

## BIBLIOGRAPHY

- ชาญวิทย์ ลีลาภุญตน์, อิมรัตน์ รัมพฤกษ์ เทคนิคทางเคมีวิทยา กับการตรวจประจำวันทางห้องปฏิบัติการเวชศาสตร์ชั้นสูตร : การตรวจแยกอัลลิลของจีโนไทด์ สารสารเคมี การแพทย์ 2546; 31(1): 292-307.
- Abbas AK, Lichtman AH and Pober JS. 1994, The major histocompatibility complex, p.97-114. In Abbas AK, Lichtman AH and Pober JS. (ed), Cellular and Molecular Immunology, W.B.Saunders.
- Adams DD, and Purve HD. 1956. Abnormal response in the assay of thyrothrophin. Proceeding of the University of Otago medical school. 34: 11-12.
- Albrecht J, Müller HAG. 1987. HLA-B27 typing by use of flow cytometry. Clin Chem. 33:1619-1623
- Alper CA, Kruskall MS, Marcus-Bagley D, Craven DE, Katz AJ, Brink SJ, et al. 1989. Genetic prediction of nonresponse to hepatitis B vaccine. N Engl J Med. 321:708-12.
- Anderson G, Anderson L, Larhammar D, Rask L and Sigurdardóttir S. 1994. Simplifying genetic locus assignment of HLA-DRB genes. Immunol Today. 15(2): 58-62.
- Austyn JM, and Wood KJ. 1994, The major histocompatibility complex, p.63-114. In Austyn JM and Wood KJ (ed), Principles of Cellular and Molecular Immunology, Oxford University Press.
- Azuma Y, Sakurami T, Ueno Y, Ohishi M, Saji H, Terasaki PI, Park MS. 1982. HLA-DR antigens in Japanese with Hashimoto's thyroiditis and Graves' disease. Endocrinol Jpn. 29(4): 423-7.
- Badenhoop K, Walfish PG, Rau H, Fischer S, Nicolay A, Bogner U, Schleusener H and Usadel KH. 1995. Susceptibility and resistance alleles of human leukocyte antigen (HLA) DQA1 and HLA DQB1 are shared in endocrine autoimmune disease. J. Clin. Endocrinol. Metab. 80(7): 2112-2117.
- Ban Y, Davies TF, DA et al. 2004. Arginine at position 74 of the HLA-DR beta1 chain is associated with Graves' disease. Genes Immun. 5: 203–8.
- Bell DA. and DeMarini DM. 1991 Excessive cycling converts PCR products to random-length higher molecular weight fragments. Nucl. Acids Res. 19: 5079.

- Bertolino P, Rabourdin-Combe C. 1996. The MHC class II-associated invariant chain: a molecule with multiple roles in MHC class II biosynthesis and antigen presentation to CD4+ T cells. *Critical Reviews in Immunology.* 16: 359-379.
- Bidwell J. 1994. Advances in DNA-based HLA-typing methods. *Immunol Today.* 15(7): 303-307.
- Bidwell JL, Bidwell EA and Bradley LA. 1990. HLA class II gene: typing by DNA analysis. *Baillieres Clin. Haematol.* 3(2): 355-384.
- Bidwell JL. 1988. DNA-RFLP analysis and genotyping of HLA-DR and DQ antigens. *Immunol Today.* 9(1): 18-23
- Bidwell J and Jarrold EA. 1986. HLA-DR allogenotyping using exon-specific cDNA probes and application of rapid minigel methods. *Molecular Immunology.* 23: 1111-1116
- Bottazzo GF, Borrell RP and Hanafusa T. 1983. Role of aberrant HLA-DR expression and antigen presentation in induction of endocrine autoimmunity. *Lancet.* 12: 1115-1119.
- Bottazzo GF and Doniach D. 1986. Autoimmune thyroid disease. *Annu. Rev. Med.* 37: 353-359.
- Brix TH, Kyvik KO, Hegedüs L. 1998. What is the evidence of genetic factors in the etiology of Graves' disease? A brief review *Thyroid.* 8:627-634.
- Brown JH, Jardetzky TS, Gorga JC, Stern LJ, Urban RG, Strominger JL and Wiley DC. 1993. Three-dimensional structure of the human class II histocompatibility antigen HLA-DR1. *Nature.* 364: 33-39.
- Bunce M, O'Neill CM, Barnardo MC.NM, Krausa P, Browning MJ, et al. 1995. Phototyping: Comprehensive DNA typing for HLA-A, B, C, DRB1, DRB3, DRB4, DRB5 & DQB1 by PCR with 144 primer mixes utilising sequence-specific primers (PCR-SSP). *Tissue Antigens.* 46:355-367
- Burch HB, Wartofsky L. 1993. Graves' ophthalmopathy: current concepts regarding pathogenesis and management. *Endocr Rev.* 14:747-93.
- Carson DA. 1992. Genetic factors in the etiology and pathogenesis of autoimmunity. *The FASEB J.* 6: 2800-2805.
- Champion BR, Page KR, Parish N, Rayner DC, Dawe K, Biswas-Hughes G, Cooke A, Geysen M, Roitt IM. 1991. Identification of a thyroxine-containing self-epitope of thyroglobulin which triggers thyroid autoreactive T cells. *J Exp Med.* 174:363-370.

- Campbell RD, Carroll MC, Porter RR. 1986. The molecular genetics of components of complement [Review]. *Advances in Immunology*. 38: 203-244.
- Caven DA, Penny MA, Jacob KH, Kelly MA, Jenkins D, Mjovic C, Chow C, Oock CS, Hawkin BR and Bennett AH. 1994. The HLA association with Graves' disease is sex specific in Hong Kong Chinese subjects. *Clin. Endocrinol.* 40: 63-66.
- Champion BR, Page KR, Parish N, Rayner DC, Dawe K, Biswas-Hughes G, Cooke A, Geysen M, Roitt IM. 1991. Identification of a thyroxine-containing self-epitope of thyroglobulin which triggers thyroid autoreactive T cells. *J Exp Med.* 174:363-370.
- Chandanayong D, Stephens HA, Klaythong R et al. 1997. HLA-A, -B, -DRB1, -DQA1, and -DQB1 polymorphism in Thais. *Hum Immunol.* 53: 174-82.
- Chan SH, Lin YN, Wee GB, Ren EC, Lui KF and Cheah JS. 1993. Human Leucocyte antigen DNA typing in Singaporean Chinese patients with Graves' disease. *Ann. Acad. Med. Singapore.* 22(4):867-879.
- Chen Q-Y, Huang W, She J-X, Baxter F, Volpe R, MacLaren NK. 1999. HLA-DRB1\*08, DRB1\*03/DRB3\*0101, and DRB3\*0202 are susceptibility genes for Graves' disease in North American Caucasians, whereas DRB1\*07 is protective. *J Clin Endocrinol Metab.* 84:3182-3186
- Chicz RM, Urban RG, Gorga JC, VIGNALI DAA, Lane WS and Strominger JL. 1993. Specificity and promiscuity among naturally processed peptides bound to HLA-DR alleles. *J. Exp. Med.* 178: 27-47
- Christian Heldt. 2004. Differentielle Expression von HLA-DRB-Gene, <http://edoc.hu-berlin.de/dissertationen/heldt-christian-2002-07-17/HTML/chapter1.html>.
- Dahlberg PA, Holmlund G, Karlsson FA and Säfvenberg J. 1981. HLA-A, -B, -C and -DR antigens in patients with Graves' disease and their correlation with signs and clinical cause. *Acta Endocrinologica.* 97: 42-47.
- Djilali-Saiah I, Benini V, Daniel S, Assan R, Bach J F, Caillat-Zucman S. 1996. Linkage disequilibrium between HLA class II (DR,DQ,DP) and antigen processing (LMP, TAP, DM) genes of the major histocompatibility complex. *Tissue Antigens.* 48:87-92.
- Dong R, Kimura A, Okubo R, Shinagawa H, Tamai H, Nishimura Y and Sasazuki T. 1992. HLA-A and DPB1 loci confer susceptibility to Graves' disease. *Hum. Immunol.* 35: 165-172.

- Ebner SA, Lueprasitsakul W, Alex S, Fang SL, Appel MC, Braverman LE. 1992. Iodine content of rat thyroglobuline affects its autogenicity in inducing lympholytic thyroiditis in the BB/Wor rat. *Autoimmunity*. 13:209–214.
- Eckert KA, and Kunkel TA. 1990, The fidelity of DNA polymerase used in the polymerase chain reaction, p. 225–244. In M. J. McPherson, P. Quirke, and G. R. Taylor (ed), PCR: a practical approach. IRL Press, Oxford University Press, Oxford, England.
- Eisenstein Z, Engelsman E, Weiso M, Kalechman Y and Sredni B. 1994. Modulation of the IL-2 production defect in vitro in Graves' disease. *Clin. Exp. Immunol.* 96(2): 323-328.
- Farid NR, Sampson L, Noel EP, Bernard JM, Mandeville R, Larsen B and Marshall WH. 1979. A study of human leukocyte D locus related antigen in Graves' disease. *J. Clin. Invest.* 63: 108-113.
- Farid NR, Stone E, Johnson G. 1980. Graves' disease and HLA: Clinical and epidemiologic associations. *Clin Endocrinol.* 13:535.
- Feder J, Gnirke A, Thomas W, et al. 1996. A novel MHC class I-like gene is mutated in patients with hereditary haemochromatosis. *Nat Genet.* 13:399-408.
- Feliciano DV. 1992. Everything you wanted to know about Graves' disease. *Am. J. Surg.* 164: 404-411.
- Fleury S, Thibodeau J, Croteau G, et al. 1995. HLA-DR polymorphism affects the interaction with CD4. *Journal of Experimental Medicine*. 182: 733-741.
- Gergely P. 1992. The pathogenesis of autoimmune disease. *Immunol. Today*. 13(8): A21-A23.
- Gilman N. Tardif and J. Marilyn MacQueen. 1993. Tissue typing reference manual. A.11 (p.1-8), South-Eastern Organ Procurement Foundation.
- Gongora R, Figueroa F, Klein J. 1996. The HLA-DRB9 gene and the origin of HLA-DRB9 haplotypes. *Hum Immunol.* 51:23-31.
- Gossage AAR and Munro DS. 1985. The pathogenesis of Graves' disease. *Clin. Endocrinol. Metab.* 14(2): 299-331.
- Gruen JR, Weissman SM. 1997. Evolving views of the major histocompatibility complex. *Blood*. 90: 4252-4265.
- Grumet FC, Payne RO, Konishi J, Kriss JP. HLA antigens as markers for disease susceptibility and autoimmunity in Graves' disease. *J Clin Endocrinol Metab.* 39:1115, 1974.

- Harding CV. 1996. Class II antigen processing: analysis of compartments and functions. *Critical Reviews in Immunology.* 16: 13-29.
- Hanafusa T, Pujol-Borrell R, Chiavato L, Rossell RCG, Doniach D and Bottazzo GF. 1983. Aberrant expression of HLA-DR antigen on thyrocytes in Graves' disease: Relevance for autoimmunity. *Lancet.* 12: 1111-1114.
- Hansen TH, Carreno BM and Sachs DH. 1993, The major histocompatibility complex, p.577-628. In Paul WE (ed), *Fundamental Immunology.* Raven Press.
- Heilig R, Eckenberg R, Petit JL, Fonknechten N, Da Silva C, Cattolico L, Levy M, Barbe V, de Berardinis V, Ureta-Vidal A, et al. 2003. The DNA sequence and analysis of human chromosome 14. *Nature.* 421:601 –607.
- Herold KC and Quintans J. 1995, Immunological mechanisms causing autoimmune endocrine disease, p.2990-3012. In Quintans J (ed), *Endocrinology.* W.B. Saunders.
- Huang SM, Wu TJ, Lee TD, Yang EK, Shaw CK, Yeh CC. 2003 The association of HLA -A, -B, and -DRB1 genotypes with Graves' disease in Taiwanese people. *Tissue Antigens.* 61(2):154-8.
- H Kropshofer, AB Vogt, C Thery, EA Armandola, BC Li, G oldenhauer, S Amigorena, and G J Hämmерling. 1998. A role for HLA-DO as a co-chaperone of HLA-DM in peptide loading of MHC class II molecules. *EMBO J.* 17(11): 2971–2981.
- Innis MA, Gelfand DH. 1990, Optimization of PCRs, In: PCR protocols. A guide to methods and applications. Editors: Innis MA, Gelfand DH, Sninsky JJ, White TJ. San Diego, CA. Academic Press, Inc, Chapter 1:3-12.
- Kendell E, Todd JA. and Campbell RD. 1991. Molecular analysis of the MHC class II region in DR4, DR7 and DR9 haplotypes. *Immunogenetics.* 34: 349-357.
- Klein J. 1976, Evolution and function of the major histocompatibility complex: facts and speculations, In Gotze D (ed), *The Major Histocompatibility System in Man and Animals,* New York: Springer-Verlag, 339-378.
- Konig R, Huang LY, Germain RN. 1992. MHC class II interaction with CD4 mediated by a region analogous to the MHC class I binding site for CD8. *Nature.* 356: 796-798.
- Kunkel LM, Smith KD, Boyer SH, Borgaonkar DS, Wachtel SS, Miller OJ, Breg WR, Jones HW Jr, Rary JM. 1977. Analysis of human Y-chromosome-specific reiterated DNA in

- chromosome variants. Proc Natl Acad Sci U S A. 74(3):1245–1249.
- Lawlor DA, JZ Emmour, PD. Ennis, and P. Parham. 1990. Evolution of class-I MHC genes and proteins: from natural selection to thymic selection. Annu. Rev. Immunol. 8:23–63.
- Levine LS, Zachmann M, New MI, et al. 1978. Genetic mapping of the 21-hydroxylase-deficiency gene within the HLA linkage group. New England Journal of Medicine. 299: 911-915.
- Liblau RS, Singer SM and McDevitt H.O. 1995. Th1 and Th2 CD4+ T cell in the pathogenesis of organ-specific autoimmune diseases. Immunol. Today. 16(1): 34-38.
- Longley MJ. et al. 1990 Characterization of the 5' to 3' exonuclease associated with *Thermus aquaticus* DNA polymerase. Nucl. Acids Res. 18, 7317–22.
- Lou G, Lin S, Chen X and Pan C. 1994, Genetic analysis of HLA-DR alleles in Graves' disease by PCR-amplified DNA with sequence specific of oligonucleotide probes, In the 10th Asian-Oceania congress of endocrinology, Beijimg China. 30th October-3rd November
- Maciel LMZ, Rodrigues SS, Dibbern RS, Navarro PAA, Donadi EA. 2001. Association of the HLA-DRB1p 0301 and HLA-DQA1p 0501 Alleles with Graves' Disease in a Population Representing the Gene Contribution from Several Ethnic Backgrounds. Thyroid. 11(1), 31-35
- Marazuela M, Vargas JA., Durantez A and Alvarez-Mon M. 1994. T lymphocyte activation in Graves' disease. Endocrine Research 20(3): 291-306.
- Marsh SG, Albert ED, Bodmer JG, et al. 2005. Nomenclature for the factors of the HLA system, 2004. Tissue Antigens. 65: 301–369
- Marsh SGE. and Bodmer JG. 1995. HLA class II region nucleotide sequences, 1995. Tissue Antigens. 45:258-280
- Matsumura M, Fremont DH, Peterson PA. and Wilson IA. 1992. Emerging principles for the recognition of peptide antigens by MHC class I molecules. Science 257: 927-934
- McCloskey DJ, Brown J and Navarrete C. 1993, Serological typing of HLA-A, -B and -C antigens, p.175-247. In Hui KM and Bidwell J (ed.), Hand book of HLA typing techniques CRC Press.
- McDougall IR. 1991, Graves' disease current concepts, p.79-95. In Greenspan PS (ed.), The medical clinics of north America, W.B. Saunders company.
- Mickelson EM, Guthrie LA & Hansen JA. 2000, The mixed lymphocyte culture (MLC) test, In:

- Land G & Strothman R (Editors), ASHI Laboratory Manual. The American Society for Histocompatibility and Immunogenetics, New York, NY, USA.
- Middleton D, Bodmer J, Heyes J and Marsh S. 1993, HLA typing reagents: alloantisera and monoclonal antibodies, p.13-50. In Dyer P and Middleton D (ed.), Histocompatibility Testing A Practical Approach. IRL Press.
- Miller SA, Dykes DD, Polesky HF. 1988. A simple salting out procedure for extracting DNA from human nucleated cells. Nucleic Acids Res. 16:1215
- Monaco JJ, Nandi D. 1995. The genetics of proteasomes and antigen processing. Annual Review of Genetics. 29: 729-754.
- Otten HG, Tilanus MG, Barnstijn M, et al. 1995. Serology versus PCR-SSP in typing for HLA-DR and HLA-DQ: a practical evaluation. Tissue Antigens. 45: 36 – 40.
- Peces R, de la Torre M, Alcazar R, Urra JM, et al. 1997. Prospective analysis of the factors influencing the antibody response to hepatitis B vaccine in hemodialysis patients. Am J Kidney Dis. 29(2):239-45.
- Peter Parham. 2005, The Immune System 2nd ed., p.145-177, Garland Science Press.
- Macchia E, Concetti R, Borgoni F, et al, 1989. "Assays of TSH-Receptor Antibodies in 576 Patients With Various Thyroid Disorders: Their Incidence, Significance and Clinical Usefulness," Autoimmunity. 3(2):103-12.
- Marsh SGE, Albert ED, Bodmer WF, Bontrop RE, Dupont B, Erlich HA, Geraghty DE, Hansen JA, Hurley CK, Mach B, Mayr WR, Parham P, Petersdorf EW, Sasazuki T, Schreuder GM Th, Strominger JL, Svejgaard A, Terasaki PI, Trowsdale J. 2005. Nomenclature for factors of the HLA system 2004. Tissue Antigens. 65; 301-368
- McDougall IR. 1991, Graves' disease current concepts, p.79-95. In Greenspan PS (ed), The medical clinics of north AmericaW.B. Saunders company.
- McGregor A, Rees Smith B, Hall R, Peterson MM, Miller M and Dewar PJ. 1980. Prediction of relapse in hyperthyroid Graves' disease. Lancet. 1101-1103.
- Nagayama Y and Rapoport B. 1992. Thyroid stimulatory autoantibodies in different patients with autoimmune thyroid disease do not all recognize the same components of the human thyrotropin receptor: selective role of receptor amino acids Ser25-Glu30. J. Clin. Endocrinol. Metab. 75(6): 1425-1430.

- Narinder K, Mehra and Gurvinder Kaur. 2003. MHC-based vaccination approaches: progress and perspectives. *Exp. Rev. Mol. Med.* Vol. 5
- Park HP, Park YJ, Song EY et al. 2005. Associations of HLA-DR and -DQ Genes with Graves Disease in Koreans. *Hum Immunol.* 66: 741–7.
- Powis SH and Geraghty DE. 1995. What is the MHC?. *Immunol. Today.* 16(10): 466-468.
- Rabinow Paul. 1996. Making PCR: A Story of Biotechnology. Chicago: University of Chicago Press.
- Rammensee HG, Friede T, Stevanovic S. 1995. MHC ligands and peptide motifs: first listing. *Immunogenetics.* 41: 178-228.
- Rasooly L, Rose NR, Saboori AM, Ladenson PW, Burek CL. 1998. Iodine is essential for human T cell recognition of human thyroglobulin. *Autoimmunity.* 27:213–219.
- Ratanachaiyavong S, Lloyd L, McGregor AM. 1989. C4A gene deletion: association with Graves' disease. *J Mol Endocrinol.* 3:145–53.
- Rees WA, et al. 1993. Betaine can eliminate the base pair composition dependence of DNA melting. *Biochemistry.* 32: 137–44.
- Robert A. Freitas Jr., Nanomedicine, Volume I: Basic Capabilities, Landes Bioscience, Georgetown, TX, 1999.
- Ropars A, Marion S, Takorabet L, Braun J and Charreire J. 1994. Antibodies specific for human thyrotropin receptor induce MHC antigen expression in thyroid cells. *J. Immunol.* 153: 3345-3352.
- Rychlik W, Spencer WJ and Rhoads RE. 1990. Optimization of the annealing temperature for DNA amplification in vitro. *Nucleic Acids Research* 18 (21):6409-6412.
- Sant AJ and Miller J. 1994. MHC class II antigen processing: biology of invariant chain. *Curr. Opin. Immunol.* 6: 57–63.
- Schleusener H, Schleusener G, Mayr WR, Kotulia P, Bogner U, Finke R, Meinhold H, Kopenhagen K and Wenzel KW. 1983. HLA-DR3 and HLA-DR5 associated thyrotoxicosis-two different types of toxic diffuse goiter. *J Clin. Endocrinol. Metab.* 56(4): 781-785.
- Segall M. 1988. HLA and genetics of IDDM holism & reductionism?. *Diabetes.* 37: 1005-1008.
- Shiina T, Inoko H & Kulski JK. 2004. An update of the HLA genomic region, locus information

- and disease associations. *Tissue Antigens.* 64 (6), 631-649.
- Simmonds MJ, Howson JM, Heward JM et al. 2005. Regression mapping of association between the human leukocyte antigen region and Graves disease. *Am J Hum Genet.* 76 :157 –63.
- Sloan VS, Cameron P, Porter G, et al. 1995. Mediation by HLA-DM of dissociation of peptides from HLA-DR. *Nature.* 375: 802-806.
- Srivastava PK, Heike M. 1991. Tumour-specific immunogenicity of stress-induced proteins: convergence of two evolutionary pathways of antigen presentation? *Seminars in Immunology.* 3: 57-64.
- Stastny P, Ball EJ, Dry PJ and Nunez G. 1983. The human immune response region (HLA-D) and disease susceptibility. *Immunological Rev.* 70: 111-154.
- Stephens HA, Chandanayingyong D, Kunachiwa W et al. A 2000. comparison of molecular HLA-DR and DQ allele profiles forming DR51-, DR52-, and DR53-related haplotypes in five ethnic Thai populations from mainland southeast Asia. *Hum Immunol.* 61: 1039–47.
- Stephens M, Donnelly P. 2003. A comparison of bayesian methods for haplotype reconstruction from population genotype data. *Am J Hum Genet.* 73: 1162–9.
- Steinmetz M, Hood L. 1983. Genes of the major histocompatibility complex in mouse and man. *Science.* 222: 727-733.
- Strominger JL. 1989. Developmental biology of T cell receptors. *Science.* 244:943-950.
- Svejgaard A, Buus S, Fugger L, editors. 1996. *HLA and Disease: The Molecular Basis (Alfred Benzon Symposium 40).* Copenhagen: Munksgaard International Publishers.
- Tandon N, Mehra NK, Taneja V, Vaidya MC, Kochupillai N. 1990. HLA antigens in Asian Indian patients with Graves' disease. *Clin Endocrinol.* 33:21–26.
- Ueda H, Howson JM, Esposito L, et al. 2003. Association of the T-cell regulatory gene CTLA4 with susceptibility to autoimmune disease. *Nature.* 423, 506–511.
- Volpé R. 1991. The pathophysiology of autoimmune thyroid disease. *Endocrine Regulations.* 25: 187-192.
- Webb GC, Chaplin DD. 1990. Genetic variability at the human tumour necrosis factor loci. *Journal of Immunology.* 145: 1278-1285.
- Welsh KI., Bunce M. 1999. Molecular typing for the MHC with PCR-SSP. *Reviews in Immunogenetics.* 1:157-176.

- Weetman AP. 1994. The potential Immunological role of the thyroid cell in autoimmune thyroid disease. *Thyroid*. 4(4): 493-499.
- Weetman AP. 2000. Graves' disease. *N Engl J Med*. 343: 1236–1248.
- Winchester R. 1994. The molecular basis of susceptibility to rheumatoid arthritis. *Adv. Immunol.* 56: 389-466.
- Wongsurawat T, Nakkuntod J, Charoenwongse P, Snabboon T, Sridama V & Hirankarn N. 2006. The association between HLA class II haplotype with Graves'disease in Thai population. *Tissue Antigens*. 67: 79–83.
- Yanagawa T, Mangklabruks A, DeGroot LJ. 1993. Human histocompatibility leukocyte antigen-DQA1\*0501 allele associated with genetic susceptibility to Graves' disease in a Caucasian population. *J. Clin. Endocrinol. Metab.* 76(6):1569-74.
- Yanagawa T, Mangklabruks A, DeGroot LJ. 1994. Strong association between HLA-DQA1\*0501 and Grave' disease in a male Caucasian population. *J. Clin. Endocrinol. Metab.* 79: 227-229.
- Yeo PP, Chan SH, Thai AC, Ng WY, Lui KF, Wee GB, Tan SH, Lee BW, Wong HB and Cheah JS. 1989. HLA-Bw46 and DR9 associations in Graves' disease of Chinese patients are age- and sex-related. *Tissue Antigens*. 34: 179-184.