

7 Literaturverzeichnis

1. Ahearn, J. M. and Fearon, D. T., Structure and function of the complement receptors, CR1 (CD35) and CR2 (CD21). *Adv Immunol* (1989), **46**: 183-219.
2. Aplin, A. E., Howe, A., Alahari, S. K., and Juliano, R. L., Signal transduction and signal modulation by cell adhesion receptors: the role of integrins, cadherins, immunoglobulin-cell adhesion molecules, and selectins. *Pharmacol Rev* (1998), **50**(2): 197-263.
3. Asano, M., Nakae, S., Kotani, N., Shirafuji, N., Nambu, A., Hashimoto, N., Kawashima, H., Hirose, M., Miyasaka, M., Takasaki, S., and Iwakura, Y., Impaired selectin-ligand biosynthesis and reduced inflammatory responses in beta-1,4-galactosyltransferase-I-deficient mice. *Blood* (2003), **102**(5): 1678-1685.
4. Baumharter, S., Singer, M. S., Henzel, W., Hemmerich, S., Renz, M., Rosen, S. D., and Lasky, L. A., Binding of L-selectin to the vascular sialomucin CD34. *Science* (1993), **262**(5132): 436-438.
5. Berg, E. L., McEvoy, L. M., Berlin, C., Bargatze, R. F., and Butcher, E. C., L-selectin-mediated lymphocyte rolling on MAdCAM-1. *Nature* (1993), **366**(6456): 695-698.
6. Bernhard, G., Enders, S., Dervedde, J., and Tauber, R., A cell surface form of Hsc70 acts as an L-selectin ligand. *Biochem Biophys Res Commun* (2007) - *submitted*.
7. Berteau, O. and Mulloy, B., Sulfated fucans, fresh perspectives: structures, functions, and biological properties of sulfated fucans and an overview of enzymes active toward this class of polysaccharide. *Glycobiology* (2003), **13**(6): 29R-40R.
8. Bevilacqua, M. P. and Nelson, R. M., Selectins. *J Clin Invest* (1993), **91**(2): 379-387.
9. Bevilacqua, M. P., Pober, J. S., Mendrick, D. L., Cotran, R. S., and Gimbrone, M. A., Jr., Identification of an inducible endothelial-leukocyte adhesion molecule. *Proc Natl Acad Sci U S A* (1987), **84**(24): 9238-9242.
10. Bevilacqua, M. P., Stengelin, S., Gimbrone, M. A., Jr., and Seed, B., Endothelial leukocyte adhesion molecule 1: an inducible receptor for neutrophils related to complement regulatory proteins and lectins. *Science* (1989), **243**(4895): 1160-1165.
11. Bhushan, M., Bleiker, T. O., Ballsdon, A. E., Allen, M. H., Sopwith, M., Robinson, M. K., Clarke, C., Weller, R. P., Graham-Brown, R. A., Keefe, M., Barker, J. N., and Griffiths, C. E., Anti-E-selectin is ineffective in the treatment of psoriasis: a randomized trial. *Br J Dermatol* (2002), **146**(5): 824-831.
12. Bovin, N. V., Polyacrylamide-based glycoconjugates as tools in glycobiology. *Glycoconj J* (1998), **15**(5): 431-446.
13. Bovin, N. V., Korchagina, E., Zemlyanukhina, T. V., Byramova, N. E., Galanina, O. E., Zemlyakov, A. E., Ivanov, A. E., Zubov, V. P., and Mochalova, L. V., Synthesis of polymeric neoglycoconjugates based on N-substituted polyacrylamides. *Glycoconj J* (1993), **10**(2): 142-151.

14. Brinkman-van der Linden, E. C., de Haan, P. F., Havenaar, E. C., and van Dijk, W., Inflammation-induced expression of sialyl LewisX is not restricted to alpha1-acid glycoprotein but also occurs to a lesser extent on alpha1-antichymotrypsin and haptoglobin. *Glycoconj J* (1998), **15**(2): 177-182.
15. Brustein, M., Kraal, G., Mebius, R. E., and Watson, S. R., Identification of a soluble form of a ligand for the lymphocyte homing receptor. *J Exp Med* (1992), **176**(5): 1415-1419.
16. Buckley, C. D., Rainger, G. E., Bradfield, P. F., Nash, G. B., and Simmons, D. L., Cell adhesion: more than just glue (review). *Mol Membr Biol* (1998), **15**(4): 167-176.
17. Buerke, M., Weyrich, A. S., Murohara, T., Queen, C., Klingbeil, C. K., Co, M. S., and Lefer, A. M., Humanized monoclonal antibody DREG-200 directed against I-selectin protects in feline myocardial reperfusion injury. *J Pharmacol Exp Ther* (1994), **271**(1): 134-142.
18. Butcher, E. C. and Picker, L. J., Lymphocyte homing and homeostasis. *Science* (1996), **272**(5258): 60-66.
19. Capila, I. and Linhardt, R. J., Heparin-protein interactions. *Angew Chem Int Ed Engl* (2002), **41**(3): 391-412.
20. Chen, A., Engel, P., and Tedder, T. F., Structural requirements regulate endoproteolytic release of the L-selectin (CD62L) adhesion receptor from the cell surface of leukocytes. *J Exp Med* (1995), **182**(2): 519-530.
21. Chung, C. T., Niemela, S. L., and Miller, R. H., One-step preparation of competent *Escherichia coli*: transformation and storage of bacterial cells in the same solution. *Proc Natl Acad Sci U S A* (1989), **86**(7): 2172-2175.
22. Cominacini, L., Fratta Pasini, A., Garbin, U., Davoli, A., De Santis, A., Campagnola, M., Rigoni, A., Zenti, M. G., Moghetti, P., and Lo Cascio, V., Elevated levels of soluble E-selectin in patients with IDDM and NIDDM: relation to metabolic control. *Diabetologia* (1995), **38**(9): 1122-1124.
23. Davidson, A. and Diamond, B., Autoimmune diseases. *N Engl J Med* (2001), **345**(5): 340-350.
24. Dwir, O., Kansas, G. S., and Alon, R., An activated L-selectin mutant with conserved equilibrium binding properties but enhanced ligand recognition under shear flow. *J Biol Chem* (2000), **275**(25): 18682-18691.
25. Edgecombe, M., Craddock, H. S., Smith, D. C., McLennan, A. G., and Fisher, M. J., Diadenosine polyphosphate-stimulated gluconeogenesis in isolated rat proximal tubules. *Biochem J* (1997), **323**(Pt 2): 451-456.
26. Ellies, L. G., Sperandio, M., Underhill, G. H., Yousif, J., Smith, M., Priatel, J. J., Kansas, G. S., Ley, K., and Marth, J. D., Sialyltransferase specificity in selectin ligand formation. *Blood* (2002), **100**(10): 3618-3625.
27. Ellies, L. G., Tsuboi, S., Petryniak, B., Lowe, J. B., Fukuda, M., and Marth, J. D., Core 2 oligosaccharide biosynthesis distinguishes between selectin ligands essential for leukocyte homing and inflammation. *Immunity* (1998), **9**(6): 881-890.

28. Enders, S., Bernhard, G., Zakrzewicz, A., and Tauber, R., Inhibition of L-selectin binding by polyacrylamide-based conjugates under defined flow conditions. *Biochim Biophys Acta* (2007), **1770**(10): 1441-1449.
29. Endresen, C., Heggenes, M., and Grov, A., Tryptic fragments of Fc from normal human IgG and their interaction with staphylococcal protein A. *Scand J Immunol* (1974), **3**(3): 261-267.
30. Eriksson, E. E., Xie, X., Werr, J., Thoren, P., and Lindbom, L., Importance of primary capture and L-selectin-dependent secondary capture in leukocyte accumulation in inflammation and atherosclerosis in vivo. *J Exp Med* (2001), **194**(2): 205-218.
31. Erlandsen, S. L., Hasslen, S. R., and Nelson, R. D., Detection and spatial distribution of the beta 2 integrin (Mac-1) and L-selectin (LECAM-1) adherence receptors on human neutrophils by high-resolution field emission SEM. *J Histochem Cytochem* (1993), **41**(3): 327-333.
32. Fieger, C. B. (1997) Klonierung und Expression von humanem L-Selektin - Charakterisierung der rekombinanten Proteinformen. Dissertationsschrift am Fachbereich Chemie - Inst. f. Biochemie, Freie Universität Berlin.
33. Fieger, C. B., Emig-Vollmer, S., Petri, T., Gräfe, M., Gohlke, M., Debus, N., Semmler, W., Tauber, R., and Volz, B., The adhesive properties of recombinant soluble L-selectin are modulated by its glycosylation. *Biochim Biophys Acta* (2001), **1524**(1): 75-85.
34. Fieger, C. B., Sasseti, C. M., and Rosen, S. D., Endoglycan, a member of the CD34 family, functions as an L-selectin ligand through modification with tyrosine sulfation and sialyl Lewis x. *J Biol Chem* (2003), **278**(30): 27390-27398.
35. Fijnheer, R., Frijns, C. J., Korteweg, J., Rommes, H., Peters, J. H., Sixma, J. J., and Nieuwenhuis, H. K., The origin of P-selectin as a circulating plasma protein. *Thromb Haemost* (1997), **77**(6): 1081-1085.
36. Finger, E. B., Puri, K. D., Alon, R., Lawrence, M. B., von Andrian, U. H., and Springer, T. A., Adhesion through L-selectin requires a threshold hydrodynamic shear. *Nature* (1996), **379**(6562): 266-269.
37. Foxall, C., Watson, S. R., Dowbenko, D., Fennie, C., Lasky, L. A., Kiso, M., Hasegawa, A., Asa, D., and Brandley, B. K., The three members of the selectin receptor family recognize a common carbohydrate epitope, the sialyl Lewis(x) oligosaccharide. *J Cell Biol* (1992), **117**(4): 895-902.
38. Frey, H. and Haag, R., Dendritic polyglycerol: a new versatile biocompatible-material. *J Biotechnol* (2002), **90**(3-4): 257-267.
39. Galanina, O. E., Tuzikov, A. B., Rapoport, E., Le Pendu, J., and Bovin, N. V., Carbohydrate-based probes for detection of cellular lectins. *Anal Biochem* (1998), **265**(2): 282-289.
40. Gallatin, W. M., Weissman, I. L., and Butcher, E. C., A cell-surface molecule involved in organ-specific homing of lymphocytes. *Nature* (1983), **304**(5921): 30-34.
41. Galustian, C., Childs, R. A., Stoll, M., Ishida, H., Kiso, M., and Feizi, T., Synergistic interactions of the two classes of ligand, sialyl-Lewis(a/x) fuco-oligosaccharides and short sulpho-motifs, with the P- and L-selectins: implications for therapeutic inhibitor designs. *Immunology* (2002), **105**(3): 350-359.

42. Game, S. M., Rajapurohit, P. K., Clifford, M., Bird, M. I., Priest, R., Bovin, N. V., Nifant'ev, N. E., O'Beirne, G., and Cook, N. D., Scintillation proximity assay for E-, P-, and L-selectin utilizing polyacrylamide-based neoglycoconjugates as ligands. *Anal Biochem* (1998), **258**(1): 127-135.
43. Gasmi, L., McLennan, A. G., and Edwards, S. W., Neutrophil apoptosis is delayed by the diadenosine polyphosphates, Ap5A and Ap6A: synergism with granulocyte-macrophage colony-stimulating factor. *Br J Haematol* (1996), **95**(4): 637-639..
44. Gibson, R. M., Kansas, G. S., Tedder, T. F., Furie, B., and Furie, B. C., Lectin and epidermal growth factor domains of P-selectin at physiologic density are the recognition unit for leukocyte binding. *Blood* (1995), **85**(1): 151-158.
45. Girard, J. P. and Springer, T. A., High endothelial venules (HEVs): specialized endothelium for lymphocyte migration. *Immunol Today* (1995), **16**(9): 449-457.
46. Goetz, D. J., Greif, D. M., Ding, H., Camphausen, R. T., Howes, S., Comess, K. M., Snapp, K. R., Kansas, G. S., and Lusciuskas, F. W., Isolated P-selectin glycoprotein ligand-1 dynamic adhesion to P- and E-selectin. *J Cell Biol* (1997), **137**(2): 509-519.
47. Gohlke, M., Mach, U., Nuck, R., Volz, B., Fieger, C., Tauber, R., and Reutter, W., H (0) blood group determinant is present on soluble human L-selectin expressed in BHK-cells. *FEBS Lett* (1999), **450**(1-2): 111-116.
48. Gohlke, M., Mach, U., Nuck, R., Zimmermann-Kordmann, M., Grunow, D., Fieger, C., Volz, B., Tauber, R., Petri, T., Debus, N., and Reutter, W., Carbohydrate structures of soluble human L-selectin recombinantly expressed in baby-hamster kidney cells. *Biotechnol Appl Biochem* (2000), **32**(Pt 1): 41-51.
49. Graves, B. J., Crowther, R. L., Chandran, C., Rumberger, J. M., Li, S., Huang, K. S., Presky, D. H., Familletti, P. C., Wolitzky, B. A., and Burns, D. K., Insight into E-selectin/ligand interaction from the crystal structure and mutagenesis of the lec/EGF domains. *Nature* (1994), **367**(6463): 532-538.
50. Guyer, D. A., Moore, K. L., Lynam, E. B., Schammel, C. M., Rogelj, S., McEver, R. P., and Sklar, L. A., P-selectin glycoprotein ligand-1 (PSGL-1) is a ligand for L-selectin in neutrophil aggregation. *Blood* (1996), **88**(7): 2415-2421.
51. Haag, R. and Kratz, F., Polymer therapeutics: concepts and applications. *Angew Chem Int Ed Engl* (2006), **45**(8): 1198-1215.
52. Hansen, J. E., Lund, O., Tolstrup, N., Gooley, A. A., Williams, K. L., and Brunak, S., NetOglyc: prediction of mucin type O-glycosylation sites based on sequence context and surface accessibility. *Glycoconj J* (1998), **15**(2): 115-130.
53. Harms, G. (2002) Identifizierung neuartiger Liganden des Adhäsionsrezeptors L-Selektin - Die L-Selektin-vermittelte homotypische Adhäsion von Leukocyten in der akuten Entzündungsreaktion. Dissertationsschrift am *Fachbereich Biologie, Chemie und Pharmazie - Inst. f. Biochemie*, Freie Universität Berlin.
54. Harms, G., Kraft, R., Grelle, G., Volz, B., Dervedde, J., and Tauber, R., Identification of nucleolin as a new L-selectin ligand. *Biochem J* (2001), **360**(Pt 3): 531-538.
55. Hasslen, S. R., von Andrian, U. H., Butcher, E. C., Nelson, R. D., and Erlandsen, S. L., Spatial distribution of L-selectin (CD62L) on human lymphocytes and transfected murine L1-2 cells. *Histochem J* (1995), **27**(7): 547-554.

56. Heidelberger, M. and Kendall, F. E., The Precipitin Reaction between Type III Pneumococcus Polysaccharide and Homologous Antibody: II. Conditions for Quantitative Precipitation of Antibody in Horse Sera. *J Exp Med* (1935a), **61**(4): 559-562.
57. Heidelberger, M. and Kendall, F. E., The Precipitin Reaction between Type III Pneumococcus Polysaccharide and Homologous Antibody: III. A Quantitative Study and a Theory of the Reaction Mechanism. *J Exp Med* (1935b), **61**(4): 563-591.
58. Heidelberger, M. and Kendall, F. E., A Quantitative Theory of the Precipitin Reaction: II. A Study of an Azoprotein-Antibody System. *J Exp Med* (1935c), **62**(4): 467-483.
59. Heidelberger, M. and Kendall, F. E., A Quantitative Theory of the Precipitin Reaction: III. The Reaction between Crystalline Egg Albumin and its Homologous Antibody. *J Exp Med* (1935d), **62**(5): 697-720.
60. Hirai, I., Sato, N., Qi, W., Ohtani, S., Torigoe, T., and Kikuchi, K., Localization of pNT22 70 kDa heat shock cognate-like protein in the plasma membrane. *Cell Struct Funct* (1998), **23**(3): 153-158.
61. Hsu-Lin, S., Berman, C. L., Furie, B. C., August, D., and Furie, B., A platelet membrane protein expressed during platelet activation and secretion. Studies using a monoclonal antibody specific for thrombin-activated platelets. *J Biol Chem* (1984), **259**(14): 9121-9126.
62. Hynes, R. O., Integrins: versatility, modulation, and signaling in cell adhesion. *Cell* (1992), **69**(1): 11-25.
63. Jaffe, E. A., Nachman, R. L., Becker, C. G., and Minick, C. R., Culture of human endothelial cells derived from umbilical veins. Identification by morphologic and immunologic criteria. *J Clin Invest* (1973), **52**(11): 2745-2756.
64. Jutila, M. A., Leukocyte traffic to sites of inflammation. *Apmis* (1992), **100**(3): 191-201.
65. Kahn, J., Ingraham, R. H., Shirley, F., Migaki, G. I., and Kishimoto, T. K., Membrane proximal cleavage of L-selectin: identification of the cleavage site and a 6-kD transmembrane peptide fragment of L-selectin. *J Cell Biol* (1994), **125**(2): 461-470.
66. Kaneider, N. C., Leger, A. J., and Kuliopulos, A., Therapeutic targeting of molecules involved in leukocyte-endothelial cell interactions. *Febs J* (2006), **273**(19): 4416-4424.
67. Kansas, G. S., Saunders, K. B., Ley, K., Zakrzewicz, A., Gibson, R. M., Furie, B. C., Furie, B., and Tedder, T. F., A role for the epidermal growth factor-like domain of P-selectin in ligand recognition and cell adhesion. *J Cell Biol* (1994), **124**(4): 609-618.
68. Kansas, G. S., Spertini, O., Stoolman, L. M., and Tedder, T. F., Molecular mapping of functional domains of the leukocyte receptor for endothelium, LAM-1. *J Cell Biol* (1991), **114**(2): 351-358.
69. Kawashima, H., Hirose, M., Hirose, J., Nagakubo, D., Plaas, A. H., and Miyasaka, M., Binding of a large chondroitin sulfate/dermatan sulfate proteoglycan, versican, to L-selectin, P-selectin, and CD44. *J Biol Chem* (2000), **275**(45): 35448-35456.

70. Kawashima, H., Li, Y. F., Watanabe, N., Hirose, J., Hirose, M., and Miyasaka, M., Identification and characterization of ligands for L-selectin in the kidney. I. Versican, a large chondroitin sulfate proteoglycan, is a ligand for L-selectin. *Int Immunol* (1999), **11**(3): 393-405.
71. Kawashima, H., Petryniak, B., Hiraoka, N., Mitoma, J., Huckaby, V., Nakayama, J., Uchimura, K., Kadomatsu, K., Muramatsu, T., Lowe, J. B., and Fukuda, M., N-acetylglucosamine-6-O-sulfotransferases 1 and 2 cooperatively control lymphocyte homing through L-selectin ligand biosynthesis in high endothelial venules. *Nat Immunol* (2005), **6**(11): 1096-1104.
72. Kishimoto, T. K., Jutila, M. A., and Butcher, E. C., Identification of a human peripheral lymph node homing receptor: a rapidly down-regulated adhesion molecule. *Proc Natl Acad Sci U S A* (1990), **87**(6): 2244-2248.
73. Kisselev, L. L., Justesen, J., Wolfson, A. D., and Frolova, L. Y., Diadenosine oligophosphates (Ap(n)A), a novel class of signalling molecules? *FEBS Lett* (1998), **427**(2): 157-163.
74. Koenig, A., Jain, R., Vig, R., Norgard-Sumnicht, K. E., Matta, K. L., and Varki, A., Selectin inhibition: synthesis and evaluation of novel sialylated, sulfated and fucosylated oligosaccharides, including the major capping group of GlyCAM-1. *Glycobiology* (1997), **7**(1): 79-93.
75. Kogan, T. P., Dupre, B., Bui, H., McAbee, K. L., Kassir, J. M., Scott, I. L., Hu, X., Vanderslice, P., Beck, P. J., and Dixon, R. A., Novel synthetic inhibitors of selectin-mediated cell adhesion: synthesis of 1,6-bis[3-(3-carboxymethylphenyl)-4-(2-alpha-D-mannopyranosyloxy)phenyl]hexane (TBC1269). *J Med Chem* (1998), **41**(7): 1099-1111.
76. Kogan, T. P., Dupre, B., Keller, K. M., Scott, I. L., Bui, H., Market, R. V., Beck, P. J., Voytus, J. A., Revelle, B. M., and Scott, D., Rational design and synthesis of small molecule, non-oligosaccharide selectin inhibitors: (alpha-D-mannopyranosyloxy)biphenyl-substituted carboxylic acids. *J Med Chem* (1995), **38**(26): 4976-4984.
77. Kumar, A., Villani, M. P., Patel, U. K., Keith, J. C., Jr., and Schaub, R. G., Recombinant soluble form of PSGL-1 accelerates thrombolysis and prevents reocclusion in a porcine model. *Circulation* (1999), **99**(10): 1363-1369.
78. Laemmli, U. K., Cleavage of structural proteins during the assembly of the head of bacteriophage T4. *Nature* (1970), **227**(5259): 680-685.
79. Lasky, L. A., Selectin-carbohydrate interactions and the initiation of the inflammatory response. *Annu Rev Biochem* (1995), **64**: 113-139.
80. Lasky, L. A., Singer, M. S., Dowbenko, D., Imai, Y., Henzel, W., Fennie, C., Watson, S., and Rosen, S. D., Glycosylation-dependent cell adhesion molecule 1: a novel mucin-like adhesion ligand for L-selectin. *Cold Spring Harb Symp Quant Biol* (1992), **57**: 259-269.
81. Lawrence, M. B. and Springer, T. A., Leukocytes roll on a selectin at physiologic flow rates: distinction from and prerequisite for adhesion through integrins. *Cell* (1991), **65**(5): 859-873.

82. Lefer, D. J., Pharmacology of selectin inhibitors in ischemia/reperfusion states. *Annu Rev Pharmacol Toxicol* (2000), **40**: 283-294.
83. Leppänen, A., White, S. P., Helin, J., McEver, R. P., and Cummings, R. D., Binding of glycosulfopeptides to P-selectin requires stereospecific contributions of individual tyrosine sulfate and sugar residues. *J Biol Chem* (2000), **275**(50): 39569-39578.
84. Leppänen, A., Yago, T., Otto, V. I., McEver, R. P., and Cummings, R. D., Model glycosulfopeptides from P-selectin glycoprotein ligand-1 require tyrosine sulfation and a core 2-branched O-glycan to bind to L-selectin. *J Biol Chem* (2003), **278**(29): 26391-26400.
85. Ley, K., Linnemann, G., Meinen, M., Stoolman, L. M., and Gaethgens, P., Fucoidin, but not yeast polyphosphomannan PPME, inhibits leukocyte rolling in venules of the rat mesentery. *Blood* (1993), **81**(1): 177-185.
86. Linhardt, R. J., Loganathan, D., al-Hakim, A., Wang, H. M., Walenga, J. M., Hoppensteadt, D., and Fareed, J., Oligosaccharide mapping of low molecular weight heparins: structure and activity differences. *J Med Chem* (1990), **33**(6): 1639-1645.
87. Linke, R. (1998) Immunpräzipitation. In *Bioanalytik* (Lottspeich, F. and Zorbas, H., Editors), 77-89. Spektrum Akademischer Verlag, Heidelberg/Berlin.
88. Liu, W., Ramachandran, V., Kang, J., Kishimoto, T. K., Cummings, R. D., and McEver, R. P., Identification of N-terminal residues on P-selectin glycoprotein ligand-1 required for binding to P-selectin. *J Biol Chem* (1998), **273**(12): 7078-7087.
89. Lorenz, H. M. and Kalden, J. R., Perspectives for TNF-alpha-targeting therapies. *Arthritis Res* (2002), **4 Suppl 3**: S17-24.
90. Lou, J., Yago, T., Klopocki, A. G., Metha, P., Chen, W., Zarnitsyna, V. I., Bovin, N. V., Zhu, C., and McEver, R. P., Flow-enhanced adhesion regulated by a selectin interdomain hinge. *J Cell Biol* (2006), **174**(7): 1107-1117.
91. Lowe, J. B., Glycosylation in the control of selectin counter-receptor structure and function. *Immunol Rev* (2002a), **186**: 19-36.
92. Lowe, J. B. and Varki, A. (2002b) Glycosyltransferases. In *Essentials of Glycobiology* (Varki, A., Cummings, R. D., Esko, J., Freeze, H. H., Hart, G., and Marth, J. D., Editors), 253-266. Cold Spring Harbor Laboratory Press, New York.
93. Luthje, J. and Ogilvie, A., Diadenosine triphosphate (Ap3A) mediates human platelet aggregation by liberation of ADP. *Biochem Biophys Res Commun* (1984), **118**(3): 704-709.
94. Maaheimo, H., Renkonen, R., Turunen, J. P., Penttilä, L., and Renkonen, O., Synthesis of a divalent sialyl Lewis x O-glycan, a potent inhibitor of lymphocyte-endothelium adhesion. Evidence that multivalency enhances the saccharide binding to L-selectin. *Eur J Biochem* (1995), **234**(2): 616-625.
95. Malhotra, R., Ward, M., Sim, R. B., and Bird, M. I., Identification of human complement Factor H as a ligand for L-selectin. *Biochem J* (1999), **341**(Pt 1): 61-69.

96. Maly, P., Thall, A., Petryniak, B., Rogers, C. E., Smith, P. L., Marks, R. M., Kelly, R. J., Gersten, K. M., Cheng, G., Saunders, T. L., Camper, S. A., Camphausen, R. T., Sullivan, F. X., Isogai, Y., Hindsgaul, O., von Andrian, U. H., and Lowe, J. B., The alpha(1,3)fucosyltransferase Fuc-TVII controls leukocyte trafficking through an essential role in L-, E-, and P-selectin ligand biosynthesis. *Cell* (1996), **86**(4): 643-653.
97. Marshall, B. T., Long, M., Piper, J. W., Yago, T., McEver, R. P., and Zhu, C., Direct observation of catch bonds involving cell-adhesion molecules. *Nature* (2003), **423**(6936): 190-193.
98. McEver, R. P., Misguided leukocyte adhesion. *J Clin Invest* (1993), **91**(6): 2340-2341.
99. McEver, R. P., Selectins. *Curr Opin Immunol* (1994), **6**(1): 75-84.
100. McNagny, K. M., Pettersson, I., Rossi, F., Flamme, I., Shevchenko, A., Mann, M., and Graf, T., Thrombomucin, a novel cell surface protein that defines thrombocytes and multipotent hematopoietic progenitors. *J Cell Biol* (1997), **138**(6): 1395-1407.
101. Merril, C. R., Goldman, D., and Van Keuren, M. L., Gel protein stains: silver stain. *Methods Enzymol* (1984), **104**: 441-447.
102. Migaki, G. I., Kahn, J., and Kishimoto, T. K., Mutational analysis of the membrane-proximal cleavage site of L-selectin: relaxed sequence specificity surrounding the cleavage site. *J Exp Med* (1995), **182**(2): 549-557.
103. Mocco, J., Choudhri, T., Huang, J., Harfeldt, E., Efros, L., Klingbeil, C., Vexler, V., Hall, W., Zhang, Y., Mack, W., Popilskis, S., Pinsky, D. J., and Connolly, E. S., Jr., HuEP5C7 as a humanized monoclonal anti-E/P-selectin neurovascular protective strategy in a blinded placebo-controlled trial of nonhuman primate stroke. *Circ Res* (2002), **91**(10): 907-914.
104. Moore, K. L., The biology and enzymology of protein tyrosine O-sulfation. *J Biol Chem* (2003), **278**(27): 24243-24246.
105. Moore, K. L., Patel, K. D., Bruehl, R. E., Li, F., Johnson, D. A., Lichenstein, H. S., Cummings, R. D., Bainton, D. F., and McEver, R. P., P-selectin glycoprotein ligand-1 mediates rolling of human neutrophils on P-selectin. *J Cell Biol* (1995), **128**(4): 661-671.
106. Moore, K. L., Stults, N. L., Diaz, S., Smith, D. F., Cummings, R. D., Varki, A., and McEver, R. P., Identification of a specific glycoprotein ligand for P-selectin (CD62) on myeloid cells. *J Cell Biol* (1992), **118**(2): 445-456.
107. Mullis, K., Faloona, F., Scharf, S., Saiki, R., Horn, G., and Erlich, H., Specific enzymatic amplification of DNA in vitro: the polymerase chain reaction. *Biotechnology* (1992), **24**: 17-27.
108. Neelamegham, S., Taylor, A. D., Shankaran, H., Smith, C. W., and Simon, S. I., Shear and time-dependent changes in Mac-1, LFA-1, and ICAM-3 binding regulate neutrophil homotypic adhesion. *J Immunol* (2000), **164**(7): 3798-3805.
109. Nelson, R. M., Cecconi, O., Roberts, W. G., Aruffo, A., Linhardt, R. J., and Bevilacqua, M. P., Heparin oligosaccharides bind L- and P-selectin and inhibit acute inflammation. *Blood* (1993), **82**(11): 3253-3258.

110. Nicholson, M. W., Barclay, A. N., Singer, M. S., Rosen, S. D., and van der Merwe, P. A., Affinity and kinetic analysis of L-selectin (CD62L) binding to glycosylation-dependent cell-adhesion molecule-1. *J Biol Chem* (1998), **273**(2): 763-770.
111. Norgard, K. E., Moore, K. L., Diaz, S., Stults, N. L., Ushiyama, S., McEver, R. P., Cummings, R. D., and Varki, A., Characterization of a specific ligand for P-selectin on myeloid cells. A minor glycoprotein with sialylated O-linked oligosaccharides. *J Biol Chem* (1993), **268**(17): 12764-12774.
112. Omata, M., Matsui, N., Inomata, N., and Ohno, T., Protective effects of polysaccharide fucoidin on myocardial ischemia-reperfusion injury in rats. *J Cardiovasc Pharmacol* (1997), **30**(6): 717-724.
113. Oostingh, G. J., Ludwig, R. J., Enders, S., Gruner, S., Harms, G., Boehncke, W. H., Nieswandt, B., Tauber, R., and Schön, M. P., Diminished lymphocyte adhesion and alleviation of allergic responses by small-molecule- or antibody-mediated inhibition of L-selectin functions. *J Invest Dermatol* (2007), **127**(1): 90-97.
114. Ouyang, Y. B. and Moore, K. L., Molecular cloning and expression of human and mouse tyrosylprotein sulfotransferase-2 and a tyrosylprotein sulfotransferase homologue in *Caenorhabditis elegans*. *J Biol Chem* (1998), **273**(38): 24770-24774.
115. Paavonen, T. and Renkonen, R., Selective expression of sialyl-Lewis x and Lewis a epitopes, putative ligands for L-selectin, on peripheral lymph-node high endothelial venules. *Am J Pathol* (1992), **141**(6): 1259-1264.
116. Patel, K. D., Moore, K. L., Nollert, M. U., and McEver, R. P., Neutrophils use both shared and distinct mechanisms to adhere to selectins under static and flow conditions. *J Clin Invest* (1995), **96**(4): 1887-1896.
117. Petruzzelli, L., Takami, M., and Humes, H. D., Structure and function of cell adhesion molecules. *Am J Med* (1999), **106**(4): 467-476.
118. Phan, U. T., Waldron, T. T., and Springer, T. A., Remodeling of the lectin-EGF-like domain interface in P- and L-selectin increases adhesiveness and shear resistance under hydrodynamic force. *Nat Immunol* (2006), **7**(8): 883-889.
119. Picker, L. J., Kishimoto, T. K., Smith, C. W., Warnock, R. A., and Butcher, E. C., ELAM-1 is an adhesion molecule for skin-homing T cells. *Nature* (1991a), **349**(6312): 796-799.
120. Picker, L. J., Warnock, R. A., Burns, A. R., Doerschuk, C. M., Berg, E. L., and Butcher, E. C., The neutrophil selectin LECAM-1 presents carbohydrate ligands to the vascular selectins ELAM-1 and GMP-140. *Cell* (1991b), **66**(5): 921-933.
121. Pigott, R., Needham, L. A., Edwards, R. M., Walker, C., and Power, C., Structural and functional studies of the endothelial activation antigen endothelial leucocyte adhesion molecule-1 using a panel of monoclonal antibodies. *J Immunol* (1991), **147**(1): 130-135.
122. Pochechueva, T. V., Galanina, O. E., Bird, M. I., Nifantiev, N. E., and Bovin, N. V., Assembly of P-selectin ligands on a polymeric template. *Chem Biol* (2002), **9**(6): 757-762.

123. Pochechueva, T. V., Ushakova, N. A., Preobrazhenskaya, M. E., Nifantiev, N. E., Tsvetkov, Y. E., Sablina, M. A., Tuzikov, A. B., Bird, M. I., Rieben, R., and Bovin, N. V., P-selectin blocking potency of multimeric tyrosine sulfates in vitro and in vivo. *Bioorg Med Chem Lett* (2003), **13**(10): 1709-1712.
124. Poppe, L., Brown, G. S., Philo, J. S., Nikrad, P. V., and Shah, B. H., Conformation of sLex Tetrasaccharide, Free in Solution and Bound to E-, P-, and L-Selectin. *J Am Chem Soc* (1997), **119**(7): 1727-1736.
125. Pouyani, T. and Seed, B., PSGL-1 recognition of P-selectin is controlled by a tyrosine sulfation consensus at the PSGL-1 amino terminus. *Cell* (1995), **83**(2): 333-343.
126. Puri, K. D., Finger, E. B., Gaudernack, G., and Springer, T. A., Sialomucin CD34 is the major L-selectin ligand in human tonsil high endothelial venules. *J Cell Biol* (1995), **131**(1): 261-270.
127. Ramachandran, V., Nollert, M. U., Qiu, H., Liu, W. J., Cummings, R. D., Zhu, C., and McEver, R. P., Tyrosine replacement in P-selectin glycoprotein ligand-1 affects distinct kinetic and mechanical properties of bonds with P- and L-selectin. *Proc Natl Acad Sci U S A* (1999), **96**(24): 13771-13776.
128. Renkonen, O., Toppila, S., Penttila, L., Salminen, H., Helin, J., Maaheimo, H., Costello, C. E., Turunen, J. P., and Renkonen, R., Synthesis of a new nanomolar saccharide inhibitor of lymphocyte adhesion: different poly lactosamine backbones present multiple sialyl Lewis x determinants to L-selectin in high-affinity mode. *Glycobiology* (1997), **7**(4): 453-461.
129. Ripoll, C., Martin, F., Manuel Rovira, J., Pintor, J., Miras-Portugal, M. T., and Soria, B., Diadenosine polyphosphates. A novel class of glucose-induced intracellular messengers in the pancreatic beta-cell. *Diabetes* (1996), **45**(10): 1431-1434.
130. Ritter, L. S., Copeland, J. G., and McDonagh, P. F., Fucoidin reduces coronary microvascular leukocyte accumulation early in reperfusion. *Ann Thorac Surg* (1998), **66**(6): 2063-2071; discussion 2072.
131. Romano, S. J., Selectin antagonists: therapeutic potential in asthma and COPD. *Treat Respir Med* (2005), **4**(2): 85-94.
132. Romano, S. J. and Slee, D. H., Targeting selectins for the treatment of respiratory diseases. *Curr Opin Investig Drugs* (2001), **2**(7): 907-913.
133. Rosen, S. D., Ligands for L-selectin: homing, inflammation, and beyond. *Annu Rev Immunol* (2004), **22**: 129-156.
134. Sako, D., Chang, X. J., Barone, K. M., Vachino, G., White, H. M., Shaw, G., Veldman, G. M., Bean, K. M., Ahern, T. J., Furie, B., and et al., Expression cloning of a functional glycoprotein ligand for P-selectin. *Cell* (1993), **75**(6): 1179-1186.
135. Sako, D., Comess, K. M., Barone, K. M., Camphausen, R. T., Cumming, D. A., and Shaw, G. D., A sulfated peptide segment at the amino terminus of PSGL-1 is critical for P-selectin binding. *Cell* (1995), **83**(2): 323-331.
136. Sambrook, J. and Russel, D. W. (2001) Quantification of Nucleic Acids. In *Molecular Cloning. A Laboratory Manual. 3rd Edition*, A8.19-A18.24. Cold Spring Harbor Laboratory Press, New York.

137. Sammons, D. W., Adams, L. D., and Nishizawa, E. E., Ultrasensitive silver-based color staining of polypeptides in polyacrylamide gels. *Electrophoresis* (1981), **2**: 135-141.
138. Sanger, F., Nicklen, S., and Coulson, A. R., DNA sequencing with chain-terminating inhibitors. *Proc Natl Acad Sci U S A* (1977), **74**(12): 5463-5467.
139. Sarangapani, K. K., Yago, T., Klopocki, A. G., Lawrence, M. B., Fieger, C. B., Rosen, S. D., McEver, R. P., and Zhu, C., Low force decelerates L-selectin dissociation from P-selectin glycoprotein ligand-1 and endoglycan. *J Biol Chem* (2004), **279**(3): 2291-2298.
140. Sasseti, C., Tangemann, K., Singer, M. S., Kershaw, D. B., and Rosen, S. D., Identification of podocalyxin-like protein as a high endothelial venule ligand for L-selectin: parallels to CD34. *J Exp Med* (1998), **187**(12): 1965-1975.
141. Sasseti, C., Van Zante, A., and Rosen, S. D., Identification of endoglycan, a member of the CD34/podocalyxin family of sialomucins. *J Biol Chem* (2000), **275**(12): 9001-9010.
142. Schön, M. P., Krahn, T., Schön, M., Rodriguez, M. L., Antonicek, H., Schultz, J. E., Ludwig, R. J., Zollner, T. M., Bischoff, E., Bremm, K. D., Schramm, M., Henninger, K., Kaufmann, R., Gollnick, H. P., Parker, C. M., and Boehncke, W. H., Efomycine M, a new specific inhibitor of selectin, impairs leukocyte adhesion and alleviates cutaneous inflammation. *Nat Med* (2002), **8**(4): 366-372.
143. Seekamp, A., van Griensven, M., Dhondt, E., Diefenbeck, M., Demeyer, I., Vundelinckx, G., Haas, N., Schaechinger, U., Wolowicka, L., Rammelt, S., Stroobants, J., Marzi, I., Brambrink, A. M., Dziurdzik, P., Gasiorowski, J., Redl, H., Beckert, M., and Khan-Boluki, J., The effect of anti-L-selectin (aselizumab) in multiple traumatized patients--results of a phase II clinical trial. *Crit Care Med* (2004), **32**(10): 2021-2028.
144. Seko, A., Dohmae, N., Takio, K., and Yamashita, K., Beta 1,4-galactosyltransferase (beta 4GalT)-IV is specific for GlcNAc 6-O-sulfate. Beta 4GalT-IV acts on keratan sulfate-related glycans and a precursor glycan of 6-sulfosialyl-Lewis X. *J Biol Chem* (2003), **278**(11): 9150-9158.
145. Seppo, A., Turunen, J. P., Penttila, L., Keane, A., Renkonen, O., and Renkonen, R., Synthesis of a tetravalent sialyl Lewis x glycan, a high-affinity inhibitor of L-selectin-mediated lymphocyte binding to endothelium. *Glycobiology* (1996), **6**(1): 65-71.
146. Siegelman, M. H. and Weissman, I. L., Human homologue of mouse lymph node homing receptor: evolutionary conservation at tandem cell interaction domains. *Proc Natl Acad Sci U S A* (1989), **86**(14): 5562-5566.
147. Simmons, D., Makgoba, M. W., and Seed, B., ICAM, an adhesion ligand of LFA-1, is homologous to the neural cell adhesion molecule NCAM. *Nature* (1988), **331**(6157): 624-627.
148. Simon, S. I., Chambers, J. D., Butcher, E., and Sklar, L. A., Neutrophil aggregation is beta 2-integrin- and L-selectin-dependent in blood and isolated cells. *J Immunol* (1992), **149**(8): 2765-2771.
149. Simon, S. I., Rochon, Y. P., Lynam, E. B., Smith, C. W., Anderson, D. C., and Sklar, L. A., Beta 2-integrin and L-selectin are obligatory receptors in neutrophil aggregation. *Blood* (1993), **82**(4): 1097-1106.

150. Singer, M. S. and Rosen, S. D., Purification and quantification of L-selectin-reactive GlyCAM-1 from mouse serum. *J Immunol Methods* (1996), **196**(2): 153-161.
151. Smalley, D. M. and Ley, K., L-selectin: mechanisms and physiological significance of ectodomain cleavage. *J Cell Mol Med* (2005), **9**(2): 255-266.
152. Somers, W. S., Tang, J., Shaw, G. D., and Camphausen, R. T., Insights into the molecular basis of leukocyte tethering and rolling revealed by structures of P- and E-selectin bound to SLe(X) and PSGL-1. *Cell* (2000), **103**(3): 467-479.
153. Sperandio, M., Thatte, A., Foy, D., Ellies, L. G., Marth, J. D., and Ley, K., Severe impairment of leukocyte rolling in venules of core 2 glucosaminyltransferase-deficient mice. *Blood* (2001), **97**(12): 3812-3819.
154. Spertini, O., Kansas, G. S., Munro, J. M., Griffin, J. D., and Tedder, T. F., Regulation of leukocyte migration by activation of the leukocyte adhesion molecule-1 (LAM-1) selectin. *Nature* (1991a), **349**(6311): 691-694.
155. Spertini, O., Kansas, G. S., Reimann, K. A., Mackay, C. R., and Tedder, T. F., Function and evolutionary conservation of distinct epitopes on the leukocyte adhesion molecule-1 (TQ-1, Leu-8) that regulate leukocyte migration. *J Immunol* (1991b), **147**(3): 942-949.
156. Spertini, O., Schleiffenbaum, B., White-Owen, C., Ruiz, P., Jr., and Tedder, T. F., ELISA for quantitation of L-selectin shed from leukocytes in vivo. *J Immunol Methods* (1992), **156**(1): 115-123.
157. Springer, T. A., Traffic signals for lymphocyte recirculation and leukocyte emigration: the multistep paradigm. *Cell* (1994), **76**(2): 301-314.
158. Stahn, R., Schafer, H., Kernchen, F., and Schreiber, J., Multivalent sialyl Lewis x ligands of definite structures as inhibitors of E-selectin mediated cell adhesion. *Glycobiology* (1998), **8**(4): 311-319.
159. Staunton, D. E., Dustin, M. L., and Springer, T. A., Functional cloning of ICAM-2, a cell adhesion ligand for LFA-1 homologous to ICAM-1. *Nature* (1989), **339**(6219): 61-64.
160. Stibenz, D., Grafe, M., Debus, N., Hasbach, M., Bahr, I., Graf, K., Fleck, E., Thanabalasingam, U., and Buhner, C., Binding of human serum amyloid P component to L-selectin. *Eur J Immunol* (2006), **36**(2): 446-456.
161. Stoddart, J. H., Jr., Jasuja, R. R., Sikorski, M. A., von Andrian, U. H., and Mier, J. W., Protease-resistant L-selectin mutants. Down-modulation by cross-linking but not cellular activation. *J Immunol* (1996), **157**(12): 5653-5659.
162. Stoolman, L. M., Tenforde, T. S., and Rosen, S. D., Phosphomannosyl receptors may participate in the adhesive interaction between lymphocytes and high endothelial venules. *J Cell Biol* (1984), **99**(4 Pt 1): 1535-1540.
163. Stoolman, L. M., Yednock, T. A., and Rosen, S. D., Homing receptors on human and rodent lymphocytes--evidence for a conserved carbohydrate-binding specificity. *Blood* (1987), **70**(6): 1842-1850.
164. Streeter, P. R., Rouse, B. T., and Butcher, E. C., Immunohistologic and functional characterization of a vascular addressin involved in lymphocyte homing into peripheral lymph nodes. *J Cell Biol* (1988), **107**(5): 1853-1862.

165. Tedder, T. F., Steeber, D. A., Chen, A., and Engel, P., The selectins: vascular adhesion molecules. *Faseb J* (1995), **9**(10): 866-873.
166. Toppila, S., Lauronen, J., Mattila, P., Turunen, J. P., Penttila, L., Paavonen, T., Renkonen, O., and Renkonen, R., L-selectin ligands in rat high endothelium: multivalent sialyl Lewis x glycans are high-affinity inhibitors of lymphocyte adhesion. *Eur J Immunol* (1997), **27**(6): 1360-1365.
167. Tsuboi, N., Ishikawa, M., Tamura, Y., Takayama, S., Tobioka, H., Matsuura, A., Hirayoshi, K., Nagata, K., Sato, N., and Kikuchi, K., Monoclonal antibody specifically reacting against 73-kilodalton heat shock cognate protein: possible expression on mammalian cell surface. *Hybridoma* (1994), **13**(5): 373-381.
168. Tu, L., Chen, A., Delahunty, M. D., Moore, K. L., Watson, S. R., McEver, R. P., and Tedder, T. F., L-selectin binds to P-selectin glycoprotein ligand-1 on leukocytes: interactions between the lectin, epidermal growth factor, and consensus repeat domains of the selectins determine ligand binding specificity. *J Immunol* (1996), **157**(9): 3995-4004.
169. Türk, H., Haag, R., and Alban, S., Dendritic polyglycerol sulfates as new heparin analogues and potent inhibitors of the complement system. *Bioconj Chem* (2004), **15**(1): 162-167.
170. Turunen, J. P., Majuri, M. L., Seppo, A., Tiisala, S., Paavonen, T., Miyasaka, M., Lemstrom, K., Penttila, L., Renkonen, O., and Renkonen, R., De novo expression of endothelial sialyl Lewis(a) and sialyl Lewis(x) during cardiac transplant rejection: superior capacity of a tetravalent sialyl Lewis(x) oligosaccharide in inhibiting L-selectin-dependent lymphocyte adhesion. *J Exp Med* (1995), **182**(4): 1133-1141.
171. Uchimura, K., Gauguet, J. M., Singer, M. S., Tsay, D., Kannagi, R., Muramatsu, T., von Andrian, U. H., and Rosen, S. D., A major class of L-selectin ligands is eliminated in mice deficient in two sulfotransferases expressed in high endothelial venules. *Nat Immunol* (2005), **6**(11): 1105-1113.
172. Ulbrich, H., Eriksson, E. E., and Lindbom, L., Leukocyte and endothelial cell adhesion molecules as targets for therapeutic interventions in inflammatory disease. *Trends Pharmacol Sci* (2003), **24**(12): 640-647.
173. Ushakova, N. A., Preobrazhenskaya, M. E., Bird, M. I., Priest, R., Semenov, A. V., Mazurov, A. V., Nifantiev, N. E., Pochechueva, T. V., Galanina, O. E., and Bovin, N. V., Monomeric and multimeric blockers of selectins: comparison of in vitro and in vivo activity. *Biochemistry (Mosc)* (2005), **70**(4): 432-439.
174. Varki, A., Selectin ligands. *Proc Natl Acad Sci U S A* (1994), **91**(16): 7390-7397.
175. Vartanian, A., Prudovsky, I., Suzuki, H., Dal Pra, I., and Kisselev, L., Opposite effects of cell differentiation and apoptosis on Ap3A/Ap4A ratio in human cell cultures. *FEBS Lett* (1997), **415**(2): 160-162.
176. Verspohl, E. J., Johannwille, B., Kaiserling-Buddemeier, I., Schluter, H., and Hagemann, J., Diadenosine polyphosphates in cultured vascular smooth-muscle cells and endothelium cells--their interaction with specific receptors and their degradation. *J Pharm Pharmacol* (1999), **51**(10): 1175-1181.
177. Vollmayer, P., Clair, T., Goding, J. W., Sano, K., Servos, J., and Zimmermann, H., Hydrolysis of diadenosine polyphosphates by nucleotide pyrophosphatases/phosphodiesterases. *Eur J Biochem* (2003), **270**(14): 2971-2978.

178. von Andrian, U. H., Chambers, J. D., Berg, E. L., Michie, S. A., Brown, D. A., Karolak, D., Ramezani, L., Berger, E. M., Arfors, K. E., and Butcher, E. C., L-selectin mediates neutrophil rolling in inflamed venules through sialyl LewisX-dependent and -independent recognition pathways. *Blood* (1993), **82**(1): 182-191.
179. von Bonin, A., Buchmann, B., Bader, B., Rausch, A., Venstrom, K., Schafer, M., Grundemann, S., Gunther, J., Zorn, L., Nubbemeyer, R., Asadullah, K., and Zollner, T. M., Efomycine M: an inhibitor of selectins? *Nat Med* (2006), **12**(8): 873; author reply 873-874.
180. Walcheck, B., Moore, K. L., McEver, R. P., and Kishimoto, T. K., Neutrophil-neutrophil interactions under hydrodynamic shear stress involve L-selectin and PSGL-1. A mechanism that amplifies initial leukocyte accumulation of P-selectin in vitro. *J Clin Invest* (1996), **98**(5): 1081-1087.
181. Wang, L., Fuster, M., Sriramarao, P., and Esko, J. D., Endothelial heparan sulfate deficiency impairs L-selectin- and chemokine-mediated neutrophil trafficking during inflammatory responses. *Nat Immunol* (2005), **6**(9): 902-910.
182. Weitz-Schmidt, G., Stokmaier, D., Scheel, G., Nifant'ev, N. E., Tuzikov, A. B., and Bovin, N. V., An E-selectin binding assay based on a polyacrylamide-type glycoconjugate. *Anal Biochem* (1996), **238**(2): 184-190.
183. Weninger, W., Ulfman, L. H., Cheng, G., Souchkova, N., Quackenbush, E. J., Lowe, J. B., and von Andrian, U. H., Specialized contributions by alpha(1,3)-fucosyltransferase-IV and FucT-VII during leukocyte rolling in dermal microvessels. *Immunity* (2000), **12**(6): 665-676.
184. Wienrich, B. G., Krahn, T., Schön, M., Rodriguez, M. L., Kramer, B., Busemann, M., Boehncke, W. H., and Schön, M. P., Structure-function relation of efomycines, a family of small-molecule inhibitors of selectin functions. *J Invest Dermatol* (2006a), **126**(4): 882-889.
185. Wienrich, B. G., Oostingh, G. J., Ludwig, R. J., Enders, S., Harms, G., Tauber, R., Krahn, T., Kramer, B., Boehncke, W. H., and Schön, M. P., Schön *et al.* reply to "Efomycine M: an inhibitor of selectins?" *Nat Med* (2006b), **12**(8): 873-874.
186. Witko-Sarsat, V., Rieu, P., Descamps-Latscha, B., Lesavre, P., and Halbwachs-Mecarelli, L., Neutrophils: molecules, functions and pathophysiological aspects. *Lab Invest* (2000), **80**(5): 617-653.
187. Woods, A. and Couchman, J. R., Syndecans: synergistic activators of cell adhesion. *Trends Cell Biol* (1998), **8**(5): 189-192.
188. Wubbolts, R., Leckie, R. S., Veenhuizen, P. T., Schwarzmann, G., Mobius, W., Hoernschemeyer, J., Slot, J. W., Geuze, H. J., and Stoorvogel, W., Proteomic and biochemical analyses of human B cell-derived exosomes. Potential implications for their function and multivesicular body formation. *J Biol Chem* (2003), **278**(13): 10963-10972.
189. Xia, J., Alderfer, J. L., Srikrishnan, T., Chandrasekaran, E. V., and Matta, K. L., A convergent synthesis of core 2 branched sialylated and sulfated oligosaccharides. *Bioorg Med Chem* (2002), **10**(11): 3673-3684.
190. Yago, T., Wu, J., Wey, C. D., Klopocki, A. G., Zhu, C., and McEver, R. P., Catch bonds govern adhesion through L-selectin at threshold shear. *J Cell Biol* (2004), **166**(6): 913-923.

191. Yamamoto, S., Higuchi, Y., Yoshiyama, K., Shimizu, E., Kataoka, M., Hijiya, N., and Matsuura, K., ADAM family proteins in the immune system. *Immunol Today* (1999), **20**(6): 278-284.
192. Yednock, T. A., Stoolman, L. M., and Rosen, S. D., Phosphomannosyl-derivatized beads detect a receptor involved in lymphocyte homing. *J Cell Biol* (1987), **104**(3): 713-723.
193. Zakrzewicz, A., Grafe, M., Terbeek, D., Bongrazio, M., Auch-Schwelk, W., Walzog, B., Graf, K., Fleck, E., Ley, K., and Gaehtgens, P., L-selectin-dependent leukocyte adhesion to microvascular but not to macrovascular endothelial cells of the human coronary system. *Blood* (1997), **89**(9): 3228-3235.
194. Zamecnik, P. C., Stephenson, M. L., Janeway, C. M., and Randerath, K., Enzymatic synthesis of diadenosine tetraphosphate and diadenosine triphosphate with purified lysyl-sRNA synthetase. *Biochem Biophys Res Commun* (1966), **24**(1): 91-97.
195. Zhao, L., Shey, M., Farnsworth, M., and Dailey, M. O., Regulation of membrane metalloproteolytic cleavage of L-selectin (CD62L) by the epidermal growth factor domain. *J Biol Chem* (2001), **276**(33): 30631-30640.
197. Zhu, C., Lou, J., and McEver, R. P., Catch bonds: physical models, structural bases, biological function and rheological relevance. *Biorheology* (2005), **42**(6): 443-462.
198. Zimmermann, H. (2001) Ecto-Nucleotidases. In *Handbook of Experimental Pharmacology. Purinergic and Pyrimidergic Signalling* (Abbracchio, M. P. and Williams, M., Editors), 209-250. Springer Verlag, Heidelberg.
199. Zöllner, O., Lenter, M. C., Blanks, J. E., Borges, E., Steegmaier, M., Zerwes, H. G., and Vestweber, D., L-selectin from human, but not from mouse neutrophils binds directly to E-selectin. *J Cell Biol* (1997), **136**(3): 707-716.