7. Literaturverzeichnis

1. Ralevic, V. and G. Burnstock, Receptors for purines and pyrimidines. *Pharmacol Rev*, 1998. 50(3): p. 413-92.

2. Khakh, B.S., et al., International union of pharmacology. XXIV. Current status of the nomenclature and properties of P2X receptors and their subunits. *Pharmacol Rev*, 2001. 53(1): p. 107-18.

3. Kunapuli, S.P. and J.L. Daniel, P2 receptor subtypes in the cardiovascular system. *Biochem J*, 1998. 336(Pt 3): p. 513-23.

4. Schlüter, H., et al., Diadenosine phosphates and the physiological control of blood pressure. *Nature*, 1994. 367(6459): p. 186-8.

5. Miras-Portugal, M.T., J. Gualix, and J. Pintor, The neurotransmitter role of diadenosine polyphosphates. *FEBS Lett*, 1998. 430(1-2): p. 78-82.

6. Flores, N.A., B.M. Stavrou, and D.J. Sheridan, The effects of diadenosine polyphosphates on the cardiovascular system. *Cardiovasc Res*, 1999. 42(1): p. 15-26.

7. Schlüter, H., M. Tepel, and W. Zidek, Vascular actions of diadenosine phosphates. *J Auton Pharmacol*, 1996. 16(6): p. 357-62.

8. Bo, X., R. Schoepfer, and G. Burnstock, Molecular cloning and characterization of a novel ATP P2X receptor subtype from embryonic chick skeletal muscle. *J Biol Chem*, 2000. 275(19): p. 14401-7.

9. von Kugelgen, I. and A. Wetter, Molecular pharmacology of P2Y-receptors. *Naunyn Schmiedebergs Arch Pharmacol*, 2000. 362(4-5): p. 310-23.

10. Barnard, E.A. and J. Simon, An elusive receptor is finally caught: P2Y(12'), an important drug target in platelets. *Trends Pharmacol Sci*, 2001. 22(8): p. 388-91.

11. Torres, G.E., et al., Co-expression of P2X1 and P2X5 receptor subunits reveals a novel ATP-gated ion channel. *Mol Pharmacol*, 1998. 54(6): p. 989-93.

12. Le, K.T., et al., Functional and biochemical evidence for heteromeric ATP-gated channels composed of P2X1 and P2X5 subunits. *J Biol Chem*, 1999. 274(22): p. 15415-9.

13. North, R.A. and E.A. Barnard, Nucleotide receptors. *Curr Opin Neurobiol*, 1997. 7(3): p. 346-57.

14. Kisselev, L.L., et al., Diadenosine oligophosphates (Ap(n)A), a novel class of signalling molecules? *FEBS Lett*, 1998. 427(2): p. 157-63.

15. Luo, J., et al., Identification and characterization of diadenosine 5',5"'-P1,P2 - diphosphate and diadenosine 5',5"'-P1,P3-triphosphate in human myocardial tissue. *Faseb J*, 1999. 13(6): p. 695-705.

16. Ahmet, I., et al., Cardioprotective effect of diadenosine tetraphosphate (AP4A) preservation in hypothermic storage and its relation with mitochondrial ATP-sensitive potassium channels. *Transplantation*, 2000. 69(1): p. 16-20.

17. Jankowski, J., et al., Dinucleotides as growth-promoting extracellular mediators. Presence of dinucleoside diphosphates Ap2A, Ap2G, and Gp2G in releasable granules of platelets. *J Biol Chem*, 2001. 276(12): p. 8904-9.

18. Jankowski, J., et al., Identification and characterization of P(1), P(7)-Di(adenosine-5')- heptaphosphate from human platelets. *J Biol Chem*, 1999. 274(34): p. 23926-31.

19. Schlüter, H., et al., Adenosine(5') oligophospho-(5') guanosines and guanosine(5') oligophospho-(5') guanosines in human platelets. *J Clin Invest*, 1998. 101(3): p. 682-8.

20. Luo, J., et al., Identification of diadenosine hexaphosphate in human erythrocytes. *Hypertension*, 1999. 34(4 Pt 2): p. 872-5.

21. Jankowski, J., et al., Vasoactive diadenosine polyphosphates in human placenta: possible candidates in the pathophysiology of pre-eclampsia? *J Hypertens*, 2001. 19(3 Pt 2): p. 567-73.

22. Ding, Y., et al., ATP, P2X receptors and pain pathways. *J Auton Nerv Syst*, 2000. 81(1-3): p. 289-94.

23. Burnstock, G., P2X receptors in sensory neurones. *Br J Anaesth*, 2000. 84(4): p. 476-88.

24. Dubyak, G.R., Purinergic signaling at immunological synapses. *J Auton Nerv Syst*, 2000. 81(1-3): p. 64-8.

25. Abbracchio, M.P. and G. Burnstock, Purinergic signalling: pathophysiological roles. *Jpn J Pharmacol*, 1998. 78(2): p. 113-45.

26. Di Virgilio, F., P.A. Borea, and P. Illes, P2 receptors meet the immune system. *Trends Pharmacol Sci*, 2001. 22(1): p. 5-7.

27. Cusack, N.J. and S.M. Hourani, Platelet P2 receptors: from curiosity to clinical targets. *J Auton Nerv Syst*, 2000. 81(1-3): p. 37-43.

28. Woulfe, D., J. Yang, and L. Brass, ADP and platelets: the end of the beginning. *J Clin Invest*, 2001. 107(12): p. 1503-5.

29. Gachet, C., Platelet activation by ADP: the role of ADP antagonists. *Ann Med*, 2000. 32(Suppl 1): p. 15-20.

30. Hoylaerts, M.F., et al., ADP receptors in platelet activation and aggregation. *Platelets*, 2000. 11(6): p. 307-9.

31. Liang, B.T. and K.A. Jacobson, Adenosine and ischemic preconditioning. *Curr Pharm Des*, 1999. 5(12): p. 1029-41.

32. Ralevic, V., P2 receptors in the central and peripheral nervous systems modulating sympathetic vasomotor tone. *J Auton Nerv Syst*, 2000. 81(1-3): p. 205-11.

33. Mei, Q. and B.T. Liang, P2 purinergic receptor activation enhances cardiac contractility in isolated rat and mouse hearts. *Am J Physiol Heart Circ Physiol*, 2001. 281(1): p. H334-41.

34. Dubyak, G.R. and C. el-Moatassim, Signal transduction via P2-purinergic receptors for extracellular ATP and other nucleotides. *Am J Physiol*, 1993. 265(3 Pt 1): p. C577-606.

35. Tepel, M., et al., Diadenosine polyphosphates' action on calcium and vessel contraction. *Am J Hypertens*, 1997. 10(12 Pt 1): p. 1404-10.

36. van der Giet, M., et al., Evidence for two different P2X-receptors mediating vasoconstriction of Ap5A and Ap6A in the isolated perfused rat kidney. *Br J Pharmacol*, 1999. 127(6): p. 1463-9.

37. van der Giet, M., et al., Mediation of the vasoactive properties of diadenosine tetraphosphate via various purinoceptors. *J Hypertens*, 1998. 16(12 Pt 2): p. 1939-43.

38. van der Giet, M., et al., Differential effects of diadenosine phosphates on purinoceptors in the rat isolated perfused kidney. *Br J Pharmacol*, 1997. 120(8): p. 1453-60.

39. van der Giet, M., et al., The critical role of adenosine and guanosine in the affinity of dinucleoside polyphosphates to P(2X)-receptors in the isolated perfused rat kidney. *Br J Pharmacol*, 2001. 132(2): p. 467-74.

40. Cinkilic, O., et al., Selective agonism of group I P2X receptors by dinucleotides dependent on a single adenine moiety. *J Pharmacol Exp Ther*, 2001. 299(1): p. 131-6.

41. Boeynaems, J.M. and J.D. Pearson, P2 purinoceptors on vascular endothelial cells: physiological significance and

transduction mechanisms. *Trends Pharmacol Sci*, 1990. 11(1): p. 34-7.

42. Pearson, J.D., L.L. Slakey, and J.L. Gordon, Stimulation of prostaglandin production through purinoceptors on cultured porcine endothelial cells. *Biochem J*, 1983. 214(1): p. 273-6.

43. Boeynaems, J.M. and N. Galand, Stimulation of vascular prostacyclin synthesis by extracellular ADP and ATP. *Biochem Biophys Res Commun*, 1983. 112(1): p. 290-6.

44. Kelm, M., et al., Quantitative and kinetic characterization of nitric oxide and EDRF released from cultured endothelial cells. *Biochem Biophys Res* Commun, 1988. 154(1): p. 236-44.

45. Dominiczak, A.F., J. Quilley, and D.F. Bohr, Contraction and relaxation of rat aorta in response to ATP. *Am J Physiol*, 1991. 261(1 Pt 2): p. H243-51.

46. Castro, A.F., et al., Extracellular ATP and bradykinin increase cGMP in vascular endothelial cells via activation of PKC. *Am J Physiol*, 1998. 275(1 Pt 1): p. C113-9.

47. Pirotton, S., et al., Endothelial P2-purinoceptors: subtypes and signal transduction. *J Auton Pharmacol*, 1996. 16(6): p. 353-6.

48. Bultmann, R., et al., Vasoconstrictor and vasodilator effects of guanine nucleotides in the rat aorta. *Naunyn Schmiedebergs Arch Pharmacol*, 1997. 356(5): p. 653-61.

49. Hansmann, G., et al., Characterization by antagonists of P2-receptors mediating endothelium-dependent relaxation in the rat aorta. *Naunyn Schmiedebergs Arch Pharmacol*, 1997. 356(5): p. 641-52.

50. Vigne, P., J.P. Breittmayer, and C. Frelin, Diadenosine polyphosphates as antagonists of the endogenous P2Y(1) receptor in rat brain capillary endothelial cells of the B7 and B10 clones. *Br J Pharmacol*, 2000. 129(7): p. 1506-12.

51. You, J., et al., Endothelial-mediated dilations of rat middle cerebral arteries by ATP and ADP. *Am J Physiol*, 1997. 273(3 Pt 2): p. H1472-7.

52. Webb, T.E., et al., The P2Y purinoceptor in rat brain microvascular endothelial cells couple to inhibition of adenylate cyclase. *Br J Pharmacol*, 1996. 119(7): p. 1385-92.

53. Malmsjo, M., L. Edvinsson, and D. Erlinge, P2X receptors counteract the vasodilatory effects of endothelium derived hyperpolarising factor. *Eur J Pharmacol*, 2000. 390(1-2): p. 173-80.

54. Malmsjo, M., et al., The stable pyrimidines UDPbetaS and UTPgammaS discriminate between the P2 receptors that mediate vascular contraction and relaxation of the rat mesenteric artery. *Br J Pharmacol*, 2000. 131(1): p. 51-6.

55. Jankowski, M., et al., Cyclic GMP-dependent relaxation of isolated rat renal glomeruli induced by extracellular ATP. *J Physiol*, 2001. 530(Pt 1): p. 123-30.

56. Chinellato, A., et al., Pharmacological characterization of endothelial cell nitric oxide synthase inhibitors in isolated rabbit aorta. *Life Sci*, 1998. 62(6): p. 479-90.

57. Chinellato, A., et al., Pharmacological characterization of ATP receptors mediating vasodilation on isolated rabbit aorta. *Gen Pharmacol*, 1992. 23(5): p. 861-5.

58. Loesch, A. and G. Burnstock, Ultrastructural localisation of ATP-gated P2X2 receptor immunoreactivity in vascular endo thelial cells in rat brain. *Endothelium*, 2000. 7(2): p. 93-8.

59. Inscho, E.W., P2 receptors in regulation of renal microvascular function. *Am J Physiol Renal Physiol*, 2001. 280(6): p. F927-44.

60. Inscho, E.W., Renal microvascular effects of P2 receptor stimulation. *Clin Exp Pharmacol Physiol*, 2001. 28(4): p. 332-9.

61. Chan, C.M., et al., Localization of P2X1 purinoceptors by autoradiography and immunohistochemistry in rat kidneys. *Am J Physiol*, 1998. 274(4 Pt 2): p. F799-804.

62. White, S.M., et al., Calcium signaling pathways utilized by P2X receptors in freshly isolated preglomerular MVSMC. *Am J Physiol Renal Physiol*, 2001. 280(6): p. F1054-61.

63. Zunkler, B.J., et al., Effects of P2 purinoceptor agonists on membrane potential and intracellular Ca2+ of human cardiac endothelial cells. *Pharmacol Toxicol*, 1999. 85(1): p. 7-15.

64. Lewis, C.J. and R.J. Evans, P2X receptor immunoreactivity in different arteries from the femoral, pulmonary, cerebral, coronary and renal circulations. *J Vasc Res*, 2001. 38(4): p. 332-40.

65. Inscho, E.W., et al., Direct assessment of renal microvascular responses to P2-purinoceptor agonists. *Am J Physiol*, 1998. 274(4 Pt 2): p. F718-27.

66. Ohkubo, T., et al., Presence and possible role of the spliced isoform of the P2X1 receptor in rat vascular smooth muscle cells. *Pflugers Arch*, 2000. 441(1): p. 57-64.

67. Galligan, J.J., et al., Differential localization of P2 receptor subtypes in mesenteric arteries and veins of nor motensive and hypertensive rats. *J Pharmacol Exp Ther*, 2001. 296(2): p. 478-85.

68. Gitterman, D.P. and R.J. Evans, Properties of P2X and P2Y receptors are dependent on artery diameter in the rat mesenteric bed. *Br J Pharmacol*, 2000. 131(8): p. 1561-8.

69. Sauzeau, V., et al., P2Y(1), P2Y(2), P2Y(4), and P2Y(6) receptors are coupled to Rho and Rho kinase activation in vas cular myocytes. *Am J Physiol Heart Circ Physiol*, 2000. 278(6): p. H1751-61.

70. Harper, S., et al., Evidence that P2Y4 nucleotide receptors are involved in the regulation of rat aortic smooth

muscle cells by UTP and ATP. *Br J Pharmacol*, 1998. 124(4): p. 703-10.

71. Nori, S., et al., Coexpression of mRNAs for P2X1, P2X2 and P2X4 receptors in rat vascular smooth muscle: an in situ hybridization and RT-PCR study. *J Vasc Res*, 1998. 35(3): p. 179-85.

72. Murthy, K.S. and G.M. Makhlouf, Coexpression of ligand-gated P2X and G protein-coupled P2Y receptors in smooth muscle. Preferential activation of P2Y receptors coupled to phospholipase C (PLC)-beta1 via Galphaq/11 and to PLC-beta3 via Gbetagammai3. *J Biol Chem*, 1998. 273(8): p. 4695-704.

73. Seye, C.I., et al., Overexpression of P2Y2 purinoceptor in intimal lesions of the rat aorta. *Arterioscler Thromb Vasc Biol*, 1997. 17(12): p. 3602-10.

74. Malmsjo, M., et al., Characterization of contractile P2 receptors in human coronary arteries by use of the stable pyrimidines uridine 5'-O-thiodiphosphate and uridine 5'-O-3-thiotriphosphate. *J Pharmacol Exp Ther*, 2000. 293(3): p. 755-60.

75. Lewis, C.J., S.J. Ennion, and R.J. Evans, P2 purinoceptor-mediated control of rat cerebral (pial) microvasculature; contribution of P2X and P2Y receptors. *J Physiol*, 2000. 527(Pt 2): p. 315-24.

76. Harada, H., et al., Induction of proliferation and apoptotic cell death via P2Y and P2X receptors, respectively, in rat glomerular mesangial cells. *Kidney Int*, 2000. 57(3): p. 949-58.

77. Malam-Souley, R., et al., Nucleotide receptor P2u partially mediates ATP-induced cell cycle progression of aortic smooth muscle cells. *J Cell Physiol*, 1996. 166(1): p. 57-65.

78. Van Der Giet, M., et al., The Role of P2Y Receptors in the Control of Blood Pressure. *Drug News Perspect*, 2002. 15(10): p. 640-646.

79. Ross, R., The smooth muscle cell. II. Growth of smooth muscle in culture and formation of elastic fibers. *J Cell Biol*, 1971. 50(1): p. 172-86.

80. Raff, T., et al., Design and testing of beta-actin primers for RT-PCR that do not co- amplify processed pseudogenes. *Biotechniques*, 1997. 23(3): p. 456-60.

81. Heidenreich, S., et al., Regulation of rat mesangial cell growth by diadenosine phosphates. *J Clin Invest*, 1995. 95(6): p. 2862-7.

82. van der Giet, M., et al., Effects of dinucleoside polyphosphates on regulation of coronary vascular tone. *Eur J Pharmacol*, 2002. 448(2-3): p. 207-13.

83. van der Giet, M., et al., The critical role of adenosine and guanosine in the affinity of dinucleoside polyphosphates to P(2X)-receptors in the isolated perfused rat kidney. *Br J Pharmacol*, 2001. 132(2): p. 467-74.

84. Gabriels, G., et al., Mesenteric and renal vascular effects of diadenosine polyphosphates (APnA). *Cardiovasc Res*, 2002. 56(1): p. 22-32.

85. Erlinge, D., Extracellular ATP: a growth factor for vascular smooth muscle cells. *Gen Pharmacol*, 1998. 31(1): p. 1-8.

86. Somlyo, A.P. and A.V. Somlyo, Signal transduction by G-proteins, rho-kinase and protein phosphatase to smooth muscle and non-muscle myosin II. *J Physiol*, 2000. 522(Pt 2): p. 177-85.

87. Satoh, M., et al., Alpha 1-adrenoceptor subtypes mediating the regulation and modulation of Ca2+ sensitization in rabbit thoracic aorta. *Eur J Pharmacol*, 1994. 265(3): p. 133-9.

88. Uehata, M., et al., Calcium sensitization of smooth muscle mediated by a Rho-associated protein kinase in hypertension. *Nature*, 1997. 389(6654): p. 990-4.
89. Kandabashi, T., et al., Involvement of rho-kinase in agonists-induced contractions of arteriosclerotic human arteries. *Arterioscler Thromb Vasc Biol*, 2002. 22(2): p. 243-8.
90. Shimokawa, H., et al., Anti-anginal effect of fasudil, a Rho-kinase inhibitor, in patients with stable effort angina: a multicenter study. *J Cardiovasc Pharmacol*, 2002. 40(5): p. 751-61.
91. Wettschureck, N. and S. Offermanns, Rho/Rho-kinase mediated signaling in physiology and pathophysiology. *J Mol Med*, 2002. 80(10): p. 629-38.
92. Fukata, Y., M. Amano, and K. Kaibuchi, Rho-Rho-kinase pathway in smooth muscle contraction and cytoskeletal reorganization of non-muscle cells. *Trends Pharmacol Sci*, 2001. 22(1): p. 32-9.

Aktenzeichen und Datum der behördlichen Genehmigung für die Tierversuche:

T 0086/01 vom 19.03.2001