March 10, 2017

Curriculum vitae

Vuorio, Eero Ilkka (male)
Place and date of birth: Valkeakoski, Finland; Feb 19, 1948
Citizenship: Finnish
Current position: retired (professor emeritus, chancellor emeritus)
Marital status: married to Leena Anttila (5 children)
Address: Hurtinkatu 11 C 18, FI-20610 Turku, Finland;
Phone +358-50-597 2005
E-mail eero.vuorio@helsinki.fi

Education:

Graduation [exchange student] from Manzano High School (Albuquerque, NM, USA), 1967
Graduation from high school (Porin Lyseo, Finland), 1968
Licentiate in medicine [M.D.] (University of Turku, Finland), 1974
Doctor in Medical Sciences [Ph.D.] (University of Turku), 1978
Docent in Medical Chemistry (University of Turku), 1984-1988

Military rank: lieutenant in medical corps in reserve

Scientific training and employment:

Assistant (Professor Eino Kulonen, Dept. of Medical Chemistry, Univ. of Turku), 1971-77
Assistant lecturer (Dept. of Medical Chemistry, Univ. of Turku), 1978-88
Research associate [postdoctoral training] (Professor Albert Dorfman, Dept. of Pediatrics and Biochemistry, Univ. of Chicago), 1979-80
Gastprofessor (Professor Kaspar Winterhalter, Laboratorium für Biochemie I, ETH, Zürich), 1985
Acting associate professor of Medical Chemistry (Univ. of Turku), 1978, 1984, 1986-87
Acting professor of Medical Chemistry (Univ. of Turku), 1984, 1986-87
Senior research fellow (Academy of Finland), 1987-90
Visiting scientist (Professor Benoit de Crombrugghe, Dept. of Molecular Genetics, The University of Texas M.D.Anderson Cancer Center, Houston), 1988-90
Professor of Molecular Biology (Univ. of Turku) 1989-2014 (leave of absence since 2003)
Chancellor of the University of Turku, 2003-2009
Director of Biocenter Finland, University of Helsinki, 2010-2014

Scientific expert duties

Official opponent at doctoral dissertations: 28 times in Universities of Helsinki, Kuopio, Oulu, Tampere and Turku, Finland, and in Universities of Lund and Uppsala, and Karolinska Institutet, Sweden.

Thesis reviewer: 18 times in Universities of Helsinki, Kuopio, Oulu, Tampere and Turku, Finland.

Reviewer for scientific competence for docent: 14 times in in Universities of Helsinki, Kuopio, Oulu, Tampere and Turku, and Åbo Akademi, Finland, and University of Lund, Sweden 2001.

Reviewer for scientific competence for professorship: 8 times in Universities of Jyväskylä, Kuopio, Oulu and Tampere, Finland, University of Lund, Sweden, University of Copenhagen and Danish Cancer Society, Denmark.

Thesis supervisor: 26 times

Editor for *Annals of Medicine*, 1992-2001 and *Solubiologi*, 1991-1993; **Ad hoc reviewer** for >10 international Journals

Reviewer of grant applications and prizes for

Academy of Finland, 1997-2013
European Commission (Biomed2; Framework Programs 5, 6 and 7) 1988-2010,
Pediatric Research Foundation [Lastentautien tutkimussäätiö (Ulla Hjelt funds)], 1994-2000,
Association of Finnish Life Insurance Companies [Vakuutusyhtiöiden keskusliitto] 1996-2001,
Turku University Foundation [Turun yliopistosäätiö; Board member 2003->], 1991-2003
Farmos Research and Science Foundation [Farmoksen tutkimus- ja tiedesäätiö, Board member)] 1994-2007
Foundation for New Technology [Uuden teknologian säätiö],
Kuopio University Hospital (EVO-funds), 1997-2006
Ministry of Education (liikuntajaosto) 1997-2000,
Swedish Research Council [Vetenskapsrådet], Evaluation board for strong research environments, 2004,
Finnish Cultural Foundation [Suomen kulttuurirahasto; Council member] 2007->
Research Council of Norway, Human Biobanks and Health Registers –program, board member and vice chair 2011-2017
Finnish Cancer Foundation, board member, 2012->
Danish National Research Foundation, board member, 2013-2017
Novo Nordisk Foundation, Research Cluster Advisory Panel member 2016-2018
Ad hoc reviewer also for the Wellcome Trust, European Science Foundation, Anders Jahre Foundation, Research Council of Norway, Novo Nordisk Foundation and Luxembourg Ministry for Research.

Other expert duties

Ministry of Education; Working group on research careers, chair 2004-2006
Ministry of Social Affairs and Health: Working group on biobanking, member 2006-2007
Finnish Higher Education Evaluation Council; Chair of the Audit Committee of the Quality Assurance System of the University of Helsinki, 2007-2008
Scientific Advisory Board of GeneLibrary Ireland, member 2008-2009
Advisory and Evaluation Board of the Organisational Unit for Research Infrastructure, Medical University of Graz, 2008-2012
Polish Foundation for Science (FNP), member of international evaluation board, 2010

Ministry of Education: National Library of Finland, member of evaluation board, 2010
EuroBioForum, chair of Scientific Advisory Board, 2010-2014
BioMedBridges, chair of Scientific Advisory Board, 2012-2015
Scientific and Ethical Advisory Board of Biobank Graz, chair, 2015->
ADOPT BBMRI-ERIC, International Advisory Committee, chair, 2015-2018

Research funding (1993-2016):

Academy of Finland, 1988-2004
Genome Research Program 1994-2000
National Institutes of Health, Co-principal investigator in the grant of Benoit de Crombrugghe, 1989-1994
EU Concerted Action on Heritable Connective Tissue Disorders 1990-1992
EU Biotechnology Program 1994-96
EU Preparatory Phase funding for BBMRI (Biobanking and Biomolecular Resources Research Infrastructure) coordination office 2008-2011; BBMRI-LPC (Large Population Cohorts) funding 2013-2016; BioMedBridges (Chair of Scientific Advisory Board) 2012-2015; CSA Personalized Medicine 2013-2015
Sigrid Jusélius Foundation 1994-2001
Arvo and Inkeri Suominen Foundation 1995-96
Leiras-Schering Pharmaceutical Company 2000-2003
Tekes 2001-2004

Publication record

202 articles (175 original articles) in peer reviewed journals; 92 other articles, reports etc.
Total citations 9542 (Google Scholar, March 10, 2017), h-index 56.

Major administrative duties

Several duties at different levels of the **University of Turku** administrative system include:

Member of the administrative council of the Department of Biomedicine 1977-78, 1981-84 (vice chairman 1983-84)
Member of the Faculty Council of the Medical Faculty 1991-96; Vice Dean of the Medical Faculty 1993-96, Vice member of the Executive Council of the University of Turku 1993-96
Chairman of the Scientific Advisory Board of BioCity (Administrative director of BioCity-Turku) 1991-97, Member of the administrative boards of Turku Centre for Biotechnology 1991-97, Turku Graduate School of Biomedical Sciences (TuBS) 1996-97, Graduate School of Musculoskeletal Problems (TULES) 1995-97, Finnish-Russian Joint Biotechnology Laboratory 1991-1997, the Center for Bioethics, and of several panels of experts on biotechnology within the University of Turku/Åbo Akademi environment.
Director, Center for Reproductive and Developmental Medicine (CREDE), University of Turku, 1996-1997
Vice Rector, University of Turku, 2003
Chancellor, University of Turku, 2003-2009

Turku University Foundation, Board Member, 2003-2010; Advisory Board/Council Member 2011-2016; Bengtskär Advisory Board, chair, 2003->
Vanhalinna Foundation, Board Member, 2003-2010
Matti Koivurinta Foundation, Board member, 2006-2013, Vice Chair 2007-2013

National administrative duties:

Academy of Finland
Chair, Research Council for Health, 1998-2003
Member of the Board of the Academy of Finland, 1998-2003
Several additional administrative duties at the Academy of Finland in 1997-2004
Chair, Expert Group on Research Infrastructures (FIRI Expert group), 2012-2013
National Advisory Board on Research Ethics,
Chairman, 2004-2010
Board of the Finnish Genome Center,
Member, 2002-2004.
Board of the National PET-Center,
Member, 2002-2004.
Sub-committee for Medical Ethics [TUKIJA],
Deputy member, 2006-2009
Finnish Cultural Foundation,
Council [hallintoneuvosto] member, 2007-2016
Biocenter Finland,
Director 2010-2014
Finnish Cancer Foundation,
Board member 2012->
BBMRI.fi (Finnish National Node for BBMRI, Biobanking and BioMolecular Resources Research Infrastructure), Board member 2016->

International administrative duties:

European Molecular Biology Laboratory (EMBL) Council;
National delegate, 2000-2012
Vice Chairman, 2000-2003
Chairman, 2003-2006, 2010-2012
National delegate, Finance Committee of EMBL Council, 2000-2012

EMBL Enterprise Management (EMBLEM)
Member of Supervisory Board, 2003-2006, 2010-2012

European Molecular Biology Conference (EMBC),
National delegate, 2000-2002
Advisor to Finnish delegation 2002-2012

European Science Foundation:
Standing Committee for European Medical Research Councils (EMRC), National representative, 1998-2003
Member of the EMRC Executive Group, 2001-2003
EURESCO Committee, Member, 2001-2003

EuroBioFund, Member of the Steering Group, 2006-2008, Acting Chair, 2007-2008
Member Organisation (MO) Forum on Research Careers, Steering Committee, Member, 2007-2010

European Commission,
Forum of Research Managers on Genomics, Chairman 2001-2003, Chairman of the Steering Committee, 2001-2003; COGENE
Forum of Research Managers on Cancer (European Cancer Forum), National representative, 2001-2003.
Advisory Group to Framework Programme 6, Priority 1, Member, 2003-2006.
European Strategy for Research Infrastructures (ESFRI), Member of Expert Panel on clinical and translational research, 2006-2007
European Research Council (ERC) Identification Committee for Scientific Council, Chair 2008-2013.
Horizon2020, Advisory Group for Sc1 (Health Demographic Change and Well-being) 2016->.

Biobanking and Biomolecular Resources Research Infrastructure (BBMRI),
Part-time Executive Manager, 2008-2011.

Danish National Research Foundation,
Board member, 2013-2017

European Cooperation in the Field of Scientific and Technical Research (COST)
COST Ad hoc/Technical Committee on Medicine and Health, National representative, 1998-2013.

Novo Nordisk Foundation,
Research Cluster Advisory Panel member 2016-2018

UNESCO (United Nations Educational, Scientific and Cultural Organization)
International Bioethics Committee (IBC), member 2010-2017.

Seremonial duties:

Host of the Medical Students' Association in Turku, 1974
Master of Seremonies at the Solemn Conferement of Academic Degrees, University of Turku, 1993

Honors

Honorary member of the Finnish Connective Tissue Society, 1998
Invited member of the Finnish Academy of Science and Letters, 1998
Order of the White Rose of Finland, Knight, I class 2002, Commander 2009
Valtion virka-ansiomerkki, 2008
Honorary professor, Yanka Kupala State University of Grodno, Belorussia, 2008
University of Turku medal, 2010

Eero Vuorio
List of Publications, March 10, 2017

Total citations 9542 (Google Scholar, March 10, 2017), h-index 56

1.A. Original publications in peer-reviewed journals

1.1. Lehtinen P, Vuorio E, Kulonen E. Plasma membranes from experimental granulation tissue. Biochem J 1975; 146: 565-573.

1.2. Saarni H, Tammi M, Vuorio E. Effects of cortisol on glycosaminoglycan synthesis by normal and rheumatoid synovial fibroblasts in vitro. Scand J Rheumatol 1977; 6: 222-224.

1.3. Vuorio E, Takala I, Pulkki K, Einola S. Effects of sodium aurothiomalate on hyaluronic acid synthesis in normal and rheumatoid synovial fibroblast cultures. Scand J Rheumatol 1979; 8: 173-176.

1.4. Saarni H, Tammi M, Vuorio E, Penttinen R. Distribution of glycosaminoglycans in rheumatoid cultures and effects of cortisol on it. Scand J Rheumatol 1980; 9: 11-16.

1.5. Vuorio E, Reid KBM. Biosynthesis of the first component of complement by normal and rheumatoid synovial fibroblasts in culture. IRCS Med Sci 1981; 9: 1146.

1.6. Vuorio E, Sandell L, Kravis D, Sheffield VC, Vuorio T, Dorfman A, Upholt WB. Construction and partial characterization of two recombinant cDNA clones for procollagen from chicken cartilage. Nucleic Acids Res 1982; 10: 1175-1192.

1.7. Vuorio E, Einola S, Hakkarainen S, Penttinen R. Synthesis of underpolymerized hyaluronic acid by fibroblasts cultured from rheumatoid and non-rheumatoid synovitis. Rheumatol Int 1982; 2: 97-102.

1.8. Kouri T, Vuorio E. Plasma membrane glycoproteins of cultured synovial fibroblasts. Clin Rheumatol 1983; 2: 153-156.

1.9. Pulkki K, Vuorio E, Jalava S. The effect of rheumatoid synovial fluid macrophages on DNA, glycosaminoglycan and collagen synthesis by synovial fibroblasts. Rheumatol Int 1983; 3: 133-138.

1.10. Kouri T, Vuorio E, Penttinen R. Characterization of plasma membranes and rough endoplasmic reticulum of synovial cells cultured from rheumatoid arthritis patients. Scand J Rheumatol 1984; 13: 247-256.

1.11. Vuorio TK, Kähäri V-M, Lehtonen A, Vuorio E. Fibroblast activation in scleroderma. Scand J Rheumatol 1984; 13: 229-237.

1.12. Vuorio EI, Schaefer IM, Vuorio TK, Dorfman A, Upholt WB. Construction and partial characterization of recombinant cDNA clones for chicken type I collagen messenger RNAs. Acta Chem Scand B 1984; 38: 237-241.

1.13. Kähäri V-M, Vuorio T, Näntö-Salonen K, Vuorio E. Increased type I collagen mRNA levels in cultured scleroderma fibroblasts. Biochim Biophys Acta 1984; 781: 183-186.

1.14. Pulkkinen L, Huovinen P, Vuorio E, Toivanen P. Characterization of trimethoprim resistance using Tn7-spacific probes. Antimicrob Agents Chemother 1984; 26: 82-86.

1.15. Vuorio E, Elima K, Pulkkinen J, Viitanen A-M. Identification of messenger RNA for human type II collagen. FEBS Lett 1984; 174: 238-242.

1.16. Vuorio T, Mäkelä JK, Vuorio E. Activation of type I collagen genes in cultured scleroderma fibroblasts. J Cell Biochem 1985; 28: 105-113.

1.17. Elima K, Mäkelä JK, Vuorio T, Kauppinen S, Knowles J, Vuorio E. Construction and identification of a cDNA clone for human type II procollagen mRNA. Biochem J 1985; 229: 183-188.

1.18. Mäkelä JK, Vuorio E. Type I collagen messenger RNA levels in experimental granulation tissue and silicosis in rats. Med Biol 1986; 64: 15-22.

1.19. Pulkkinen L, Vuorio E, Hyypiä T, Toivanen A. Lack of DNA homology between arthritis triggering bacteria and plasmid of *yersinia enterocolitica* or *chlamydia trachomatis*. J Rheumatol 1986; 13: 831-833.

1.20. Vuorio T, Mäkelä JK, Kähäri V-M, Vuorio E. Coordinated regulation of type I and type III collagen production and mRNA levels of proα1(I) and proα2(I) collagen in cultured morphea fibroblasts. Arch Dermatol Res 1987; 279: 154-160.

1.21. Mäkinen J, Kähäri V-M, Söderström K-O, Vuorio E, Hirvonen T. Collagen synthesis in the vaginal connective tissue of patients with and without uterine prolapse. Eur J Gyn Obst Reprod Biol 1987; 24: 319-325.

1.22. Kähäri V-M, Heino J, Larjava H, Vuorio E. Alterations in scleroderma fibroblast surface glycoproteins associated with increased collagen synthesis. Acta Derm Venerol (Stockh) 1987; 67: 199-205.

1.23. Sandberg M, Vuorio E. Localization of types I, II and III collagen mRNAs in developing human skeletal tissues by in situ hybridization. J Cell Biol 1987; 104: 1077-1084.

1.24. Multimäki P, Aro H, Vuorio E. Differential expression of fibrillar collagen genes during callus formation. Biochem Biophys Res Comm 1987; 142: 536-541.

1.25. Kähäri V-M, Multimäki P, Vuorio E. Elevated proα2(I) collagen mRNA levels in cultured scleroderma fibroblasts result from an increased transcription rate of the corresponding gene. FEBS Lett 1987; 215: 331-334.

1.26. Kähäri V-M, Heino J, Vuorio E. Interleukin 1 increases collagen production and mRNA levels in cultured skin fibroblasts. Biochim Biophys Acta 1987; 929: 142-147.

1.27. Kähäri V-M, Vuorio EI. Increased half-lives of procollagen mRNAs may contribute to the elevated procollagen mRNAs in cultured scleroderma fibroblasts. Med Sci Res 1987; 15: 417-418.

1.28. Laato M, Kähäri V-M, Niinikoski J, Vuorio E. Epidermal growth factor increases collagen production in granulation tissue by stimulation of fibroblast proliferation and not by activation of procollagen genes. Biochem J 1987; 247: 385-388.

1.29. Elima K, Vuorio T, Vuorio E. Determination of the single polyadenylation site of the human proα1(II)collagen gene. Nucleic Acids Res 1987; 15: 9499-9504.

1.30. Väisänen P, Elima K, Palotie A, Peltonen L, Vuorio E. Polymorphic restriction sites of type II collagen gene: their location and frequencies in the Finnish population. Hum Hered 1988; 38: 65-71.

1.31. Eerola E, Pulkki K, Pelliniemi LJ, Vuorio E, Toivanen A. Arthritis-associated changes in flow cytometric characteristics of cultured synovial fibroblasts. Arthritis Rheum 1988; 31: 339-347.

1.32. Pulkki K, Eerola E, Saario R, Toivanen A, Vuorio E. Activated monocytes induce arthritis-associated changes in mitochondria of cultured synovial fibroblasts. Scand J Rheumatol 1988; 17: 131-141.

1.33. Kähäri V-M, Eerola E, Vuorio E. Flow cytometry of fibroblasts cultured from skin of patients with localized scleroderma. Dermatologica 1988; 177: 348-353.

1.34. Kähäri V-M, Heino J, Vuorio T, Vuorio E. Interferon-α and interferon-γ reduce excessive collagen synthesis and procollagen mRNA levels of scleroderma fibroblasts in culture. Biochim Biophys Acta 1988; 968: 45-50.

1.35. Kähäri V-M, Sandberg M, Kalimo H, Vuorio T, Vuorio E. Identification of fibroblasts responsible for increased collagen production in localized scleroderma by *in situ* hybridization. J Invest Dermatol 1988; 90: 664-670.

1.36. Sandberg M, Vuorio T, Hirvonen H, Alitalo K, Vuorio E. Enhanced expression of TGF-β and c-*fos* mRNAs in the growth plates of developing human long bones. Development 1988; 102: 461-470.

1.37. Oikarinen AI, Vuorio EI, Zaragoza EJ, Palotie A, Chu M-L, Uitto J. Modulation of collagen metabolism by glucocorticoids. Receptor-mediated

effects of dexamethasone on collagen biosynthesis in chick embryo fibroblasts and chondrocytes. Biochem Pharmacol 1988; 37: 1451-1462.

1.38. Larjava H, Heino J, Krusius T, Vuorio E, Tammi M. The small dermatan sulphate proteoglycans synthesized by fibroblasts derived from skin, synovium and gingiva show tissue-related heterogeneity. Biochem J 1988; 256: 35-40.

1.39. Mali P, Sandberg M, Vuorio E, Hecht NB, Parvinen M. Localization of protamine 1 mRNA in different stages of the cycle of rat seminiferous epithelium. J Cell Biol 1988; 107: 407-412.

1.40. Vuorio T, Wärri A, Vuorio E, Alitalo K. Expression of the c-Ha-*ras* and *neu* oncogenes in DMBA-induced, anti-estrogen-treated rat mammary tumors. Int J Cancer 1988; 42: 774-779.

1.41. Mäkelä JK, Raassina A, Virta A, Vuorio E. Human proα1(I) collagen: cDNA sequence for the C-propeptide domain. Nucleic Acids Res 1988; 16: 349.

1.42. Sandberg M, Autio-Harmainen H, Vuorio E. Localization of the expression of types I, III and IV collagen, TGF-ß and c-*fos* genes in developing human calvarial bones. Dev Biol 1988; 130: 324-334.

1.43. Sandberg M, Aro H, Multimäki P, Aho H, Vuorio E. In situ localization of collagen production by chondrocytes and osteoblasts in fracture callus tissue. J Bone Joint Surg 1989; 71-A: 69-77.

1.44. Larjava H, Heino J, Kähäri V-M, Krusius T, Vuorio E. Characterization of one phenotype of human peridontal granulation tissue fibroblasts. J Dent Res 1989; 68: 20-25.

1.45. Hirvonen H, Sandberg M, Kalimo H, Hukkanen V, Vuorio E, Salmi TT, Alitalo K. The N-*myc* proto-oncogene and IGF-II growth factor mRNAs are expressed by distinct cells in human fetal kidney and brain. J Cell Biol 1989; 108: 1093-1104.

1.46. Sandberg M, Mäkelä JK, Multimäki P, Vuorio T, Vuorio E. Construction of a human proα1(III) collagen cDNA clone and localization of type III collagen expression in human fetal tissues. Matrix 1989; 9: 82-91.

1.47. Elima K, Kaitila I, Mikonoja L, Elonsalo U, Peltonen L, Vuorio E. Exclusion of the COL2A1 gene as the mutation site in diastrophic dysplasia. J Med Genet 1989; 26: 314-319.

1.48. Vuorio EI, Mäkelä JK, Vuorio TK, Poole A, Wagner JC. Characterization of excessive collagen production during development of pulmonary fibrosis induced by chronic silica inhalation in rats. Brit J Exp Path 1989; 70: 305-315.

1.49. Larjava H, Sandberg M, Vuorio E. Altered distribution of type I collagen mRNA in periodontal disease. J Periodont Res 1989; 24: 171-177.

1.50. Metsäranta M, Young MF, Sandberg M, Termine J, Vuorio E. Localization of osteonectin expression in human fetal skeletal tissues by *in situ* hybridization. Calcif Tiss Int 1989; 45: 146-152.

1.51. Palotie A, Väisänen P, Ott J, Ryhänen L, Elima K, Vikkula M, Cheah K, Vuorio E, Peltonen L. Predisposition to familial osteoarthrosis is linked to type II collagen gene. Lancet 1989; i: 924-927.

1.52. Sandberg M, Tamminen M, Hirvonen H, Vuorio E, Pihlajaniemi T. Expression of mRNAs coding for the α1 chain of type XIII collagen in human fetal tissues: comparison with expression of mRNAs for collagen types I, II and III. J Cell Biol 1989; 109: 1371-1379.

1.53. Oikarinen A, Vuorio E, Vuorio T. Comparison of the effects of dexamethasone and 13-*cis*-retinoic acid on connective tissue biosynthesis in human skin fibroblasts. Arch Dermatol Res 1989; 281: 273-278.

1.54. Elima K, Vuorio E. Expression of mRNAs for collagen and other matrix components in dedifferentiating and redifferentiating human chondrocytes in culture. FEBS Lett 1989; 258: 195-198.

1.55. Oikarinen A, Vuorio T, Mäkelä J, Vuorio E. 13-*cis* retinoic acid and dexamethasone modulate the gene expression of epidermal growth factor receptor and fibroblast proteoglycan 40 core protein in human skin fibroblasts. Acta Derm Venerol 1989; 69: 466-469.

1.56. Larjava H, Sandberg M, Happonen R-P, Vuorio E. Differential localization of type I and type III procollagen messenger ribonucleic acids in inflamed periodontal and periapical connective tissues by in situ hybridization. Lab Invest 1990; 62: 96-103.

1.57. Pihlajaniemi T, Tamminen M, Sandberg M, Hirvonen H, Vuorio E. The α1 chain of type XIII collagen: polypeptide structure, alternative splicing and tissue distribution. Ann NY Acad Sci 1990; 580: 440-443.

1.58. Mäkelä JK, Vuorio T, Vuorio E. Growth-dependent modulation of type I collagen production and mRNA levels in cultured human skin fibroblasts. Biochim Biophys Acta 1990; 1049: 171-176.

1.59. Hirvonen H, Mäkelä TP, Sandberg M, Kalimo H, Vuorio E, Alitalo K. Expression of the *myc* proto-oncogenes in developing human fetal brain. Oncogene 1990; 5: 1787-1797.

1.60. Mauviel A, Heino J, Kähäri V-M, Hartman D, Pujol J-P, Vuorio E. Regulation of collagen and fibronectin gene expression by interleukin-1. Different control mechanisms for mRNA levels and protein production are involved. J Invest Dermatol 1991; 96: 243-249.

1.61. Hurme T, Kalimo H, Sandberg M, Lehto M, Vuorio E. Localization of type I and III collagen and fibronectin production in injured gastrocnemius muscle. Lab Invest 1991; 64: 76-84.

1.62. Autio-Harmainen H, Sandberg M, Pihjalaniemi T, Vuorio E. Synthesis of laminin and type IV collagen by trophoblastic cells and fibroblastic stromal cells in early human placenta. Lab Invest 1991; 64: 483-491.

1.63. Vuorio T, Kähäri V-M, Black C, Vuorio E. Expression of osteonectin, decorin, and TGF-β genes in fibroblasts cultured from patients with systemic sclerosis and morphea. J Rheumatol 1991; 18: 247-251.

1.64. Metsäranta M, Toman D, de Crombrugghe B, Vuorio E. The mouse type II collagen gene: complete nucleotide sequence, exon structure and alternative splicing. J Biol Chem 1991; 266: 16862-16869.

1.65. Metsäranta M, Toman D, de Crombrugghe B, Vuorio E. Specific hybridization probes for mouse type I, II, III and IX collagen mRNAs. Biochim Biophys Acta 1991; 1089: 241-243.

1.66. Garofalo S, Vuorio E, Metsäranta M, Rosati R, Toman D, Vaughan J, Lozano G, Mayne R, Ellard J, Horton W, de Crombrugghe B. Reduced amounts of cartilage collagen fibrils and growth plate anomalies in transgenic mice harboring a glycine to cysteine mutation in the mouse type II collagen α1-chain gene. Proc Natl Acad Sci USA 1991; 88: 9648-9652.

1.67. Oikarinen A, Mäkelä J, Vuorio T, Vuorio E. Comparison on collagen gene expression in the developing chick embryo tendon and heart. Tissue and development time-dependent action of dexamethasone. Biochim Biophys Acta 1991; 1089: 40-46.

1.68. Vikkula M, Metsäranta M, Syvänen A-C, Ala-Kokko L, Vuorio E, Peltonen L. Structural analysis of the regulatory elements of the type II collagen gene: Conservation of promoter and first intron sequences between human and mouse. Biochem J 1992; 285: 287-294.

1.69. Metsäranta M, Garofalo S, Decker G, Rintala M, de Crombrugghe B, Vuorio E. Chondrodysplasia in transgenic mice harboring a 15 amino acid deletion in the triple helical domain of proα1(II) collagen chain. J Cell Biol 1992; 118: 203-212.

1.70. Elima K, Metsäranta M, Kallio J, Perälä M, Eerola I, Garofalo S, de Crombrugghe B, Vuorio E. Specific hybridization probes for mouse α2(IX) and α1(X) collagen mRNAs. Biochim Biophys Acta 1992; 1130: 78-80.

1.71. Rintala M, Metsäranta M, Garofalo S, de Crombrugghe B, Vuorio E, Rönning O. Abnormal craniofacial development and cartilage structure in transgenic mice harbouring a gly -> cys mutation in the cartilage specific type II collagen gene. J Craniofac Genet Dev Biol 1993; 13: 137-146.

1.72. Hiltunen A, Vuorio E, Aro H. A standardized experimental fracture in the mouse tibia. J Orthop Res 1993; 11: 305-312.

1.73. Elima K, Eerola I, Rosati R, Metsäranta M, Garofalo S, Perälä M, de Crombrugghe B, Vuorio E. The mouse type X collagen gene: complete nucleotide sequence, exon structure and expression pattern. Biochem J 1993; 289: 247-253.

1.74. Perälä M, Hänninen M, Hästbacka J, Elima K, Vuorio E. Molecular cloning of human α2(IX) collagen cDNA and assignment of the human COL9A2 gene to chromosome 1. FEBS Lett 1993; 319: 177-180.

1.75. Gomez-Reino JJ, Sandberg M, Carreira PE, Vuorio E. Expression of types I, III and IV collagen genes in fibrotic skin and nerve lesions of toxic oil syndrome patients. Clin Exp Immunol 1993; 93: 103-107.

1.76. Garofalo S, Metsäranta M, Ellard J, Smith C, Horton W, Vuorio E, de Crombrugghe B. Assembly of cartilage collagen fibrils is disrupted by overexpression of normal type II collagen in transgenic mice. Proc Natl Acad Sci USA 1993; 90: 3825-3529.

1.77. Hiltunen A, Aro H, Vuorio E. Regulation of extracellular matrix genes during fracture healing in mice. Clin Orthop 1993; 297: 23-27.

1.78. Langenskiöld A, Elima K, Vuorio E. Specific collagen mRNAs elucidate the histogenetic relationship between the growth plate, the tissue in the ossification groove of Ranvier, and the cambium layer of the adjacent periosteum. Clin Orthop 1993; 297: 51-54.

1.79. Virolainen P, Vuorio E, Aro H. Gene expression at graft-host interphases of cortical bone allografts and autografts. Clin Orthop 1993; 297: 144-149.

1.80. Sandberg MM, Hirvonen HE, Elima KM, Vuorio EI. Co-expression of collagens II and XI and alternative splicing of exon 2 of collagen II in several developing human tissues. Biochem J 1993; 294: 595-602.

1.81. Perälä M, Elima K, Metsäranta M, Rosati R, de Crombrugghe B, Vuorio E. The exon structure of the mouse α2(IX) collagen gene shows unexpected divergence from the chick gene. J Biol Chem 1994; 269: 5064-5071.

1.82. Hirvonen HE, Salonen R, Sandberg MM, Vuorio E, Västrik I, Kotilainen E, Kalimo H. Differential expression of *myc*, *Max* and *RB1* genes in human gliomas and glioma cell lines. Brit J Cancer 1994; 69: 16-25.

1.83. Glumoff V, Mäkelä JK, Vuorio E. Cloning of cDNA for rat proα1(III) collagen mRNA. Different expression patterns of type I and type III collagens and fibronectin in experimental granulation tissue. Biochim Biophys Acta 1994; 1217: 41-48.

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