlener, E.M., and Graniger, R.M. 1956. The pathogenic components of an experimental mixed infection. J. Infect. Dis. 98: 15-20.

Macdonald, J.B., Socransky, S.S., and Gibbon, R.J. 1963. Aspects of the pathogenesis of mixed anaerobic infections of mucous membranes. J. Dent. Res. 42: 529-544.

Mammo, W., Singh, G., and Dolby, A.E. 1982. Enhanced cellular immune response to type I collagen in patients with periodontal disease. Int. Archs. Allergy Appl. Immunol. 67: 149-154.

Manhart, S.S., Reinhart, R.A., Payne, J.B., Seymour, G.J., Gemmell, E., Dyer, J.K., and Petro, T.M. 1994. Gingival cell IL-2 and IL-4 on early-onset periodontitis. J. Periodontol. 65: 807-813.

Masada, M.P., Persson, R., Kenney, J.S., Lee, S.W., and Page, R.C. 1990. Measurement of interleukin-1 $\alpha$  and -1 $\beta$  in gingival crevicular fluid: Implication for the pathogenesis of periodontal disease. J. Periodont. Res. 25: 156-163.

Mathur, A., and Michalowicz, B.S. 1997. Cell-mediated immune system regulation in periodontal diseases. Crit. Rev. Oral Biol. Med. 8: 76-89.

Matsuki, Y., Yamamoto, T., and Hara, K. 1993. Localization of interleukin-1 mRNA-expressing macrophages in human inflamed gingiva and IL-1 activity in gingival crevicular fluid. J. Periodont. Res. 28: 35-42.

Matsuo, T., Tagawa, C., Ozaki, K., Noiri, Y., and Ebisu, S. 1996. A histological analysis of T and B cells in periodontal tissue destruction. Oral Med. Pathol. 1: 77-83.

Mayrand, D., and Holt, S.C. 1988. Biology of asaccharolytic black-pigmented *Bacteroides* species. Microbiol. Rev. 52: 134-152.

McFall, W.T. Jr. 1982. Tooth loss in 100 treated patients with periodontal disease: A long-term study. J. Periodontol. 53: 539-549.

Moore, K.W., Vieira, P., Fiorentino, D.F., Trounstein, M.L., Khan, T.A., and Mosmann, T.R. 1990. Homology of cytokine synthesis inhibitory factor (IL-10) to the Epstein-Barr virus gene BCRF1. Science 248: 1230-1234.

Mosmann, T.M. 1994. Properties and function of interleukin-10. Adv. Immunol. 56: 1-26.

Noelle, R.J., Marshall, L., Roy, M., Shepherd, D.M., Stamenkovic, I., Ledbetter, J.A., and Fell, H.P. 1992. Role of contact and soluble factors in the growth and differentiation of B cells by helper T cells. Adv. Exp. Med. Biol. 323: 131-138.

Noorchashm, H., Noorchashm, N., Kern, J., Rostami, S.Y., Barker, C.F., and Naji, A. 1997. B cells required for the initiation of insulitis and sialitis in nonobese diabetic mice. Diabetes 46: 941- 946.

O'Neill, P.A., Woodson, D.L., and Mackler, B.F. 1982. Functional characterization of human gingival lymphocytes: Cytotoxic activity. J. Periodont. Res. 17: 50-59.

- O'Garra, A. 1989a. Peptide regulatory factors. Interleukins and the immune system. Part I. Lancet 1: 943-946.
- O'Garra, A. 1989b. Peptide regulatory factors. Interleukins and the immune system. Part 2. Lancet 1: 1003-1005..
- Page, R.C. 1991. The role of inflammatory mediators in the pathogenesis of periodontal disease. J. Periodont. Res. 26: 230-242.
- Page, R.C., Offenbacher, S., Schroeder, H.E., Seymour, G.J., and Kornman, K. 1997. Advanced in the pathogenesis of periodontitis: summary of development, clinical implications and future direction. Periodontol. 2000 14: 216-248.
- Prabhu, A., Michalowicz, B.S., and Mathur, A. 1996. Detection of local and systemic cytokines in adult periodontitis. J. Periodontol. 67: 515-522.
- Pistoia, V. 1997. Production of cytokines by human B cells in health and disease. Immunol. Today 18: 343-349.
- Polak, B., Vance, J.B., Dyer, J.K., Bird, H.S., Gemmell, E., Reinhardt, R.A., and Seymour, G.J. 1995. IgG antibody subclass response to *Porphyromonas gingivalis* outer membrane antigens in gingivitis and adult periodontitis. J. Periodontol. 66: 363-368.

Punnonen, J., and de Vries, J.E. 1994. IL-13 induces proliferation, Ig isotype switching, and Ig synthesis by immature human fetal B cells. J. Immunol. 152: 1094-1102.

Qwarnstrom, E.E., MacFarlane, S.A., and Page, R.C. 1989. Effects of interleukin-1 on fibroblast extracellular matrix, using a 3-dimensional culture system. J. Cell. Physiol. 139: 501-508.

Ranney, R.R. 1991. Immunologic mechanisms of pathogenesis in periodontal disease: an assessment. J. Periodont. Res. 26: 243-254.

Rousset, F., Garcia, E., and Banchereau, J. 1991. Cytokine-induced proliferation and immunoglobulin production of human B lymphocytes triggered through their CD40 antigen. J. Exp. Med. 173: 705-710.

Reinhardt, R.A., Masada, M.P., Kaldahl, W.B., Dubois, L.M., Kornman, K.S., Choi, J.I., Kalkwarf, K.L., and Allison, A.C. 1993. Gingival fluid IL-1 and IL-6 levels in refractory periodontitis. J. Clin. Periodontol. 20: 225-231.

Roodman, G.D. 1992. Interleukin-6: an osteotropic factor? J. Bone Miner. Res. 7: 475-478.

Rook, G., and Balkwill, F. 1998. Cell-mediated immune reactions. In: Roitt, I., Brostoff, J., and Male, D. ed. Immunology, Fifth ed. London: Mosby International Ltd. : 121-138.

- Rousset, F., Garcia, E., Defrance, T., Peronne, C., Vezzio, N., Hsu, D.H., Kastelein, R., Moore, K.W., and Banchereau, J. 1992. Interleukin-10 is a potent growth and differentiation factor for activated human B lymphocytes. Proc. Natl. Acad. Sci. USA 89: 1890-1893.
- Salvi, G.E., Brown, C.E., Fujihashi, H., Kiyono, H., Smith, F.W., Beck, J.D., and Offenbacher, S. 1998. Inflammatory Mediators of the terminal dentition in adult and early onset periodontitis. J. Periodont. Res. 33: 212 -225.
- Sandros, J., Papapanou, P.N., Nannmark, U., and Dahler, G. 1994. *Porphyromonas gingivalis* invades human pocket epithelium *in vitro*. J. Periodont. Res. 29: 62-69.
- Santis, A.G., Lopez-Cabrera, M., Sanchez-Madrid, F., and Proudfoot, N. 1995. Expression of the early lymphocyte activation antigen CD69, a C-type lectin, is regulated by mRNA degradation associated with AU-rich sequence motifs. Eur. J. Immunol. 25: 2142-2146.
- Schenkein, H.A. 1988. The effect of periodontal proteolytic *Bacteroides* species on proteins of the human complement system. J. Periodont. Res. 23: 187-192.
- Schifferle, R.E., Chen, P.B., Davern, L.B., Aguirre A., Genco, R.J., and Levine, M. J. 1993a. Modification of experimental *Porphyromonas gingivalis* murine infection by immunization with a polysaccharide-protein conjugate. Oral Microbiol. Immunol. 8: 266-271.

Schifferle, R.E., Wilson, M.E., and Levine, M. J. 1993b. Activation of serum complement by polysaccharide-containing antigen of *Porphyromonas gingivalis*. J. Periodont. Res. 28: 248-254.

Serreze, D.V., Chapman, H.D., Varnum, D.S., Hanson, M.S., Reifsnyder, P.C., Richard, S.D., Fleming S.A., Leiter, E.H., and Shultz, L.D. 1996. B lymphocytes are essential for the initiation of T cell-mediated autoimmune diabetes: analysis of a new "speed congenic" stock of NOD.Ig $\mu$ <sup>null</sup> mice. J. Exp. Med. 184: 2049- 2053.

Seymour, G.J. 1991. Importance of the host response in the periodontium. J. Clin. Periodontol. 18; 421-426.

Seymour G.J., Gemmell E., Reinhardt, R. A., Eastcoot, J., and Taubman, M.A. 1993. Immunopathogenesis of chronic inflammatory periodontal disease: Cellular and molecular mechanisms. J. Periodont. Res. 28: 478-486.

Seymour G.J., Gemmell E., Walsh, L.J., and Powell, R.N. 1985. Analysis of lymphocyte populations extracted from chronically inflamed human periodontal tissues: I. Identification. J. Periodont. Res. 20: 47-57.

Seymour, G.J., and Greenspan, J.S. 1979. The phenotypic characterization of lymphocyte subpopulations in established human periodontal disease. J. Periodont. Res. 14: 39-46.

Seymour, G.J., Powell, R.N., and Davies, W.R. 1979a. Conversion of a stable T-cell lesion to a progressive B-cell lesion in the pathogenesis of chronic inflammatory periodontal disease: a hypothesis. J. Clin. Periodontol. 6: 267-277.

Seymour, G.J., Powell, R.N., and Davies, W.R. 1979b. The immunopathogenesis of chronic inflammatory periodontal disease. J. Oral Pathol. 8: 249-265.

Simonson, L.G., Goodman, C.H., Bial, J.J., and Mortan, H.E. 1988. Quantitative relationship of *Treponema denticola* to severity of periodontal disease. Infect. Immun. 56: 726-728.

Slots, J. 1977a. Microflora in the healthy gingival sulcus in men. Scand. J. Dent. Res. 85: 247-254.

Slots, J. 1977b. The predominant cultivable microflora of advanced periodontitis. Scand. J. Dent. Res. 85: 114-121.

Socransky, S.S., and Haffajee, A.D. 1992. The bacterial etiology of destructive periodontal disease. Current concepts 63 (suppl.): 322-331.

Sosroseno, W., and Herminajeng, E. 1995. The immunopathology of chronic inflammatory periodontal disease. FEMS Immunol. Med. Microbiol. 10: 171-180.

- Stashenko, P., Dewhirst, F.E., Peros, W.J. Kent, R.L., and Ago, J.M. 1987. Synergistic interactions between interleukin-1, tumor necrosis factor and lymphotoxin in bone resorption. J. Immunol. 138: 1464-1468.
- Stashenko, P., Fujiyoshie, P., Obernesser, M.S., Prostak, L., Haffajee, A.D., and Socransky, S.S. 1991. Levels of interleukin-1 beta in tissue from sites of active periodontal disease. J. Clin. Periodontol. 18: 548-554.
- Stein S.H., Hart, T.E, Hoffma, W.H., Hendrix, C.L., Gustke, C.J., and Watson, S.C. 1997. Interleukin-10 promotes ant collagen antibody production in type I diabetic peripheral B lymphocytes. J. Periodont. Res. 32: 189-195.
- Stoufi, E.D., Taubman , M.A., Ebersole, J.L., Smith, D.J., and Stashenko P.P. 1987. Phenotypic analyses of mononuclear cells recovered from healthy and diseased human periodontal tissues. J. Clin. Immunol. 7: 235-143.
- Sugawara, M., Yamashita, K., Yoshie, H., and Hara, K. 1992. Detection of anti-collagen antibody produced by, CD5-positive B cells in inflamed gingival tissue. J. Periodont. Res. 27: 489-498.
- Sundqvist, G.K., Carlsson, J., Herrmann, B.F., Hofling, J.F., and Vatainen, A. 1984. Degradation *in vivo* of the C3 protein of guinea-pig complement by a pathogenic strain of *Bacteroides gingivalis*. Scand. J. Dent. Res. 92: 14-24.

Takahashi, K., Takshiba, S., Nagai, A., Takigawa, M., Myouki, F., Kurihara, H., and Murayama, Y. 1994. Assessment of interleukin-6 in the pathogenesis of periodontal disease. J. Periodontol. 65: 147-153.

Takeichi, O., Taubman , M.A., Haber, J., Smith, D.J., and Moro, I. 1994. Cytokine profiles of CD4 and CD8 T cells isolated from adult periodontitis gingivae. J. Dent Res. 73: 205. (Abstr.)

Tanaka, Y., Saito, K., Shirakawa, F., Ota, T., Suzuki, H., Eto, S., and Yamashita, U. 1988. Production of B cell-stimulating factors by B cells in patients with systemic lupus erythematosus. J. Immunol. 141: 3043-3049.

Taubman, M.A., Stoufi, E.D., Ebersole, J.L., and Smith, D.J., 1984. Phenotypic studies of cells from periodontal disease tissues. J. Periodont. Res. 19: 587-590.

Taubman, M.A., Stoufi, E.D., Seymour, G.J., Smith, D.J., and Ebersole, J.L. 1988. Immunoregulatory aspects of periodontal disease. Adv. Dent. Res. 2: 328-333.

Tew, J., Engel, D., and Mangan, D. 1989. Polyclonal B-cell activation in periodontitis. J. Periodont. Res. 24: 225-241.

Tokoro, Y., Yamamoto, T., and Hara, K. 1996. IL-1 $\beta$  mRNA as the predominant inflammatory cytokine transcript; correlation with

inflammatory cell infiltration into human gingiva. J. Oral Pathol. Med. 25: 225-231.

Van Winkelhoff, A.J., Van der Velden, U., and De Graaff, J. 1988. Microbial succession in recolonized deep periodontal pockets after a single course of supra- and subgingival debridement. J. Clin. Periodontol. 15: 116-122.

Wassenaar, A., Reinhardus, C., Thepen, T., Abraham-Inpun, L., and Kievits, F. 1995. Cloning, characterization, and antigen specificity of T-lymphocyte subsets extracted from gingival tissue of chronic adult periodontitis patients. Infect. Immun. 63: 2147-2153.

Whitney, C., Ant, J., Moncla, B., Page, R.C., and Engle, D. 1992. Serum immunoglobulin G antibody to *Porphyromonas gingivalis* in rapidly progressive periodontitis: titer, avidity, and subclass distribution. Infect. Immun. 60: 2194-2200.

Williams, R.C. 1990. Periodontal disease. N. Eng. J. Med. 322: 373-382.

Yamazaki, K., Nakajima, T., and Hara, K. 1995. Immunohistological analysis of T cell functional subsets in chronic inflammatory periodontal disease. Clin. Exp. Immunol. 99: 384-391.

Yamazaki, K., Nakajima, T., Kubota, Y., Gemmell, E., Seymour, G.J. and Hara, K. 1997. Cytokine messenger RNA expression in chronic inflammatory periodontal disease. Oral Microbiol. Immunol. 12: 281-287.

Yavuzyilmaz, E., Yamalik, N., Bulus, S., Ozen, S., Ersoy, F., and Saatci., U., 1995. The gingival crevicular fluid interleukin-1 $\beta$  and tumor necrosis factor- $\alpha$  levels on patients with rapidly progressive periodontitis. Aust Dent J. 40: 46-49.

Yoshimura, F., Takahashi, K., Nodasaka, S.,and Suzuki, T. 1984. Purification and characterization of a novel type of fimbriae from the oral anaerobes *Bacteroides gingivalis*. J. Bacteriol. 160: 949-957.

Zambon, J.J. 1994. The adjunctive use of clinical microbiology in periodontal diagnosis and treatment. Periodontal disease management. Chicago: The American Academy of Periodontology: 115-125.

---

สถาบันวิทยบริการ  
จุฬาลงกรณ์มหาวิทยาลัย

## BIOGRAPHY

Miss Chantrakorn Champaiboon was born on the 3<sup>rd</sup> of May 1971 in Bangkok. She graduated with D.D.S. (Doctor of Dental Surgery: 2<sup>nd</sup> class of honor) from the Faculty of Dentistry, Chulalongkorn University in 1994, and became a staff member of the Faculty of Dentistry, Songkhlanakarin University. In 1996, she was supported by the university to be a candidate in a Master degree program in Periodontics at Graduate School, Chulalongkorn University.



สถาบันวิทยบริการ  
จุฬาลงกรณ์มหาวิทยาลัย