

BIBLIOGRAPHY

- [1] H. Lodish, A. Berk, S. L. Zipursky, P. Matsudaira, D. Baltimore, and J. Darnell, *Overview of Extracellular Signaling*. W. H. Freeman and Company, 2000.
- [2] G. J. Weiner, “Building better monoclonal antibody-based therapeutics,” *Nat. Rev. Cancer*, vol. 15, pp. 361–370, June 2015.
- [3] M. R. Arkin and J. A. Wells, “Small-molecule inhibitors of protein-protein interactions: progressing towards the dream,” *Nat. Rev. Drug Discov.*, vol. 3, pp. 301–317, Apr. 2004.
- [4] M. Rask-Andersen, M. S. Almén, and H. B. Schiöth, “Trends in the exploitation of novel drug targets,” *Nat. Rev. Drug Discov.*, vol. 10, pp. 579–590, 1 Aug. 2011.
- [5] B. K. Brandley and R. L. Schnaar, “Cell-surface carbohydrates in cell recognition and response,” *J. Leukoc. Biol.*, vol. 40, pp. 97–111, July 1986.
- [6] J. Liu and B. Rost, “Comparing function and structure between entire proteomes,” *Protein Sci.*, vol. 10, pp. 1970–1979, Oct. 2001.
- [7] M. Diehn, R. Bhattacharya, D. Botstein, and P. O. Brown, “Genome-scale identification of membrane-associated human mRNAs,” *PLoS Genet.*, vol. 2, p. e11, Jan. 2006.
- [8] B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, and P. Walter, *General Principles of Cell Communication*. Garland Science, 2002.
- [9] B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, and P. Walter, *Ion Channels and the Electrical Properties of Membranes*. Garland Science, 2002.
- [10] W. A. Catterall, “Structure and function of Voltage-Gated ion channels,” *Annu. Rev. Biochem.*, vol. 64, pp. 493–531, 1 June 1995.
- [11] J.-L. Galzi and J.-P. Changeux, “Neurotransmitter-gated ion channels as unconventional allosteric proteins,” *Curr. Opin. Struct. Biol.*, vol. 4, pp. 554–565, 1 Jan. 1994.
- [12] J. Bockaert and J. P. Pin, “Molecular tinkering of G protein-coupled receptors: an evolutionary success,” *EMBO J.*, vol. 18, pp. 1723–1729, 1 Apr. 1999.

- [13] A. D. Howard, G. McAllister, S. D. Feighner, Q. Liu, R. P. Nargund, L. H. Van der Ploeg, and A. A. Patchett, “Orphan G-protein-coupled receptors and natural ligand discovery,” *Trends Pharmacol. Sci.*, vol. 22, pp. 132–140, Mar. 2001.
- [14] D. K. Vassilatis, J. G. Hohmann, H. Zeng, F. Li, J. E. Ranchalis, M. T. Mortrud, A. Brown, S. S. Rodriguez, J. R. Weller, A. C. Wright, J. E. Bergmann, and G. A. Gaitanaris, “The G protein-coupled receptor repertoires of human and mouse,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 100, pp. 4903–4908, 15 Apr. 2003.
- [15] R. Fredriksson and H. B. Schiöth, “The repertoire of g-protein-coupled receptors in fully sequenced genomes,” *Mol. Pharmacol.*, vol. 67, pp. 1414–1425, May 2005.
- [16] W. M. Oldham and H. E. Hamm, “Heterotrimeric G protein activation by g-protein-coupled receptors,” *Nat. Rev. Mol. Cell Biol.*, vol. 9, pp. 60–71, Jan. 2008.
- [17] X.-L. Tang, Y. Wang, D.-L. Li, J. Luo, and M.-Y. Liu, “Orphan G protein-coupled receptors (GPCRs): biological functions and potential drug targets,” *Acta Pharmacol. Sin.*, vol. 33, pp. 363–371, Mar. 2012.
- [18] B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, and P. Walter, *Signaling through Enzyme-Linked Cell-Surface Receptors*. Garland Science, 2002.
- [19] A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds., *Essentials of glycobiology*. Cold Spring Harbor Laboratory Press, 2009.
- [20] H. Ghazarian, B. Idoni, and S. B. Oppenheimer, “A glycobiology review: carbohydrates, lectins and implications in cancer therapeutics,” *Acta Histochem.*, vol. 113, pp. 236–247, May 2011.
- [21] R. D. Cummings and J. D. Esko, “Principles of glycan recognition,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [22] U. S. von Euler, “On the specific vaso-dilating and plain muscle stimulating substances from accessory genital glands in man and certain animals (prostaglandin and vesiglandin),” *J. Physiol.*, vol. 88, pp. 213–234, 6 Nov. 1936.
- [23] W. Feldberg, H. F. Holden, and C. H. Kellaway, “The formation of lysocithin and of a muscle-stimulating substance by snake venoms,” *J. Physiol.*, vol. 94, pp. 232–248, 14 Nov. 1938.
- [24] M. J. Berridge and R. F. Irvine, “Inositol trisphosphate, a novel second messenger in cellular signal transduction,” *Nature*, vol. 312, no. 5992, pp. 315–321, 1984.

- [25] Y. A. Hannun and L. M. Obeid, “Principles of bioactive lipid signalling: lessons from sphingolipids,” *Nat. Rev. Mol. Cell Biol.*, vol. 9, pp. 139–150, Feb. 2008.
- [26] S.-i. Hakomori, “Cell adhesion/recognition and signal transduction through glycosphingolipid microdomain,” *Glycoconj. J.*, vol. 17, pp. 143–151, Mar. 2000.
- [27] K. Iwabuchi, S. Yamamura, A. Prinetti, K. Handa, and S.-i. Hakomori, “GM3-enriched microdomain involved in cell adhesion and signal transduction through carbohydrate-carbohydrate interaction in mouse melanoma B16 cells,” *J. Biol. Chem.*, vol. 273, pp. 9130–9138, 10 Apr. 1998.
- [28] R. L. Schnaar, “Glycolipid-mediated cell-cell recognition in inflammation and nerve regeneration,” *Arch. Biochem. Biophys.*, vol. 426, pp. 163–172, 15 June 2004.
- [29] V. Cabiaux, C. Wolff, and J. M. Ruysschaert, “Interaction with a lipid membrane: a key step in bacterial toxins virulence,” *Int. J. Biol. Macromol.*, vol. 21, pp. 285–298, Dec. 1997.
- [30] C. Rodighiero, Y. Fujinaga, T. R. Hirst, and W. I. Lencer, “A cholera toxin b-subunit variant that binds ganglioside G(M1) but fails to induce toxicity,” *J. Biol. Chem.*, vol. 276, pp. 36939–36945, 5 Oct. 2001.
- [31] K. Bock, M. E. Breimer, A. Brignole, G. C. Hansson, K.-A. Karlsson, G. Larson, H. Leffler, B. E. Samuelsson, N. Strömberg, C. S. Edén, and J. Thurin, “Specificity of binding of a strain of uropathogenic escherichia coli to gal alpha 1-4gal-containing glycosphingolipids,” *J. Biol. Chem.*, vol. 260, pp. 8545–8551, 15 July 1985.
- [32] M. D. Resh, “Covalent lipid modifications of proteins,” *Curr. Biol.*, vol. 23, pp. R431–R435, 20 May 2013.
- [33] K. Simons and D. Toomre, “Lipid rafts and signal transduction,” *Nat. Rev. Mol. Cell Biol.*, vol. 1, pp. 31–39, Oct. 2000.
- [34] G. J. Wright, S. Martin, K. M. Bushell, and C. Söllner, “High-throughput identification of transient extracellular protein interactions,” *Biochem. Soc. Trans.*, vol. 38, pp. 919–922, Aug. 2010.
- [35] T. Glatter, A. Wepf, R. Aebersold, and M. Gstaiger, “An integrated workflow for charting the human interaction proteome: insights into the PP2A system,” *Mol. Syst. Biol.*, vol. 5, p. 237, 20 Jan. 2009.
- [36] Y. V. Miteva, H. G. Budayeva, and I. M. Cristea, “Proteomics-based methods for discovery, quantification, and validation of protein-protein interactions,” *Anal. Chem.*, vol. 85, pp. 749–768, 15 Jan. 2013.
- [37] N. C. Hubner, A. W. Bird, J. Cox, B. Splettstoesser, P. Bandilla, I. Poser, A. Hyman, and M. Mann, “Quantitative proteomics combined with BAC TransgeneOomics reveals in vivo protein interactions,” *J. Cell Biol.*, vol. 189, pp. 739–754, 17 May 2010.

- [38] T. Rolland, M. Taşan, B. Charlotteaux, S. J. Pevzner, Q. Zhong, N. Sahni, S. Yi, I. Lemmens, C. Fontanillo, R. Mosca, A. Kamburov, S. D. Ghiassian, X. Yang, L. Ghamsari, D. Balcha, B. E. Begg, P. Braun, M. Brehme, M. P. Broly, A.-R. Carvunis, D. Convery-Zupan, R. Corominas, J. Coulombe-Huntington, E. Dann, M. Dreze, A. Dricot, C. Fan, E. Franzosa, F. Gebreab, B. J. Gutierrez, M. F. Hardy, M. Jin, S. Kang, R. Kiros, G. N. Lin, K. Luck, A. MacWilliams, J. Menche, R. R. Murray, A. Palagi, M. M. Poulin, X. Rambout, J. Rasla, P. Reichert, V. Romero, E. Ruyssinck, J. M. Sahalie, A. Scholz, A. A. Shah, A. Sharma, Y. Shen, K. Spirohn, S. Tam, A. O. Tejeda, S. A. Trigg, J.-C. Twizere, K. Vega, J. Walsh, M. E. Cusick, Y. Xia, A.-L. Barabási, L. M. Iakoucheva, P. Aloy, J. De Las Rivas, J. Tavernier, M. A. Calderwood, D. E. Hill, T. Hao, F. P. Roth, and M. Vidal, “A proteome-scale map of the human interactome network,” *Cell*, vol. 159, pp. 1212–1226, 20 Nov. 2014.
- [39] N. Ramachandran, J. V. Raphael, E. Hainsworth, G. Demirkan, M. G. Fuentes, A. Rolfs, Y. Hu, and J. LaBaer, “Next-generation high-density self-assembling functional protein arrays,” *Nat. Methods*, vol. 5, pp. 535–538, June 2008.
- [40] M. Meier, R. Sit, W. Pan, and S. R. Quake, “High-performance binary protein interaction screening in a microfluidic format,” *Anal. Chem.*, vol. 84, pp. 9572–9578, 6 Nov. 2012.
- [41] P. A. van der Merwe and A. N. Barclay, “Transient intercellular adhesion: the importance of weak protein-protein interactions,” *Trends Biochem. Sci.*, vol. 19, pp. 354–358, Sept. 1994.
- [42] G. J. Wright, “Signal initiation in biological systems: the properties and detection of transient extracellular protein interactions,” *Mol. Biosyst.*, vol. 5, pp. 1405–1412, Dec. 2009.
- [43] O. Oyelaran and J. C. Gildersleeve, “Glycan arrays: recent advances and future challenges,” *Curr. Opin. Chem. Biol.*, vol. 13, pp. 406–413, Oct. 2009.
- [44] A. Varki and N. Sharon, “Historical background and overview,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [45] H. H. Freeze and H. Schachter, “Genetic disorders of glycosylation,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [46] J. D. Esko and P. Stanley, “Glycosylation mutants of cultured cells,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.

- [47] E. W. Raines and R. Ross, "Platelet-derived growth factor. i. high yield purification and evidence for multiple forms," *J. Biol. Chem.*, vol. 257, pp. 5154–5160, 10 May 1982.
- [48] D. F. Bowen-Pope and R. Ross, "Platelet-derived growth factor. II. specific binding to cultured cells," *J. Biol. Chem.*, vol. 257, pp. 5161–5171, 10 May 1982.
- [49] S. Cohen, R. A. Fava, and S. T. Sawyer, "Purification and characterization of epidermal growth factor receptor/protein kinase from normal mouse liver," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 79, pp. 6237–6241, Oct. 1982.
- [50] S. Jacobs, E. Hazum, Y. Shechter, and P. Cuatrecasas, "Insulin receptor: covalent labeling and identification of subunits," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 76, pp. 4918–4921, Oct. 1979.
- [51] H. Simonsen and H. F. Lodish, "Cloning by function: expression cloning in mammalian cells," *Trends Pharmacol. Sci.*, vol. 15, pp. 437–441, 1 Dec. 1994.
- [52] A. Aruffo and B. Seed, "Molecular cloning of a CD28 cDNA by a high-efficiency COS cell expression system," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 84, pp. 8573–8577, Dec. 1987.
- [53] B. Seed and A. Aruffo, "Molecular cloning of the CD2 antigen, the t-cell erythrocyte receptor, by a rapid immunoselection procedure," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 84, pp. 3365–3369, May 1987.
- [54] P. S. Linsley, E. A. Clark, and J. A. Ledbetter, "T-cell antigen CD28 mediates adhesion with B cells by interacting with activation antigen B7/BB-1," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 87, pp. 5031–5035, July 1990.
- [55] K. Kato, M. Koyanagi, H. Okada, T. Takanashi, Y. W. Wong, A. F. Williams, K. Okumura, and H. Yagita, "CD48 is a counter-receptor for mouse CD2 and is involved in T cell activation," *J. Exp. Med.*, vol. 176, pp. 1241–1249, 1 Nov. 1992.
- [56] A. G. Dalgleish, P. C. Beverley, P. R. Clapham, D. H. Crawford, M. F. Greaves, and R. A. Weiss, "The CD4 (T4) antigen is an essential component of the receptor for the AIDS retrovirus," *Nature*, vol. 312, no. 5996, pp. 763–767, 1984.
- [57] D. Klatzmann, E. Champagne, S. Chamaret, J. Gruest, D. Guetard, T. Hercend, J.-C. Gluckman, and L. Montagnier, "T-lymphocyte T4 molecule behaves as the receptor for human retrovirus LAV," *Nature*, vol. 312, no. 5996, pp. 767–768, 1984.
- [58] R. J. Colonna, P. L. Callahan, and W. J. Long, "Isolation of a monoclonal antibody that blocks attachment of the major group of human rhinoviruses," *J. Virol.*, vol. 57, pp. 7–12, Jan. 1986.

- [59] J. M. Greve, G. Davis, A. M. Meyer, C. P. Forte, S. C. Yost, C. W. Marlor, M. E. Kamarck, and A. McClelland, “The major human rhinovirus receptor is ICAM-1,” *Cell*, vol. 56, pp. 839–847, 10 Mar. 1989.
- [60] M. L. Plunkett, M. E. Sanders, P. Selvaraj, M. L. Dustin, and T. A. Springer, “Rosetting of activated human T lymphocytes with autologous erythrocytes. definition of the receptor and ligand molecules as CD2 and lymphocyte function-associated antigen 3 (LFA-3),” *J. Exp. Med.*, vol. 165, pp. 664–676, 1 Mar. 1987.
- [61] R. G. Fehon, P. J. Kooh, I. Rebay, C. L. Regan, T. Xu, M. A. Muskavitch, and S. Artavanis-Tsakonas, “Molecular interactions between the protein products of the neurogenic loci notch and delta, two EGF-homologous genes in drosophila,” *Cell*, vol. 61, pp. 523–534, 4 May 1990.
- [62] M. Guttinger, F. Sutti, M. Panigada, S. Porcellini, B. Merati, M. Mariani, T. Teesalu, G. Consalez, and F. Grassi, “Epithelial v-like antigen (EVA), a novel member of the immunoglobulin superfamily, expressed in embryonic epithelia with a potential role as homotypic adhesion molecule in thymus histogenesis,” *J. Cell Biol.*, vol. 141, pp. 1061–1071, 18 May 1998.
- [63] S. S. Chan, H. Zheng, M. W. Su, R. Wilk, M. T. Killeen, E. M. Hedgecock, and J. G. Culotti, “UNC-40, a *C. elegans* homolog of DCC (deleted in colorectal cancer), is required in motile cells responding to UNC-6 netrin cues,” *Cell*, vol. 87, pp. 187–195, 18 Oct. 1996.
- [64] K. Keino-Masu, M. Masu, L. Hinck, E. D. Leonardo, S. S. Chan, J. G. Culotti, and M. Tessier-Lavigne, “Deleted in colorectal cancer (DCC) encodes a netrin receptor,” *Cell*, vol. 87, pp. 175–185, 18 Oct. 1996.
- [65] K. Brose, K. S. Bland, K. H. Wang, D. Arnott, W. Henzel, C. S. Goodman, M. Tessier-Lavigne, and T. Kidd, “Slit proteins bind robo receptors and have an evolutionarily conserved role in repulsive axon guidance,” *Cell*, vol. 96, pp. 795–806, 19 Mar. 1999.
- [66] H. F. Clark, A. L. Gurney, E. Abaya, K. Baker, D. Baldwin, J. Brush, J. Chen, B. Chow, C. Chui, C. Crowley, B. Currell, B. Deuel, P. Dowd, D. Eaton, J. Foster, C. Grimaldi, Q. Gu, P. E. Hass, S. Heldens, A. Huang, H. S. Kim, L. Klimowski, Y. Jin, S. Johnson, J. Lee, L. Lewis, D. Liao, M. Mark, E. Robbie, C. Sanchez, J. Schoenfeld, S. Seshagiri, L. Simmons, J. Singh, V. Smith, J. Stinson, A. Vagts, R. Vandlen, C. Watanabe, D. Wieand, K. Woods, M.-H. Xie, D. Yansura, S. Yi, G. Yu, J. Yuan, M. Zhang, Z. Zhang, A. Goddard, W. I. Wood, P. Godowski, and A. Gray, “The secreted protein discovery initiative (SPDI), a large-scale effort to identify novel human secreted and transmembrane proteins: a bioinformatics assessment,” *Genome Res.*, vol. 13, pp. 2265–2270, Oct. 2003.
- [67] T. Battle, B. Antonsson, G. Feger, and D. Besson, “A high-throughput mammalian protein expression, purification, aliquoting and storage pipeline to assemble a library of the human secretome,” *Comb. Chem. High Throughput Screen.*, vol. 9, pp. 639–649, Nov. 2006.

- [68] M. S. Almén, K. J. V. Nordström, R. Fredriksson, and H. B. Schiöth, “Mapping the human membrane proteome: a majority of the human membrane proteins can be classified according to function and evolutionary origin,” *BMC Biol.*, vol. 7, p. 50, 13 Aug. 2009.
- [69] J. Liu, V. T. K. Chow, and S. D. S. Jois, “A novel, rapid and sensitive heterotypic cell adhesion assay for CD2-CD58 interaction, and its application for testing inhibitory peptides,” *J. Immunol. Methods*, vol. 291, pp. 39–49, Aug. 2004.
- [70] S. D. Satyanarayananajois, S. Ronald, and J. Liu, “Heterotypic cell adhesion assay for the study of cell adhesion inhibition,” *Methods Mol. Biol.*, vol. 716, pp. 225–243, 2011.
- [71] D. M. E. Otto, M. A. Campanero-Rhodes, R. Karamanska, A. K. Powell, N. Bovin, J. E. Turnbull, R. A. Field, J. Blackburn, T. Feizi, and P. R. Crocker, “An expression system for screening of proteins for glycan and protein interactions,” *Anal. Biochem.*, vol. 411, pp. 261–270, 15 Apr. 2011.
- [72] A. R. Mäkelä and C. Oker-Blom, “The baculovirus display technology—an evolving instrument for molecular screening and drug delivery,” *Comb. Chem. High Throughput Screen.*, vol. 11, pp. 86–98, Feb. 2008.
- [73] T. Sakihama, T. Sato, H. Iwanari, T. Kitamura, S. Sakaguchi, T. Kodama, and T. Hamakubo, “A simple detection method for Low-Affinity membrane protein interactions by baculoviral display,” *PLoS One*, vol. 3, p. e4024, 24 Dec. 2008.
- [74] J. C. Lin, W.-H. Ho, A. Gurney, and A. Rosenthal, “The netrin-g1 ligand NGL-1 promotes the outgrowth of thalamocortical axons,” *Nat. Neurosci.*, vol. 6, pp. 1270–1276, Dec. 2003.
- [75] C. Bossen, K. Ingold, A. Tardivel, J.-L. Bodmer, O. Gaide, S. Hertig, C. Ambrose, J. Tschopp, and P. Schneider, “Interactions of tumor necrosis factor (TNF) and TNF receptor family members in the mouse and human,” *J. Biol. Chem.*, vol. 281, pp. 13964–13971, 19 May 2006.
- [76] S. V. Sosnovtsev, C. Sandoval-Jaime, G. I. Parra, C. M. Tin, R. W. Jones, J. Soden, D. Barnes, J. Freeth, A. W. Smith, and K. Y. Green, “Identification of human junctional adhesion molecule 1 as a functional receptor for the hom-1 calicivirus on human cells,” *MBio*, vol. 8, 8 Mar. 2017.
- [77] A. Salanti, T. M. Clausen, M. Ø. Agerbæk, N. Al Nakouzi, M. Dahlbäck, H. Z. Oo, S. Lee, T. Gustavsson, J. R. Rich, B. J. Hedberg, Y. Mao, L. Barington, M. A. Pereira, J. LoBello, M. Endo, L. Fazli, J. Soden, C. K. Wang, A. F. Sander, R. Dagil, S. Thrane, P. J. Holst, L. Meng, F. Favero, G. J. Weiss, M. A. Nielsen, J. Freeth, T. O. Nielsen, J. Zaia, N. L. Tran, J. Trent, J. S. Babcock, T. G. Theander, P. H. Sorensen, and M. Daugaard, “Targeting human cancer by a glycosaminoglycan binding malaria protein,” *Cancer Cell*, vol. 28, pp. 500–514, 12 Oct. 2015.

- [78] L. Turner, T. Lavstsen, S. S. Berger, C. W. Wang, J. E. V. Petersen, M. Avril, A. J. Brazier, J. Freeth, J. S. Jespersen, M. A. Nielsen, P. Magistrado, J. Lusingu, J. D. Smith, M. K. Higgins, and T. G. Theander, "Severe malaria is associated with parasite binding to endothelial protein C receptor," *Nature*, vol. 498, pp. 502–505, 27 June 2013.
- [79] E. Bianchi, B. Doe, D. Goulding, and G. J. Wright, "Juno is the egg izumo receptor and is essential for mammalian fertilization," *Nature*, vol. 508, pp. 483–487, 24 Apr. 2014.
- [80] K. M. Bushell, C. Söllner, B. Schuster-Boeckler, A. Bateman, and G. J. Wright, "Large-scale screening for novel low-affinity extracellular protein interactions," *Genome Res.*, vol. 18, pp. 622–630, Apr. 2008.
- [81] J. J. Visser, Y. Cheng, S. C. Perry, A. B. Chastain, B. Parsa, S. S. Masri, T. A. Ray, J. N. Kay, and W. M. Wojtowicz, "An extracellular biochemical screen reveals that FLRTs and unc5s mediate neuronal subtype recognition in the retina," *Elife*, vol. 4, p. e08149, 2 Dec. 2015.
- [82] E. Özkan, R. A. Carrillo, C. L. Eastman, R. Weiszmann, D. Waghray, K. G. Johnson, K. Zinn, S. E. Celtniker, and K. C. Garcia, "An extracellular interactome of immunoglobulin and LRR proteins reveals receptor-ligand networks," *Cell*, vol. 154, pp. 228–239, 3 July 2013.
- [83] S. R. Ramani, I. Tom, N. Lewin-Koh, B. Wranik, L. Depalatis, J. Zhang, D. Eaton, and L. C. Gonzalez, "A secreted protein microarray platform for extracellular protein interaction discovery," *Anal. Biochem.*, vol. 420, pp. 127–138, 15 Jan. 2012.
- [84] K. M. Bushell, C. Söllner, B. Schuster-Boeckler, A. Bateman, and G. J. Wright, "Large-scale screening for novel low-affinity extracellular protein interactions," *Genome Res.*, vol. 18, pp. 622–630, Apr. 2008.
- [85] C. Söllner and G. J. Wright, "A cell surface interaction network of neural leucine-rich repeat receptors," *Genome Biol.*, vol. 10, p. R99, 18 Sept. 2009.
- [86] S. Martin, C. Söllner, V. Charoensawan, B. Adryan, B. Thisse, C. Thisse, S. Teichmann, and G. J. Wright, "Construction of a large extracellular protein interaction network and its resolution by spatiotemporal expression profiling," *Mol. Cell. Proteomics*, vol. 9, pp. 2654–2665, Dec. 2010.
- [87] X. Gao, U. Metzger, P. Panza, P. Mahalwar, S. Alsheimer, H. Geiger, H.-M. Maischein, M. P. Levesque, M. Templin, and C. Söllner, "A Floor-Plate extracellular Protein-Protein interaction screen identifies draxin as a secreted netrin-1 antagonist," *Cell Rep.*, vol. 12, pp. 694–708, 28 July 2015.
- [88] C. Crosnier, L. Y. Bustamante, S. J. Bartholdson, A. K. Bei, M. Theron, M. Uchikawa, S. Mboup, O. Ndir, D. P. Kwiatkowski, M. T. Duraisingh, J. C. Rayner, and G. J. Wright, "Basigin is a receptor essential for erythrocyte invasion by plasmodium falciparum," *Nature*, vol. 480, pp. 534–537, 22 Dec. 2011.

- [89] S. J. Bartholdson, L. Y. Bustamante, C. Crosnier, S. Johnson, S. Lea, J. C. Rayner, and G. J. Wright, "Semaphorin-7A is an erythrocyte receptor for *p. falciparum* merozoite-specific TRAP homolog, MTRAP," *PLoS Pathog.*, vol. 8, p. e1003031, Jan. 2012.
- [90] F. Galaway, L. G. Drought, M. Fala, N. Cross, A. C. Kemp, J. C. Rayner, and G. J. Wright, "P113 is a merozoite surface protein that binds the N terminus of plasmodium falciparum RH5," *Nat. Commun.*, vol. 8, p. 14333, 10 Feb. 2017.
- [91] G. J. Wright, M. J. Puklavec, A. C. Willis, R. M. Hoek, J. D. Sedgwick, M. H. Brown, and A. N. Barclay, "Lymphoid/neuronal cell surface OX2 glycoprotein recognizes a novel receptor on macrophages implicated in the control of their function," *Immunity*, vol. 13, pp. 233–242, Aug. 2000.
- [92] M. Letarte, D. Voulgaraki, D. Hatherley, M. Foster-Cuevas, N. J. Saunders, and A. N. Barclay, "Analysis of leukocyte membrane protein interactions using protein microarrays," *BMC Biochem.*, vol. 6, p. 2, 1 Mar. 2005.
- [93] D. Voulgaraki, R. Mitnacht-Kraus, M. Letarte, M. Foster-Cuevas, M. H. Brown, and A. N. Barclay, "Multivalent recombinant proteins for probing functions of leucocyte surface proteins such as the CD200 receptor," *Immunology*, vol. 115, pp. 337–346, July 2005.
- [94] N. Martinez-Martin, S. R. Ramani, J. A. Hackney, I. Tom, B. J. Wranik, M. Chan, J. Wu, M. T. Paluch, K. Takeda, P. E. Hass, H. Clark, and L. C. Gonzalez, "The extracellular interactome of the human adenovirus family reveals diverse strategies for immunomodulation," *Nat. Commun.*, vol. 7, p. 11473, 5 May 2016.
- [95] Y. Sun, M. Gallagher-Jones, C. Barker, and G. J. Wright, "A benchmarked protein microarray-based platform for the identification of novel low-affinity extracellular protein interactions," *Anal. Biochem.*, vol. 424, pp. 45–53, 1 May 2012.
- [96] Y. Sun, C. Vandenbriele, A. Kauskot, P. Verhamme, M. F. Hoylaerts, and G. J. Wright, "A human platelet receptor protein microarray identifies the high affinity immunoglobulin E receptor subunit α (Fc ϵ R1 α) as an activating platelet endothelium aggregation receptor 1 (PEAR1) ligand," *Mol. Cell. Proteomics*, vol. 14, pp. 1265–1274, May 2015.
- [97] D. Josic and J. G. Clifton, "Mammalian plasma membrane proteomics," *Proteomics*, vol. 7, pp. 3010–3029, Aug. 2007.
- [98] B. A. Macher and T.-Y. Yen, "Proteins at membrane surfaces-a review of approaches," *Mol. Biosyst.*, vol. 3, pp. 705–713, Oct. 2007.
- [99] H. Zhang, X.-J. Li, D. B. Martin, and R. Aebersold, "Identification and quantification of n-linked glycoproteins using hydrazide chemistry, stable isotope labeling and mass spectrometry," *Nat. Biotechnol.*, vol. 21, pp. 660–666, June 2003.

- [100] C. C. Wu, M. J. MacCoss, K. E. Howell, and J. R. Yates, 3rd, “A method for the comprehensive proteomic analysis of membrane proteins,” *Nat. Biotechnol.*, vol. 21, pp. 532–538, May 2003.
- [101] H. Watarai, A. Hinohara, J. Nagafune, T. Nakayama, M. Taniguchi, and Y. Yamaguchi, “Plasma membrane-focused proteomics: dramatic changes in surface expression during the maturation of human dendritic cells,” *Proteomics*, vol. 5, pp. 4001–4011, Oct. 2005.
- [102] A. P. Frei, O.-Y. Jeon, S. Kilcher, H. Moest, L. M. Henning, C. Jost, A. Plückthun, J. Mercer, R. Aebersold, E. M. Carreira, and B. Wollscheid, “Direct identification of ligand-receptor interactions on living cells and tissues,” *Nat. Biotechnol.*, vol. 30, pp. 997–1001, 16 Sept. 2012.
- [103] Y. Li, T. Ozment, G. L. Wright, and J. M. Peterson, “Identification of putative receptors for the novel adipokine CTRP3 using Ligand-Receptor capture technology,” *PLoS One*, vol. 11, p. e0164593, 11 Oct. 2016.
- [104] R. D. Cummings and M. E. Etzler, “Antibodies and lectins in glycan analysis,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [105] B. K. Brandley, S. J. Swiedler, and P. W. Robbins, “Carbohydrate ligands of the LEC cell adhesion molecules,” *Cell*, vol. 63, pp. 861–863, 30 Nov. 1990.
- [106] L. A. Lasky, “Selectin-carbohydrate interactions and the initiation of the inflammatory response,” *Annu. Rev. Biochem.*, vol. 64, pp. 113–139, 1995.
- [107] N. Sharon and H. Lis, “History of lectins: from hemagglutinins to biological recognition molecules,” *Glycobiology*, vol. 14, pp. 53R–62R, 1 Nov. 2004.
- [108] J. D. Esko and C. R. Bertozzi, “Chemical tools for inhibiting glycosylation,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [109] D. E. Humphries and J. E. Silbert, “Chlorate: a reversible inhibitor of proteoglycan sulfation,” *Biochem. Biophys. Res. Commun.*, vol. 154, pp. 365–371, 15 July 1988.
- [110] H. H. Freeze and C. Kranz, “Endoglycosidase and glycoamidase release of n-linked glycans,” *Curr. Protoc. Mol. Biol.*, vol. Chapter 17, p. Unit 17.13A, Jan. 2010.
- [111] D. Camus and T. J. Hadley, “A plasmodium falciparum antigen that binds to host erythrocytes and merozoites,” *Science*, vol. 230, pp. 553–556, 1 Nov. 1985.

- [112] P. A. Orlandi, F. W. Klotz, and J. D. Haynes, "A malaria invasion receptor, the 175-kilodalton erythrocyte binding antigen of plasmodium falciparum recognizes the terminal Neu5Ac(alpha 2-3)gal- sequences of glycophorin a," *J. Cell Biol.*, vol. 116, pp. 901–909, Feb. 1992.
- [113] F. Li, P. P. Wilkins, S. Crawley, J. Weinstein, R. D. Cummings, and R. P. McEver, "Post-translational modifications of recombinant p-selectin glycoprotein ligand-1 required for binding to P- and e-selectin," *J. Biol. Chem.*, vol. 271, pp. 3255–3264, 9 Feb. 1996.
- [114] I. Stamenkovic, D. Sgroi, A. Aruffo, M. S. Sy, and T. Anderson, "The B lymphocyte adhesion molecule CD22 interacts with leukocyte common antigen CD45RO on T cells and alpha 2-6 sialyltransferase, CD75, on B cells," *Cell*, vol. 66, pp. 1133–1144, 20 Sept. 1991.
- [115] P. R. Crocker and A. Varki, "Siglecs in the immune system," *Immunology*, vol. 103, pp. 137–145, June 2001.
- [116] C. D. Rillahan and J. C. Paulson, "Glycan microarrays for decoding the glycome," *Annu. Rev. Biochem.*, vol. 80, pp. 797–823, 2011.
- [117] M. Wanaguru, C. Crosnier, S. Johnson, J. C. Rayner, and G. J. Wright, "Biochemical analysis of the plasmodium falciparum erythrocyte-binding antigen-175 (EBA175)-Glycophorin-A interaction: IMPLICATIONS FOR VACCINE DESIGN," *J. Biol. Chem.*, vol. 288, pp. 32106–32117, 8 Nov. 2013.
- [118] R. Phillips, T. Ursell, P. Wiggins, and P. Sens, "Emerging roles for lipids in shaping membrane-protein function," *Nature*, vol. 459, pp. 379–385, 21 May 2009.
- [119] A. G. Lee, "How lipids affect the activities of integral membrane proteins," *Biochim. Biophys. Acta*, vol. 1666, pp. 62–87, 3 Nov. 2004.
- [120] J. Oates and A. Watts, "Uncovering the intimate relationship between lipids, cholesterol and GPCR activation," *Curr. Opin. Struct. Biol.*, vol. 21, pp. 802–807, Dec. 2011.
- [121] P. P. Wilkins, K. L. Moore, R. P. McEver, and R. D. Cummings, "Tyrosine sulfation of p-selectin glycoprotein ligand-1 is required for high affinity binding to p-selectin," *J. Biol. Chem.*, vol. 270, pp. 22677–22680, 29 Sept. 1995.
- [122] B. E. Housden, M. Muhar, M. Gemberling, C. A. Gersbach, D. Y. R. Stainier, G. Seydoux, S. E. Mohr, J. Zuber, and N. Perrimon, "Loss-of-function genetic tools for animal models: cross-species and cross-platform differences," *Nat. Rev. Genet.*, vol. 18, pp. 24–40, Jan. 2017.
- [123] S. Brenner, "The genetics of *caenorhabditis elegans*," *Genetics*, vol. 77, pp. 71–94, May 1974.
- [124] M. Gans, C. Audit, and M. Masson, "Isolation and characterization of sex-linked female-sterile mutants in *drosophila melanogaster*," *Genetics*, vol. 81, pp. 683–704, Dec. 1975.

- [125] C. Nüsslein-Volhard and E. Wieschaus, "Mutations affecting segment number and polarity in drosophila," *Nature*, vol. 287, pp. 795–801, 30 Oct. 1980.
- [126] L. H. Miller, S. J. Mason, D. F. Clyde, and M. H. McGinniss, "The resistance factor to plasmodium vivax in blacks. the duffy-blood-group genotype, FyFy," *N. Engl. J. Med.*, vol. 295, pp. 302–304, 5 Aug. 1976.
- [127] R. E. Howes, A. P. Patil, F. B. Piel, O. A. Nyangiri, C. W. Kabaria, P. W. Gething, P. A. Zimmerman, C. Barnadas, C. M. Beall, A. Gebremedhin, D. Ménard, T. N. Williams, D. J. Weatherall, and S. I. Hay, "The global distribution of the duffy blood group," *Nat. Commun.*, vol. 2, p. 266, 2011.
- [128] S. J. Bartholdson, C. Crosnier, L. Y. Bustamante, J. C. Rayner, and G. J. Wright, "Identifying novel plasmodium falciparum erythrocyte invasion receptors using systematic extracellular protein interaction screens," *Cell. Microbiol.*, vol. 15, pp. 1304–1312, Aug. 2013.
- [129] R. Liu, W. A. Paxton, S. Choe, D. Ceradini, S. R. Martin, R. Horuk, M. E. MacDonald, H. Stuhlmann, R. A. Koup, and N. R. Landau, "Homozygous defect in HIV-1 coreceptor accounts for resistance of some multiply-exposed individuals to HIV-1 infection," *Cell*, vol. 86, pp. 367–377, 9 Aug. 1996.
- [130] P. Anderson, "Mutagenesis," *Methods Cell Biol.*, vol. 48, pp. 31–58, 1995.
- [131] P. Novick, C. Field, and R. Schekman, "Identification of 23 complementation groups required for post-translational events in the yeast secretory pathway," *Cell*, vol. 21, pp. 205–215, Aug. 1980.
- [132] P. Novick and R. Schekman, "Secretion and cell-surface growth are blocked in a temperature-sensitive mutant of saccharomyces cerevisiae," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 76, pp. 1858–1862, Apr. 1979.
- [133] J. W. Ziel and D. R. Sherwood, "Roles for netrin signaling outside of axon guidance: a view from the worm," *Dev. Dyn.*, vol. 239, pp. 1296–1305, May 2010.
- [134] G. Guo, W. Wang, and A. Bradley, "Mismatch repair genes identified using genetic screens in blm-deficient embryonic stem cells," *Nature*, vol. 429, pp. 891–895, 24 June 2004.
- [135] M. Kotecki, P. S. Reddy, and B. H. Cochran, "Isolation and characterization of a near-haploid human cell line," *Exp. Cell Res.*, vol. 252, pp. 273–280, 1 Nov. 1999.
- [136] B. S. Andersson, V. P. Collins, R. Kurzrock, D. W. Larkin, C. Childs, A. Ost, A. Cork, J. M. Trujillo, E. J. Freireich, and M. J. Siciliano, "KBM-7, a human myeloid leukemia cell line with double philadelphia chromosomes lacking normal c-ABL and BCR transcripts," *Leukemia*, vol. 9, pp. 2100–2108, Dec. 1995.

- [137] J. E. Carette, M. Raaben, A. C. Wong, A. S. Herbert, G. Obernosterer, N. Mulherkar, A. I. Kuehne, P. J. Krantzsch, A. M. Griffin, G. Ruthel, P. Dal Cin, J. M. Dye, S. P. Whelan, K. Chandran, and T. R. Brummelkamp, “Ebola virus entry requires the cholesterol transporter Niemann-Pick C1,” *Nature*, vol. 477, pp. 340–343, 24 Aug. 2011.
- [138] M. Leeb and A. Wutz, “Derivation of haploid embryonic stem cells from mouse embryos,” *Nature*, vol. 479, pp. 131–134, 7 Sept. 2011.
- [139] S. Pillay and J. E. Carette, “Hunting viral receptors using haploid cells,” *Annu Rev Virol*, vol. 2, pp. 219–239, Nov. 2015.
- [140] J. E. Carette, C. P. Guimaraes, M. Varadarajan, A. S. Park, I. Wuethrich, A. Godarova, M. Kotecki, B. H. Cochran, E. Spooner, H. L. Ploegh, and T. R. Brummelkamp, “Haploid genetic screens in human cells identify host factors used by pathogens,” *Science*, vol. 326, pp. 1231–1235, 27 Nov. 2009.
- [141] J. E. Carette, C. P. Guimaraes, I. Wuethrich, V. A. Blomen, M. Varadarajan, C. Sun, G. Bell, B. Yuan, M. K. Muellner, S. M. Nijman, H. L. Ploegh, and T. R. Brummelkamp, “Global gene disruption in human cells to assign genes to phenotypes by deep sequencing,” *Nat. Biotechnol.*, vol. 29, pp. 542–546, 29 May 2011.
- [142] F. G. Tafesse, C. P. Guimaraes, T. Maruyama, J. E. Carette, S. Lory, T. R. Brummelkamp, and H. L. Ploegh, “GPR107, a g-protein-coupled receptor essential for intoxication by *pseudomonas aeruginosa* exotoxin a, localizes to the golgi and is cleaved by furin,” *J. Biol. Chem.*, vol. 289, pp. 24005–24018, 29 Aug. 2014.
- [143] L. T. Jae, M. Raaben, M. Riemersma, E. van Beusekom, V. A. Blomen, A. Velds, R. M. Kerkhoven, J. E. Carette, H. Topaloglu, P. Meinecke, M. W. Wessels, D. J. Lefeber, S. P. Whelan, H. van Bokhoven, and T. R. Brummelkamp, “Deciphering the glycosylome of dystroglycanopathies using haploid screens for lassa virus entry,” *Science*, vol. 340, pp. 479–483, 26 Apr. 2013.
- [144] L. T. Jae, M. Raaben, A. S. Herbert, A. I. Kuehne, A. S. Wirchnianski, T. K. Soh, S. H. Stubbs, H. Janssen, M. Damme, P. Saftig, S. P. Whelan, J. M. Dye, and T. R. Brummelkamp, “Virus entry. lassa virus entry requires a trigger-induced receptor switch,” *Science*, vol. 344, pp. 1506–1510, 27 June 2014.
- [145] S. Pillay, N. L. Meyer, A. S. Puschnik, O. Davulcu, J. Diep, Y. Ishikawa, L. T. Jae, J. E. Wosen, C. M. Nagamine, M. S. Chapman, and J. E. Carette, “An essential receptor for adeno-associated virus infection,” *Nature*, vol. 530, pp. 108–112, 4 Feb. 2016.
- [146] C. Fellmann and S. W. Lowe, “Stable RNA interference rules for silencing,” *Nat. Cell Biol.*, vol. 16, pp. 10–18, Jan. 2014.
- [147] L. Timmons and A. Fire, “Specific interference by ingested dsRNA,” *Nature*, vol. 395, p. 854, 29 Oct. 1998.

- [148] L. Pelkmans, E. Fava, H. Grabner, M. Hannus, B. Habermann, E. Krausz, and M. Zerial, “Genome-wide analysis of human kinases in clathrin- and caveolae/raft-mediated endocytosis,” *Nature*, vol. 436, pp. 78–86, 7 July 2005.
- [149] X. Huang, J. Y. J. Wang, and X. Lu, “Systems analysis of quantitative shRNA-library screens identifies regulators of cell adhesion,” *BMC Syst. Biol.*, vol. 2, p. 49, 13 June 2008.
- [150] P. P. Rose, S. L. Hanna, A. Spirigliozi, N. Wannissorn, D. P. Beiting, S. R. Ross, R. W. Hardy, S. A. Bambina, M. T. Heise, and S. Cherry, “Natural resistance-associated macrophage protein is a cellular receptor for sindbis virus in both insect and mammalian hosts,” *Cell Host Microbe*, vol. 10, pp. 97–104, 18 Aug. 2011.
- [151] O. M. Sessions, N. J. Barrows, J. A. Souza-Neto, T. J. Robinson, C. L. Hershey, M. A. Rodgers, J. L. Ramirez, G. Dimopoulos, P. L. Yang, J. L. Pearson, and M. A. Garcia-Blanco, “Discovery of insect and human dengue virus host factors,” *Nature*, vol. 458, pp. 1047–1050, 23 Apr. 2009.
- [152] A. W. Tai, Y. Benita, L. F. Peng, S.-S. Kim, N. Sakamoto, R. J. Xavier, and R. T. Chung, “A functional genomic screen identifies cellular cofactors of hepatitis C virus replication,” *Cell Host Microbe*, vol. 5, pp. 298–307, 19 Mar. 2009.
- [153] Q. Li, A. L. Brass, A. Ng, Z. Hu, R. J. Xavier, T. J. Liang, and S. J. Elledge, “A genome-wide genetic screen for host factors required for hepatitis C virus propagation,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 106, pp. 16410–16415, 22 Sept. 2009.
- [154] M. N. Krishnan, A. Ng, B. Sukumaran, F. D. Gilfoy, P. D. Uchil, H. Sultana, A. L. Brass, R. Adametz, M. Tsui, F. Qian, R. R. Montgomery, S. Lev, P. W. Mason, R. A. Koski, S. J. Elledge, R. J. Xavier, H. Agaisse, and E. Fikrig, “RNA interference screen for human genes associated with west nile virus infection,” *Nature*, vol. 455, pp. 242–245, 11 Sept. 2008.
- [155] J. Mercer, B. Snijder, R. Sacher, C. Burkard, C. K. E. Bleck, H. Stahlberg, L. Pelkmans, and A. Helenius, “RNAi screening reveals proteasome- and cullin3-dependent stages in vaccinia virus infection,” *Cell Rep.*, vol. 2, pp. 1036–1047, 25 Oct. 2012.
- [156] S. P. Goff, “Knockdown screens to knockout HIV-1,” *Cell*, vol. 135, pp. 417–420, 31 Oct. 2008.
- [157] E. S. Egan, R. H. Y. Jiang, M. A. Moechtar, N. S. Barteneva, M. P. Weekes, L. V. Nobre, S. P. Gygi, J. A. Paulo, C. Frantzreb, Y. Tani, J. Takahashi, S. Watanabe, J. Goldberg, A. S. Paul, C. Brugnara, D. E. Root, R. C. Wiegand, J. G. Doench, and M. T. Duraisingh, “Malaria. a forward genetic screen identifies erythrocyte CD55 as essential for plasmodium falciparum invasion,” *Science*, vol. 348, pp. 711–714, 8 May 2015.

- [158] A. L. Jackson and P. S. Linsley, “Recognizing and avoiding siRNA off-target effects for target identification and therapeutic application,” *Nat. Rev. Drug Discov.*, vol. 9, pp. 57–67, Jan. 2010.
- [159] R. König, Y. Zhou, D. Elleder, T. L. Diamond, G. M. C. Bonamy, J. T. Irelan, C.-Y. Chiang, B. P. Tu, P. D. De Jesus, C. E. Lilley, S. Seidel, A. M. Opaluch, J. S. Caldwell, M. D. Weitzman, K. L. Kuhen, S. Bandyopadhyay, T. Ideker, A. P. Orth, L. J. Miraglia, F. D. Bushman, J. A. Young, and S. K. Chanda, “Global analysis of host-pathogen interactions that regulate early-stage HIV-1 replication,” *Cell*, vol. 135, pp. 49–60, 3 Oct. 2008.
- [160] A. L. Brass, D. M. Dykxhoorn, Y. Benita, N. Yan, A. Engelman, R. J. Xavier, J. Lieberman, and S. J. Elledge, “Identification of host proteins required for HIV infection through a functional genomic screen,” *Science*, vol. 319, pp. 921–926, 15 Feb. 2008.
- [161] H. Zhou, M. Xu, Q. Huang, A. T. Gates, X. D. Zhang, J. C. Castle, E. Stec, M. Ferrer, B. Strulovici, D. J. Hazuda, and A. S. Espeseth, “Genome-scale RNAi screen for host factors required for HIV replication,” *Cell Host Microbe*, vol. 4, pp. 495–504, 13 Nov. 2008.
- [162] F. J. M. Mojica, C. Díez-Villaseñor, J. García-Martínez, and E. Soria, “Intervening sequences of regularly spaced prokaryotic repeats derive from foreign genetic elements,” *J. Mol. Evol.*, vol. 60, pp. 174–182, Feb. 2005.
- [163] R. Barrangou, C. Fremaux, H. Deveau, M. Richards, P. Boyaval, S. Moineau, D. A. Romero, and P. Horvath, “CRISPR provides acquired resistance against viruses in prokaryotes,” *Science*, vol. 315, pp. 1709–1712, 23 Mar. 2007.
- [164] P. D. Hsu, E. S. Lander, and F. Zhang, “Development and applications of CRISPR-Cas9 for genome engineering,” *Cell*, vol. 157, pp. 1262–1278, 5 June 2014.
- [165] J. A. Doudna and E. Charpentier, “The new frontier of genome engineering with CRISPR-Cas9,” *Science*, vol. 346, p. 1258096, 28 Nov. 2014.
- [166] “CRISPR guide RNA | dharmacon.” <http://dharmacon.gelifesciences.com/gene-editing/crispr-cas9/crispr-guide-rna/>. Accessed: 2017-9-18.
- [167] M. Jinek, K. Chylinski, I. Fonfara, M. Hauer, J. A. Doudna, and E. Charpentier, “A programmable dual-RNA-guided DNA endonuclease in adaptive bacterial immunity,” *Science*, vol. 337, pp. 816–821, 17 Aug. 2012.
- [168] P. Mali, L. Yang, K. M. Esvelt, J. Aach, M. Guell, J. E. DiCarlo, J. E. Norville, and G. M. Church, “RNA-guided human genome engineering via cas9,” *Science*, vol. 339, pp. 823–826, 15 Feb. 2013.
- [169] L. Cong, F. A. Ran, D. Cox, S. Lin, R. Barretto, N. Habib, P. D. Hsu, X. Wu, W. Jiang, L. A. Marraffini, and F. Zhang, “Multiplex genome engineering

- using CRISPR/Cas systems," *Science*, vol. 339, pp. 819–823, 15 Feb. 2013.
- [170] Z. Mao, M. Bozzella, A. Seluanov, and V. Gorbunova, "DNA repair by nonhomologous end joining and homologous recombination during cell cycle in human cells," *Cell Cycle*, vol. 7, pp. 2902–2906, 15 Sept. 2008.
- [171] O. Shalem, N. E. Sanjana, E. Hartenian, X. Shi, D. A. Scott, T. S. Mikkelsen, D. Heckl, B. L. Ebert, D. E. Root, J. G. Doench, and F. Zhang, "Genome-scale CRISPR-Cas9 knockout screening in human cells," *Science*, vol. 343, pp. 84–87, 3 Jan. 2014.
- [172] T. Wang, J. J. Wei, D. M. Sabatini, and E. S. Lander, "Genetic screens in human cells using the CRISPR-Cas9 system," *Science*, vol. 343, pp. 80–84, 3 Jan. 2014.
- [173] H. Koike-Yusa, Y. Li, E.-P. Tan, M. D. C. Velasco-Herrera, and K. Yusa, "Genome-wide recessive genetic screening in mammalian cells with a lentiviral CRISPR-guide RNA library," *Nat. Biotechnol.*, vol. 32, pp. 267–273, 23 Mar. 2014.
- [174] J. Joung, S. Konermann, J. S. Gootenberg, O. O. Abudayyeh, R. J. Platt, M. D. Brigham, N. E. Sanjana, and F. Zhang, "Genome-scale CRISPR-Cas9 knockout and transcriptional activation screening," *Nat. Protoc.*, vol. 12, pp. 828–863, Apr. 2017.
- [175] T. Hart, M. Chandrashekhar, M. Aregger, Z. Steinhart, K. R. Brown, G. MacLeod, M. Mis, M. Zimmermann, A. Fradet-Turcotte, S. Sun, P. Mero, P. Dirks, S. Sidhu, F. P. Roth, O. S. Rissland, D. Durocher, S. Angers, and J. Moffat, "High-Resolution CRISPR screens reveal fitness genes and Genotype-Specific cancer liabilities," *Cell*, vol. 163, pp. 1515–1526, 3 Dec. 2015.
- [176] K. Tzelepis, H. Koike-Yusa, E. De Braekeleer, Y. Li, E. Metzakopian, O. M. Dovey, A. Mupo, V. Grinkevich, M. Li, M. Mazan, M. Gozdecka, S. Ohnishi, J. Cooper, M. Patel, T. McKerrell, B. Chen, A. F. Domingues, P. Gallipoli, S. Teichmann, H. Ponstingl, U. McDermott, J. Saez-Rodriguez, B. J. P. Huntly, F. Iorio, C. Pina, G. S. Vassiliou, and K. Yusa, "A CRISPR dropout screen identifies genetic vulnerabilities and therapeutic targets in acute myeloid leukemia," *Cell Rep.*, vol. 17, pp. 1193–1205, 18 Oct. 2016.
- [177] T. Wang, K. Birsoy, N. W. Hughes, K. M. Krupczak, Y. Post, J. J. Wei, E. S. Lander, and D. M. Sabatini, "Identification and characterization of essential genes in the human genome," *Science*, vol. 350, pp. 1096–1101, 27 Nov. 2015.
- [178] Y. Zhou, S. Zhu, C. Cai, P. Yuan, C. Li, Y. Huang, and W. Wei, "High-throughput screening of a CRISPR/Cas9 library for functional genomics in human cells," *Nature*, vol. 509, pp. 487–491, 22 May 2014.
- [179] S. Virreira Winter, A. Zychlinsky, and B. W. Bardoel, "Genome-wide CRISPR screen reveals novel host factors required for staphylococcus

- aureus α -hemolysin-mediated toxicity," *Sci. Rep.*, vol. 6, p. 24242, 12 Apr. 2016.
- [180] I. H. Jain, L. Zazzeron, R. Goli, K. Alexa, S. Schatzman-Bone, H. Dhillon, O. Goldberger, J. Peng, O. Shalem, N. E. Sanjana, F. Zhang, W. Goessling, W. M. Zapol, and V. K. Mootha, "Hypoxia as a therapy for mitochondrial disease," *Science*, vol. 352, pp. 54–61, 1 Apr. 2016.
- [181] C. J. Blondel, J. S. Park, T. P. Hubbard, A. R. Pacheco, C. J. Kuehl, M. J. Walsh, B. M. Davis, B. E. Gewurz, J. G. Doench, and M. K. Waldor, "CRISPR/Cas9 screens reveal requirements for host cell sulfation and fucosylation in bacterial type III secretion System-Mediated cytotoxicity," *Cell Host Microbe*, vol. 20, pp. 226–237, 10 Aug. 2016.
- [182] R. J. Park, T. Wang, D. Koundakjian, J. F. Hultquist, P. Lamothe-Molina, B. Monel, K. Schumann, H. Yu, K. M. Krupczak, W. Garcia-Beltran, A. Piechocka-Trocha, N. J. Krogan, A. Marson, D. M. Sabatini, E. S. Lander, N. Hacohen, and B. D. Walker, "A genome-wide CRISPR screen identifies a restricted set of HIV host dependency factors," *Nat. Genet.*, vol. 49, pp. 193–203, Feb. 2017.
- [183] R. Zhang, J. J. Miner, M. J. Gorman, K. Rausch, H. Ramage, J. P. White, A. Zuiani, P. Zhang, E. Fernandez, Q. Zhang, K. A. Dowd, T. C. Pierson, S. Cherry, and M. S. Diamond, "A CRISPR screen defines a signal peptide processing pathway required by flaviviruses," *Nature*, vol. 535, pp. 164–168, 17 June 2016.
- [184] E. Hartenian and J. G. Doench, "Genetic screens and functional genomics using CRISPR/Cas9 technology," *FEBS J.*, vol. 282, pp. 1383–1393, 1 Apr. 2015.
- [185] R. DeJesus, F. Moretti, G. McAllister, Z. Wang, P. Bergman, S. Liu, E. Frias, J. Alford, J. S. Reece-Hoyes, A. Lindeman, J. Kelliher, C. Russ, J. Knehr, W. Carbone, M. Beibel, G. Roma, A. Ng, J. A. Tallarico, J. A. Porter, R. J. Xavier, C. Mickanin, L. O. Murphy, G. R. Hoffman, and B. Nyfeler, "Functional CRISPR screening identifies the ufmylation pathway as a regulator of SQSTM1/p62," *Elife*, vol. 5, 28 June 2016.
- [186] O. Parnas, M. Jovanovic, T. M. Eisenhaure, R. H. Herbst, A. Dixit, C. J. Ye, D. Przybylski, R. J. Platt, I. Tiros, N. E. Sanjana, O. Shalem, R. Satija, R. Raychowdhury, P. Mertins, S. A. Carr, F. Zhang, N. Hacohen, and A. Regev, "A genome-wide CRISPR screen in primary immune cells to dissect regulatory networks," *Cell*, vol. 162, pp. 675–686, 30 July 2015.
- [187] M. L. Burr, C. E. Sparbier, Y.-C. Chan, J. C. Williamson, K. Woods, P. A. Beavis, E. Y. N. Lam, M. A. Henderson, C. C. Bell, S. Stolzenburg, O. Gilan, S. Bloor, T. Noori, D. W. Morgens, M. C. Bassik, P. J. Neeson, A. Behren, P. K. Darcy, S.-J. Dawson, I. Voskoboinik, J. A. Trapani, J. Cebon, P. J. Lehner, and M. A. Dawson, "CMTM6 maintains the expression of PD-L1 and regulates anti-tumour immunity," *Nature*, vol. 549, pp. 101–105, 7 Sept. 2017.

- [188] Y. Durocher, S. Perret, and A. Kamen, “High-level and high-throughput recombinant protein production by transient transfection of suspension-growing human 293-EBNA1 cells,” *Nucleic Acids Res.*, vol. 30, p. E9, 15 Jan. 2002.
- [189] E. K. Brinkman, T. Chen, M. Amendola, and B. van Steensel, “Easy quantitative assessment of genome editing by sequence trace decomposition,” *Nucleic Acids Res.*, vol. 42, p. e168, 16 Dec. 2014.
- [190] W. Li, H. Xu, T. Xiao, L. Cong, M. I. Love, F. Zhang, R. A. Irizarry, J. S. Liu, M. Brown, and X. S. Liu, “MAGECK enables robust identification of essential genes from genome-scale CRISPR/Cas9 knockout screens,” *Genome Biol.*, vol. 15, no. 12, p. 554, 2014.
- [191] M. Kanehisa, Y. Sato, M. Kawashima, M. Furumichi, and M. Tanabe, “KEGG as a reference resource for gene and protein annotation,” *Nucleic Acids Res.*, vol. 44, pp. D457–62, Jan. 2016.
- [192] R Development Core Team, *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2008. ISBN 3-900051-07-0.
- [193] The UniProt Consortium, “UniProt: the universal protein knowledgebase,” *Nucleic Acids Res.*, vol. 45, pp. D158–D169, Jan 2017.
- [194] N. L. Grimsey, C. E. Goodfellow, E. L. Scotter, M. J. Dowie, M. Glass, and E. S. Graham, “Specific detection of CB1 receptors; cannabinoid CB1 receptor antibodies are not all created equal!,” *J. Neurosci. Methods*, vol. 171, pp. 78–86, 15 June 2008.
- [195] B. C. Jensen, P. M. Swigart, and P. C. Simpson, “Ten commercial antibodies for alpha-1-adrenergic receptor subtypes are nonspecific,” *Naunyn. Schmiedebergs. Arch. Pharmacol.*, vol. 379, pp. 409–412, Apr. 2009.
- [196] C. B. Saper, “An open letter to our readers on the use of antibodies,” *J. Comp. Neurol.*, vol. 493, pp. 477–478, 26 Dec. 2005.
- [197] M. C. Michel, T. Wieland, and G. Tsujimoto, “How reliable are g-protein-coupled receptor antibodies?,” *Naunyn. Schmiedebergs. Arch. Pharmacol.*, vol. 379, pp. 385–388, Apr. 2009.
- [198] D. M. Ecker, S. D. Jones, and H. L. Levine, “The therapeutic monoclonal antibody market,” *MAbs*, vol. 7, pp. 9–14, 2 Jan. 2015.
- [199] G. Roncador, P. Engel, L. Maestre, A. P. Anderson, J. L. Cordell, M. S. Cragg, V. Č. Šerbec, M. Jones, V. J. Lisnic, L. Kremer, D. Li, F. Koch-Nolte, N. Pascual, J.-I. Rodríguez-Barbosa, R. Torensma, H. Turley, K. Pulford, and A. H. Banham, “The european antibody network’s practical guide to finding and validating suitable antibodies for research,” *MAbs*, vol. 8, no. 1, pp. 27–36, 2016.
- [200] J. Bordeaux, A. Welsh, S. Agarwal, E. Killiam, M. Baquero, J. Hanna, V. Anagnostou, and D. Rimm, “Antibody validation,” *Biotechniques*, vol. 48, pp. 197–209, Mar. 2010.

- [201] H. A. Mannsperger, S. Uhlmann, C. Schmidt, S. Wiemann, O. Sahin, and U. Korf, “RNAi-based validation of antibodies for reverse phase protein arrays,” *Proteome Sci.*, vol. 8, p. 69, 23 Dec. 2010.
- [202] C. Stadler, M. Hjelmare, B. Neumann, K. Jonasson, R. Pepperkok, M. Uh-lén, and E. Lundberg, “Systematic validation of antibody binding and protein subcellular localization using siRNA and confocal microscopy,” *J. Proteomics*, vol. 75, pp. 2236–2251, 3 Apr. 2012.
- [203] L. Zhao, L. Qu, J. Zhou, Z. Sun, H. Zou, Y.-Y. Chen, J. D. Marks, and Y. Zhou, “High throughput identification of monoclonal antibodies to membrane bound and secreted proteins using yeast and phage display,” *PLoS One*, vol. 9, p. e111339, 29 Oct. 2014.
- [204] D. Akopian, K. Shen, X. Zhang, and S.-O. Shan, “Signal recognition particle: an essential protein-targeting machine,” *Annu. Rev. Biochem.*, vol. 82, pp. 693–721, 13 Feb. 2013.
- [205] J. G. Doench, N. Fusi, M. Sullender, M. Hegde, E. W. Vaimberg, K. F. Donovan, I. Smith, Z. Tothova, C. Wilen, R. Orchard, H. W. Virgin, J. Listgarten, and D. E. Root, “Optimized sgRNA design to maximize activity and minimize off-target effects of CRISPR-Cas9,” *Nat. Biotechnol.*, vol. 34, pp. 184–191, Feb. 2016.
- [206] B. Chen, L. A. Gilbert, B. A. Cimini, J. Schnitzbauer, W. Zhang, G.-W. Li, J. Park, E. H. Blackburn, J. S. Weissman, L. S. Qi, and B. Huang, “Dynamic imaging of genomic loci in living human cells by an optimized CRISPR/Cas system,” *Cell*, vol. 155, pp. 1479–1491, 19 Dec. 2013.
- [207] A. Agrotis and R. Ketteler, “A new age in functional genomics using CRISPR/Cas9 in arrayed library screening,” *Front. Genet.*, vol. 6, 2015.
- [208] P. Kirk, M. C. Wilson, C. Heddle, M. H. Brown, A. N. Barclay, and A. P. Halestrap, “CD147 is tightly associated with lactate transporters MCT1 and MCT4 and facilitates their cell surface expression,” *EMBO J.*, vol. 19, pp. 3896–3904, 1 Aug. 2000.
- [209] A. A. Deora, N. Philp, J. Hu, D. Bok, and E. Rodriguez-Boulanger, “Mechanisms regulating tissue-specific polarity of monocarboxylate transporters and their chaperone CD147 in kidney and retinal epithelia,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 102, pp. 16245–16250, 8 Nov. 2005.
- [210] M. Voss, U. Künzel, F. Higel, P.-H. Kuhn, A. Colombo, A. Fukumori, M. Haug-Kröper, B. Klier, G. Grammer, A. Seidl, B. Schröder, R. Obst, H. Steiner, S. F. Lichtenthaler, C. Haass, and R. Fluhrer, “Shedding of glycan-modifying enzymes by signal peptide peptidase-like 3 (SPPL3) regulates cellular n-glycosylation,” *EMBO J.*, vol. 33, pp. 2890–2905, 17 Dec. 2014.
- [211] Y. Bai, W. Huang, L.-T. Ma, J.-L. Jiang, and Z.-N. Chen, “Importance of n-glycosylation on CD147 for its biological functions,” *Int. J. Mol. Sci.*, vol. 15, pp. 6356–6377, 15 Apr. 2014.

- [212] Z. Luo, X. Zhang, W. Zeng, J. Su, K. Yang, L. Lu, C. B. Lim, W. Tang, L. Wu, S. Zhao, X. Jia, C. Peng, and X. Chen, “TRAF6 regulates melanoma invasion and metastasis through ubiquitination of basigin,” *Oncotarget*, vol. 7, pp. 7179–7192, 9 Feb. 2016.
- [213] B. P. Morgan, “Isolation and characterization of the complement-inhibiting protein CD59 antigen from platelet membranes,” *Biochem. J.*, vol. 282 (Pt 2), pp. 409–413, 1 Mar. 1992.
- [214] P. M. Rudd, B. P. Morgan, M. R. Wormald, D. J. Harvey, C. W. van den Berg, S. J. Davis, M. A. Ferguson, and R. A. Dwek, “The glycosylation of the complement regulatory protein, human erythrocyte CD59,” *J. Biol. Chem.*, vol. 272, pp. 7229–7244, 14 Mar. 1997.
- [215] C. Xu and D. T. W. Ng, “Glycosylation-directed quality control of protein folding,” *Nat. Rev. Mol. Cell Biol.*, vol. 16, pp. 742–752, Dec. 2015.
- [216] C. C. R. Center, “Integrated technology resource for biomedical glycomics.” <https://www.ccrc.uga.edu/~moremen/glycomics/>. Accessed: 2017-6-10.
- [217] M. A. Kukuruzinska and P. W. Robbins, “Protein glycosylation in yeast: transcript heterogeneity of the ALG7 gene,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 84, pp. 2145–2149, Apr. 1987.
- [218] R. J. Kaufman, “Stress signaling from the lumen of the endoplasmic reticulum: coordination of gene transcriptional and translational controls,” *Genes Dev.*, vol. 13, pp. 1211–1233, 15 May 1999.
- [219] L. Williamson, M. Saponaro, S. Boeing, P. East, R. Mitter, T. Kantidakis, G. P. Kelly, A. Loble, J. Walker, B. Spencer-Dene, M. Howell, A. Stewart, and J. Q. Svejstrup, “UV irradiation induces a non-coding RNA that functionally opposes the protein encoded by the same gene,” *Cell*, vol. 168, pp. 843–855.e13, 23 Feb. 2017.
- [220] C. D. Marceau, A. S. Puschnik, K. Majzoub, Y. S. Ooi, S. M. Brewer, G. Fuchs, K. Swaminathan, M. A. Mata, J. E. Elias, P. Sarnow, and J. E. Carette, “Genetic dissection of flaviviridae host factors through genome-scale CRISPR screens,” *Nature*, vol. 535, pp. 159–163, 7 July 2016.
- [221] J. A. Chasis and N. Mohandas, “Red blood cell glycophorins,” *Blood*, vol. 80, pp. 1869–1879, 15 Oct. 1992.
- [222] IBGRL, “IBGRL-Research products,” tech. rep., Bristol Institute for Transfusion Sciences, 1999.
- [223] C. G. Gahmberg, M. Ekblom, and L. C. Andersson, “Differentiation of human erythroid cells is associated with increased o-glycosylation of the major sialoglycoprotein, glycophorin a,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 81, pp. 6752–6756, Nov. 1984.

- [224] R. A. Anderson and V. T. Marchesi, “Regulation of the association of membrane skeletal protein 4.1 with glycophorin by a polyphosphoinositide,” *Nature*, vol. 318, no. 6043, pp. 295–298, 1985.
- [225] X. An, M. Salomao, X. Guo, W. Gratzer, and N. Mohandas, “Tropomyosin modulates erythrocyte membrane stability,” *Blood*, vol. 109, pp. 1284–1288, 1 Feb. 2007.
- [226] I. Rouiller, X.-P. Xu, K. J. Amann, C. Egile, S. Nickell, D. Nicastro, R. Li, T. D. Pollard, N. Volkmann, and D. Hanein, “The structural basis of actin filament branching by the arp2/3 complex,” *J. Cell Biol.*, vol. 180, pp. 887–895, 10 Mar. 2008.
- [227] “Introduction to essentials of cell biology | learn science at scitable.” <http://www.nature.com/scitable/ebooks/essentials-of-cell-biology-14749010>. Accessed: 2017-8-17.
- [228] K. Burridge and M. Chrzanowska-Wodnicka, “Focal adhesions, contractility, and signaling,” *Annu. Rev. Cell Dev. Biol.*, vol. 12, pp. 463–518, 1996.
- [229] C. Brakebusch and R. Fässler, “The integrin-actin connection, an eternal love affair,” *EMBO J.*, vol. 22, pp. 2324–2333, 15 May 2003.
- [230] A. Byron, J. D. Humphries, J. A. Askari, S. E. Craig, A. Paul Mould, and M. J. Humphries, “Anti-integrin monoclonal antibodies,” *J. Cell Sci.*, vol. 122, pp. 4009–4011, 15 Nov. 2009.
- [231] N. E. Sanjana, O. Shalem, and F. Zhang, “Improved vectors and genome-wide libraries for CRISPR screening,” *Nat. Methods*, vol. 11, pp. 783–784, Aug. 2014.
- [232] H. Ma, Y. Dang, Y. Wu, G. Jia, E. Anaya, J. Zhang, S. Abraham, J.-G. Choi, G. Shi, L. Qi, N. Manjunath, and H. Wu, “A CRISPR-Based screen identifies genes essential for West-Nile-Virus-Induced cell death,” *Cell Rep.*, vol. 12, pp. 673–683, July 2015.
- [233] T. Hart, A. H. Y. Tong, K. Chan, J. Van Leeuwen, A. Seetharaman, M. Aregger, M. Chandrashekhar, N. Hustedt, S. Seth, A. Noonan, A. Habbid, O. Sizova, L. Nedyalkova, R. Climie, L. Tworzyanski, K. Lawson, M. A. Sartori, S. Alibeh, D. Tieu, S. Masud, P. Mero, A. Weiss, K. R. Brown, M. Usaj, M. Billmann, M. Rahman, M. Constanzo, C. L. Myers, B. J. Andrews, C. Boone, D. Durocher, and J. Moffat, “Evaluation and design of Genome-Wide CRISPR/SpCas9 knockout screens,” *G3*, vol. 7, pp. 2719–2727, Aug. 2017.
- [234] S. H. Ong, Y. Li, H. Koike-Yusa, and K. Yusa, “Optimised metrics for CRISPR-KO screens with second-generation gRNA libraries,” *Scientific Reports*, vol. 7, Aug. 2017.
- [235] A. Zotova, I. Zотов, A. Filatov, and D. Mazurov, “Determining antigen specificity of a monoclonal antibody using genome-scale CRISPR-Cas9 knockout library,” *J. Immunol. Methods*, vol. 439, pp. 8–14, Dec. 2016.

- [236] A. S. Puschnik, K. Majzoub, Y. S. Ooi, and J. E. Carette, “A CRISPR toolbox to study virus-host interactions,” *Nat. Rev. Microbiol.*, vol. 15, pp. 351–364, June 2017.
- [237] J. G. Beeson, D. R. Drew, M. J. Boyle, G. Feng, F. J. I. Fowkes, and J. S. Richards, “Merozoite surface proteins in red blood cell invasion, immunity and vaccines against malaria,” *FEMS Microbiol. Rev.*, vol. 40, pp. 343–372, May 2016.
- [238] C. Crosnier, M. Wanaguru, B. McDade, F. H. Osier, K. Marsh, J. C. Rayner, and G. J. Wright, “A library of functional recombinant cell-surface and secreted p. falciparum merozoite proteins,” *Mol. Cell. Proteomics*, vol. 12, pp. 3976–3986, Dec. 2013.
- [239] Z. A. Zenonos, J. C. Rayner, and G. J. Wright, “Towards a comprehensive plasmodium falciparum merozoite cell surface and secreted recombinant protein library,” *Malar. J.*, vol. 13, p. 93, 12 Mar. 2014.
- [240] A. J. Perrin, S. J. Bartholdson, and G. J. Wright, “P-selectin is a host receptor for plasmodium MSP7 ligands,” *Malar. J.*, vol. 14, p. 238, 5 June 2015.
- [241] A. F. Cowman, D. Berry, and J. Baum, “The cellular and molecular basis for malaria parasite invasion of the human red blood cell,” *J. Cell Biol.*, vol. 198, pp. 961–971, 17 Sept. 2012.
- [242] K. S. Reddy, E. Amlabu, A. K. Pandey, P. Mitra, V. S. Chauhan, and D. Gaur, “Multiprotein complex between the GPI-anchored CyRPA with PfRH5 and PfRipr is crucial for plasmodium falciparum erythrocyte invasion,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 112, pp. 1179–1184, 27 Jan. 2015.
- [243] L. Y. Bustamante, G. T. Powell, Y.-C. Lin, M. D. Macklin, N. Cross, A. Kemp, P. Cawkill, T. Sanderson, C. Crosnier, N. Muller-Sienert, O. K. Doumbo, B. Traore, P. D. Crompton, P. Cicuta, T. M. Tran, G. J. Wright, and J. C. Rayner, “Synergistic malaria vaccine combinations identified by systematic antigen screening,” *Proceedings of the National Academy of Sciences*, vol. 114, no. 45, pp. 12045–12050, 2017.
- [244] J. S. Richards and J. G. Beeson, “The future for blood-stage vaccines against malaria,” *Immunol. Cell Biol.*, vol. 87, pp. 377–390, July 2009.
- [245] L. Brass, “Understanding and evaluating platelet function,” *Hematology Am. Soc. Hematol. Educ. Program*, vol. 2010, pp. 387–396, 2010.
- [246] K. E. Wright, K. A. Hjerrild, J. Bartlett, A. D. Douglas, J. Jin, R. E. Brown, J. J. Illingworth, R. Ashfield, S. B. Clemmensen, W. A. de Jongh, S. J. Draper, and M. K. Higgins, “Structure of malaria invasion protein RH5 with erythrocyte basigin and blocking antibodies,” *Nature*, vol. 515, pp. 427–430, 20 Nov. 2014.
- [247] S. Kamiyama, T. Suda, R. Ueda, M. Suzuki, R. Okubo, N. Kikuchi, Y. Chiba, S. Goto, H. Toyoda, K. Saigo, M. Watanabe, H. Narimatsu,

- Y. Jigami, and S. Nishihara, "Molecular cloning and identification of 3'-phosphoadenosine 5'-phosphosulfate transporter," *J. Biol. Chem.*, vol. 278, pp. 25958–25963, 11 July 2003.
- [248] J. Baum, L. Chen, J. Healer, S. Lopaticki, M. Boyle, T. Triglia, F. Ehlgen, S. a. Ralph, J. G. Beeson, and A. F. Cowman, "Reticulocyte-binding protein homologue 5 - an essential adhesin involved in invasion of human erythrocytes by plasmodium falciparum," *Int. J. Parasitol.*, vol. 39, pp. 371–380, Feb. 2009.
- [249] J. D. Esko, K. Kimata, and U. Lindahl, "Proteoglycans and sulfated glycosaminoglycans," in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [250] M. Bernfield, M. Götte, P. W. Park, O. Reizes, M. L. Fitzgerald, J. Lincecum, and M. Zako, "Functions of cell surface heparan sulfate proteoglycans," *Annu. Rev. Biochem.*, vol. 68, pp. 729–777, 1 June 1999.
- [251] F. Foulquier, M. Amyere, J. Jaeken, R. Zeevaert, E. Schollen, V. Race, R. Bammens, W. Morelle, C. Rosnoblet, D. Legrand, D. Demaegd, N. Buist, D. Cheillan, N. Guffon, P. Morsomme, W. Annaert, H. H. Freeze, E. Van Schaftingen, M. Vikkula, and G. Matthijs, "TMEM165 deficiency causes a congenital disorder of glycosylation," *Am. J. Hum. Genet.*, vol. 91, pp. 15–26, 13 July 2012.
- [252] A. Nikolaev, T. McLaughlin, D. D. M. O'Leary, and M. Tessier-Lavigne, "APP binds DR6 to trigger axon pruning and neuron death via distinct caspases," *Nature*, vol. 457, pp. 981–989, 19 Feb. 2009.
- [253] R. J. O'Brien and P. C. Wong, "Amyloid precursor protein processing and alzheimer's disease," *Annu. Rev. Neurosci.*, vol. 34, pp. 185–204, 2011.
- [254] E. C. J. M. de Vet, S. A. B. Newland, P. A. Lyons, B. Aguado, and R. D. Campbell, "The cell surface receptor g6b, a member of the immunoglobulin superfamily, binds heparin," *FEBS Lett.*, vol. 579, pp. 2355–2358, 25 Apr. 2005.
- [255] S. A. Newland, I. C. Macaulay, A. R. Floto, E. C. de Vet, W. H. Ouwehand, N. A. Watkins, P. A. Lyons, and D. R. Campbell, "The novel inhibitory receptor G6B is expressed on the surface of platelets and attenuates platelet function in vitro," *Blood*, vol. 109, pp. 4806–4809, 1 June 2007.
- [256] S. Tahara-Hanaoka, K. Shibuya, Y. Onoda, H. Zhang, S. Yamazaki, A. Miyamoto, S.-I. Honda, L. L. Lanier, and A. Shibuya, "Functional characterization of DNAM-1 (CD226) interaction with its ligands PVR (CD155) and nectin-2 (PRR-2/CD112)," *Int. Immunol.*, vol. 16, pp. 533–538, Apr. 2004.
- [257] A. D. Bergemann, H. J. Cheng, R. Brambilla, R. Klein, and J. G. Flanagan, "ELF-2, a new member of the eph ligand family, is segmentally

- expressed in mouse embryos in the region of the hindbrain and newly forming somites," *Mol. Cell. Biol.*, vol. 15, pp. 4921–4929, Sept. 1995.
- [258] A. A. Boucard, S. Maxeiner, and T. C. Südhof, "Latrophilins function as heterophilic cell-adhesion molecules by binding to teneurins: regulation by alternative splicing," *J. Biol. Chem.*, vol. 289, pp. 387–402, 3 Jan. 2014.
- [259] I. Melero, W. W. Shuford, S. A. Newby, A. Aruffo, J. A. Ledbetter, K. E. Hellström, R. S. Mittler, and L. Chen, "Monoclonal antibodies against the 4-1BB t-cell activation molecule eradicate established tumors," *Nat. Med.*, vol. 3, pp. 682–685, June 1997.
- [260] A. Makkouk, C. Chester, and H. E. Kohrt, "Rationale for anti-CD137 cancer immunotherapy," *Eur. J. Cancer*, vol. 54, pp. 112–119, Feb. 2016.
- [261] H. R. Salih, S. G. Kosowski, V. F. Haluska, G. C. Starling, D. T. Loo, F. Lee, A. A. Aruffo, P. A. Trail, and P. A. Kiener, "Constitutive expression of functional 4-1BB (CD137) ligand on carcinoma cells," *J. Immunol.*, vol. 165, pp. 2903–2910, 1 Sept. 2000.
- [262] A. Kulane, H. P. Ekre, P. Perlmann, L. Rombo, M. Wahlgren, and B. Wahlin, "Effect of different fractions of heparin on plasmodium falciparum merozoite invasion of red blood cells in vitro," *Am. J. Trop. Med. Hyg.*, vol. 46, pp. 589–594, May 1992.
- [263] M. J. Boyle, J. S. Richards, P. R. Gilson, W. Chai, and J. G. Beeson, "Interactions with heparin-like molecules during erythrocyte invasion by plasmodium falciparum merozoites," *Blood*, vol. 115, pp. 4559–4568, 3 June 2010.
- [264] G. E. Weiss, P. R. Gilson, T. Taechalertpaisarn, W.-H. Tham, N. W. M. de Jong, K. L. Harvey, F. J. I. Fowkes, P. N. Barlow, J. C. Rayner, G. J. Wright, A. F. Cowman, and B. S. Crabb, "Revealing the sequence and resulting cellular morphology of Receptor-Ligand interactions during plasmodium falciparum invasion of erythrocytes," *PLoS Pathog.*, vol. 11, p. e1004670, 27 Feb. 2015.
- [265] S. M. de Boer, J. Kortekaas, C. A. M. de Haan, P. J. M. Rottier, R. J. M. Moormann, and B. J. Bosch, "Heparan sulfate facilitates rift valley fever virus entry into the cell," *J. Virol.*, vol. 86, pp. 13767–13771, Dec. 2012.
- [266] D. M. Rosmarin, J. E. Carette, A. J. Olive, M. N. Starnbach, T. R. Brummelkamp, and H. L. Ploegh, "Attachment of chlamydia trachomatis L2 to host cells requires sulfation," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 109, pp. 10059–10064, 19 June 2012.
- [267] V. B. Carruthers, S. Håkansson, O. K. Giddings, and L. D. Sibley, "Toxoplasma gondii uses sulfated proteoglycans for substrate and host cell attachment," *Infect. Immun.*, vol. 68, pp. 4005–4011, July 2000.
- [268] A. Barragan, V. Fernandez, Q. Chen, A. von Euler, M. Wahlgren, and D. Spillmann, "The duffy-binding-like domain 1 of plasmodium falciparum

- erythrocyte membrane protein 1 (PfEMP1) is a heparan sulfate ligand that requires 12 mers for binding,” *Blood*, vol. 95, pp. 3594–3599, 1 June 2000.
- [269] K. Kobayashi, K. Kato, T. Sugi, H. Takemae, K. Pandey, H. Gong, Y. Tohya, and H. Akashi, “Plasmodium falciparum BAEBL binds to heparan sulfate proteoglycans on the human erythrocyte surface,” *J. Biol. Chem.*, vol. 285, pp. 1716–1725, 15 Jan. 2010.
- [270] K. Kobayashi, R. Takano, H. Takemae, T. Sugi, A. Ishiwa, H. Gong, F. C. Recuenco, T. Iwanaga, T. Horimoto, H. Akashi, and K. Kato, “Analyses of interactions between heparin and the apical surface proteins of plasmodium falciparum,” *Sci. Rep.*, vol. 3, p. 3178, 11 Nov. 2013.
- [271] J. D. Esko and R. J. Linhardt, “Proteins that bind sulfated glycosaminoglycans,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [272] W.-H. Tham, D. W. Wilson, S. Lopaticki, C. Q. Schmidt, P. B. Tetteh-Quarcoo, P. N. Barlow, D. Richard, J. E. Corbin, J. G. Beeson, and A. F. Cowman, “Complement receptor 1 is the host erythrocyte receptor for plasmodium falciparum PfRh4 invasion ligand,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 107, pp. 17327–17332, 5 Oct. 2010.
- [273] D. M. Ornitz, “FGFs, heparan sulfate and FGFRs: complex interactions essential for development,” *Bioessays*, vol. 22, pp. 108–112, Feb. 2000.
- [274] S. Rashi-Elkeles, R. Elkon, S. Shavit, Y. Lerenthal, C. Linhart, A. Kuperstein, N. Amariglio, G. Rechavi, R. Shamir, and Y. Shiloh, “Transcriptional modulation induced by ionizing radiation: p53 remains a central player,” *Mol. Oncol.*, vol. 5, pp. 336–348, 1 Aug. 2011.
- [275] D. R. Burt and G. L. Kamatchi, “GABAA receptor subtypes: from pharmacology to molecular biology,” *FASEB J.*, vol. 5, pp. 2916–2923, Nov. 1991.
- [276] N. G. Bowery, B. Bettler, W. Froestl, J. P. Gallagher, F. Marshall, M. Raiteri, T. I. Bonner, and S. J. Enna, “International union of pharmacology. XXXIII. mammalian gamma-aminobutyric acid(b) receptors: structure and function,” *Pharmacol. Rev.*, vol. 54, pp. 247–264, June 2002.
- [277] N. G. Bowery and S. J. Enna, “gamma-aminobutyric acid(b) receptors: first of the functional metabotropic heterodimers,” *J. Pharmacol. Exp. Ther.*, vol. 292, pp. 2–7, Jan. 2000.
- [278] T. Galvez, B. Duthey, J. Kniazeff, J. Blahos, G. Rovelli, B. Bettler, L. Prézeau, and J. P. Pin, “Allosteric interactions between GB1 and GB2 subunits are required for optimal GABA(B) receptor function,” *EMBO J.*, vol. 20, pp. 2152–2159, 1 May 2001.

- [279] R. Vigot, S. Barbieri, H. Bräuner-Osborne, R. Turecek, R. Shigemoto, Y.-P. Zhang, R. Luján, L. H. Jacobson, B. Biermann, J.-M. Fritschy, C.-M. Vacher, M. Müller, G. Sansig, N. Guetg, J. F. Cryan, K. Kaupmann, M. Gassmann, T. G. Oertner, and B. Bettler, “Differential compartmentalization and distinct functions of GABAB receptor variants,” *Neuron*, vol. 50, pp. 589–601, 18 May 2006.
- [280] M. Gassmann and B. Bettler, “Regulation of neuronal GABA(B) receptor functions by subunit composition,” *Nat. Rev. Neurosci.*, vol. 13, pp. 380–394, 18 May 2012.
- [281] S. Ghose, M. K. Winter, K. E. McCarson, C. A. Tamminga, and S. J. Enna, “The GABA β receptor as a target for antidepressant drug action,” *Br. J. Pharmacol.*, vol. 162, pp. 1–17, Jan. 2011.
- [282] S. S. Ferguson, “Evolving concepts in G protein-coupled receptor endocytosis: the role in receptor desensitization and signaling,” *Pharmacol. Rev.*, vol. 53, pp. 1–24, Mar. 2001.
- [283] M. von Zastrow, “Mechanisms regulating membrane trafficking of G protein-coupled receptors in the endocytic pathway,” *Life Sci.*, vol. 74, pp. 217–224, 5 Dec. 2003.
- [284] B. P. Fairfax, J. A. Pitcher, M. G. H. Scott, A. R. Calver, M. N. Pangalos, S. J. Moss, and A. Couve, “Phosphorylation and chronic agonist treatment atypically modulate GABAB receptor cell surface stability,” *J. Biol. Chem.*, vol. 279, pp. 12565–12573, 26 Mar. 2004.
- [285] J. Perroy, L. Adam, R. Qanbar, S. Chénier, and M. Bouvier, “Phosphorylation-independent desensitization of GABA(B) receptor by GRK4,” *EMBO J.*, vol. 22, pp. 3816–3824, 1 Aug. 2003.
- [286] J. González-Maeso, A. Wise, A. Green, and J. A. Koenig, “Agonist-induced desensitization and endocytosis of heterodimeric GABAB receptors in CHO-K1 cells,” *Eur. J. Pharmacol.*, vol. 481, pp. 15–23, 14 Nov. 2003.
- [287] S. Laffray, K. Tan, J. Dulluc, R. Bouali-Benazzouz, A. R. Calver, F. Nagy, and M. Landry, “Dissociation and trafficking of rat GABAB receptor heterodimer upon chronic capsaicin stimulation,” *Eur. J. Neurosci.*, vol. 25, pp. 1402–1416, Mar. 2007.
- [288] K. J. Vargas, M. Terunuma, J. A. Tello, M. N. Pangalos, S. J. Moss, and A. Couve, “The availability of surface GABAB receptors is independent of γ -Aminobutyric acid but controlled by glutamate in central neurons,” *J. Biol. Chem.*, vol. 283, pp. 24641–24648, 5 Sept. 2008.
- [289] T. Grampp, K. Sauter, B. Markovic, and D. Benke, “Gamma-aminobutyric acid type B receptors are constitutively internalized via the clathrin-dependent pathway and targeted to lysosomes for degradation,” *J. Biol. Chem.*, vol. 282, pp. 24157–24165, 17 Aug. 2007.

- [290] S. Balasubramanian, J. A. Teissére, D. V. Raju, and R. A. Hall, “Hetero-oligomerization between GABAA and GABAB receptors regulates GABAB receptor trafficking,” *J. Biol. Chem.*, vol. 279, pp. 18840–18850, 30 Apr. 2004.
- [291] T. Grampp, V. Notz, I. Broll, N. Fischer, and D. Benke, “Constitutive, agonist-accelerated, recycling and lysosomal degradation of GABA(B) receptors in cortical neurons,” *Mol. Cell. Neurosci.*, vol. 39, pp. 628–637, Dec. 2008.
- [292] S. Hannan, M. E. Wilkins, E. Dehghani-Tafti, P. Thomas, S. M. Baddeley, and T. G. Smart, “Gamma-aminobutyric acid type B (GABA(B)) receptor internalization is regulated by the R2 subunit,” *J. Biol. Chem.*, vol. 286, pp. 24324–24335, 8 July 2011.
- [293] M. Terunuma, K. J. Vargas, M. E. Wilkins, O. A. Ramírez, M. Jaureguierry-Bravo, M. N. Pangalos, T. G. Smart, S. J. Moss, and A. Couve, “Prolonged activation of NMDA receptors promotes dephosphorylation and alters postendocytic sorting of GABAB receptors,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 107, pp. 13918–13923, Aug. 2010.
- [294] S. K. Shenoy, P. H. McDonald, T. A. Kohout, and R. J. Lefkowitz, “Regulation of receptor fate by ubiquitination of activated beta 2-adrenergic receptor and beta-arrestin,” *Science*, vol. 294, pp. 1307–1313, Nov. 2001.
- [295] S. Sarker, K. Xiao, and S. K. Shenoy, “A tale of two sites: How ubiquitination of a G protein-coupled receptor is coupled to its lysosomal trafficking from distinct receptor domains,” *Commun. Integr. Biol.*, vol. 4, pp. 528–531, Sept. 2011.
- [296] J. F. Nabhan, H. Pan, and Q. Lu, “Arrestin domain-containing protein 3 recruits the NEDD4 E3 ligase to mediate ubiquitination of the beta2-adrenergic receptor,” *EMBO Rep.*, vol. 11, pp. 605–611, Aug. 2010.
- [297] M. R. Dores and J. Trejo, “Atypical regulation of G protein-coupled receptor intracellular trafficking by ubiquitination,” *Curr. Opin. Cell Biol.*, vol. 27, pp. 44–50, Apr. 2014.
- [298] K. Zemoura, C. Trümpler, and D. Benke, “Lys-63-linked ubiquitination of γ -Aminobutyric acid (GABA), type b1, at multiple sites by the E3 ligase mind bomb-2 targets GABAB receptors to lysosomal degradation,” *J. Biol. Chem.*, vol. 291, pp. 21682–21693, Oct. 2016.
- [299] N. Lahaie, M. Kralikova, L. Prézeau, J. Blahos, and M. Bouvier, “Post-endocytotic deubiquitination and degradation of the metabotropic γ -Aminobutyric acid receptor by the ubiquitin-specific protease 14,” *J. Biol. Chem.*, vol. 291, pp. 7156–7170, Mar. 2016.
- [300] P. Ghosh, N. M. Dahms, and S. Kornfeld, “Mannose 6-phosphate receptors: new twists in the tale,” *Nat. Rev. Mol. Cell Biol.*, vol. 4, pp. 202–212, Mar. 2003.

- [301] A. Varki and S. Kornfeld, “P-type lectins,” in *Essentials of Glycobiology* (A. Varki, R. D. Cummings, J. D. Esko, H. H. Freeze, P. Stanley, C. R. Bertozzi, G. W. Hart, and M. E. Etzler, eds.), Cold Spring Harbor (NY): Cold Spring Harbor Laboratory Press, 20 Mar. 2010.
- [302] J. Brown, E. Y. Jones, and B. E. Forbes, “Interactions of IGF-II with the IGF2R/cation-independent mannose-6-phosphate receptor mechanism and biological outcomes,” *Vitam. Horm.*, vol. 80, pp. 699–719, 2009.
- [303] N. M. Dahms and M. K. Hancock, “P-type lectins,” *Biochim. Biophys. Acta*, vol. 1572, pp. 317–340, 19 Sept. 2002.
- [304] P. A. Dennis and D. B. Rifkin, “Cellular activation of latent transforming growth factor beta requires binding to the cation-independent mannose 6-phosphate/insulin-like growth factor type II receptor,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 88, pp. 580–584, 15 Jan. 1991.
- [305] F. Blanchard, S. Raher, L. Duplomb, P. Vusio, V. Pitard, J. L. Taupin, J. F. Moreau, B. Hoflack, S. Minvielle, Y. Jacques, and A. Godard, “The mannose 6-phosphate/insulin-like growth factor II receptor is a nanomolar affinity receptor for glycosylated human leukemia inhibitory factor,” *J. Biol. Chem.*, vol. 273, pp. 20886–20893, 14 Aug. 1998.
- [306] F. Blanchard, L. Duplomb, S. Raher, P. Vusio, B. Hoflack, Y. Jacques, and A. Godard, “Mannose 6-Phosphate/Insulin-like growth factor II receptor mediates internalization and degradation of leukemia inhibitory factor but not signal transduction,” *J. Biol. Chem.*, vol. 274, pp. 24685–24693, 27 Aug. 1999.
- [307] H. Ikushima, Y. Munakata, T. Ishii, S. Iwata, M. Terashima, H. Tanaka, S. F. Schlossman, and C. Morimoto, “Internalization of CD26 by mannose 6-phosphate/insulin-like growth factor II receptor contributes to T cell activation,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 97, pp. 8439–8444, 18 July 2000.
- [308] B. Motyka, G. Korbutt, M. J. Pinkoski, J. A. Heibein, A. Caputo, M. Hobman, M. Barry, I. Shostak, T. Sawchuk, C. F. B. Holmes, J. Gauldie, and R. C. Bleackley, “Mannose 6-Phosphate/Insulin-like growth factor II receptor is a death receptor for granzyme B during cytotoxic T Cell–Induced apoptosis,” *Cell*, vol. 103, pp. 491–500, 27 Oct. 2000.
- [309] C. R. Brunetti, R. L. Burke, S. Kornfeld, W. Gregory, F. R. Masiarz, K. S. Dingwell, and D. C. Johnson, “Herpes simplex virus glycoprotein D acquires mannose 6-phosphate residues and binds to mannose 6-phosphate receptors,” *J. Biol. Chem.*, vol. 269, pp. 17067–17074, 24 June 1994.
- [310] R. G. MacDonald, S. R. Pfeffer, L. Coussens, M. A. Tepper, C. M. Brocklebank, J. E. Mole, J. K. Anderson, E. Chen, M. P. Czech, and A. Ullrich, “A single receptor binds both insulin-like growth factor II and mannose-6-phosphate,” *Science*, vol. 239, pp. 1134–1137, 4 Mar. 1988.

- [311] P. Y. Tong, S. E. Tollefsen, and S. Kornfeld, “The cation-independent mannose 6-phosphate receptor binds insulin-like growth factor II,” *J. Biol. Chem.*, vol. 263, pp. 2585–2588, 25 Feb. 1988.
- [312] D. O. Morgan, J. C. Edman, D. N. Standring, V. A. Fried, M. C. Smith, R. A. Roth, and W. J. Rutter, “Insulin-like growth factor II receptor as a multifunctional binding protein,” *Nature*, vol. 329, no. 6137, pp. 301–307, 1987.
- [313] J. X. Kang, Y. Li, and A. Leaf, “Mannose-6-phosphate/insulin-like growth factor-II receptor is a receptor for retinoic acid,” *Proceedings of the National Academy of Sciences*, vol. 94, pp. 13671–13676, 9 Dec. 1997.
- [314] A. Nykjaer, E. I. Christensen, H. Vorum, H. Hager, C. M. Petersen, H. Rørigaard, H. Y. Min, F. Vilhardt, L. B. Møller, S. Kornfeld, and J. Gliemann, “Mannose 6-phosphate/insulin-like growth factor-II receptor targets the urokinase receptor to lysosomes via a novel binding interaction,” *J. Cell Biol.*, vol. 141, pp. 815–828, 4 May 1998.
- [315] S. Godár, V. Horejsi, U. H. Weidle, B. R. Binder, C. Hansmann, and H. Stockinger, “M6P/IGFII-receptor complexes urokinase receptor and plasminogen for activation of transforming growth factor-beta1,” *Eur. J. Immunol.*, vol. 29, pp. 1004–1013, Mar. 1999.
- [316] M. Forgac, “Vacuolar ATPases: rotary proton pumps in physiology and pathophysiology,” *Nat. Rev. Mol. Cell Biol.*, vol. 8, pp. 917–929, Nov. 2007.
- [317] J. A. Solinger and A. Spang, “Tethering complexes in the endocytic pathway: CORVET and HOPS,” *FEBS J.*, vol. 280, pp. 2743–2757, 1 June 2013.
- [318] B. Reaves and G. Banting, “Vacuolar ATPase inactivation blocks recycling to the trans-golgi network from the plasma membrane,” *FEBS Lett.*, vol. 345, pp. 61–66, 23 May 1994.
- [319] M. Merkulova, T. G. Păunescu, A. Azroyan, V. Marshansky, S. Breton, and D. Brown, “Mapping the h(+) (V)-ATPase interactome: identification of proteins involved in trafficking, folding, assembly and phosphorylation,” *Sci. Rep.*, vol. 5, p. 14827, 7 Oct. 2015.
- [320] C. Hawkes and S. Kar, “The insulin-like growth factor-II/mannose-6-phosphate receptor: structure, distribution and function in the central nervous system,” *Brain Res. Brain Res. Rev.*, vol. 44, pp. 117–140, Mar. 2004.
- [321] M. Jadot, W. M. Canfield, W. Gregory, and S. Kornfeld, “Characterization of the signal for rapid internalization of the bovine mannose 6-phosphate/insulin-like growth factor-II receptor,” *J. Biol. Chem.*, vol. 267, pp. 11069–11077, 5 June 1992.

- [322] P. Ramoino, P. Bianchini, A. Diaspro, and C. Usai, “Visualizing GABAB receptor internalization and intracellular trafficking,” in *Visualization Techniques: From Immunohistochemistry to Magnetic Resonance Imaging* (E. Badoer, ed.), pp. 71–95, Totowa, NJ: Humana Press, 2012.
- [323] R. C. Orchard, C. B. Wilen, J. G. Doench, M. T. Baldridge, B. T. McCune, Y.-C. J. Lee, S. Lee, S. M. Pruett-Miller, C. A. Nelson, D. H. Fremont, and H. W. Virgin, “Discovery of a proteinaceous cellular receptor for a norovirus,” *Science*, vol. 353, pp. 933–936, 26 Aug. 2016.
- [324] K. Haga, A. Fujimoto, R. Takai-Todaka, M. Miki, Y. H. Doan, K. Murakami, M. Yokoyama, K. Murata, A. Nakanishi, and K. Katayama, “Functional receptor molecules CD300lf and CD300ld within the CD300 family enable murine noroviruses to infect cells,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 113, pp. E6248–E6255, 11 Oct. 2016.
- [325] L. M. Duncan, R. T. Timms, E. Zavodszky, F. Cano, G. Dougan, F. Rando, and P. J. Lehner, “Fluorescence-Based phenotypic selection allows forward genetic screens in haploid human cells,” *PLoS One*, vol. 7, p. e39651, 22 June 2012.
- [326] P.-H. Kuhn, M. Voss, M. Haug-Kröper, B. Schröder, U. Schepers, S. Bräse, C. Haass, S. F. Lichtenthaler, and R. Flührer, “Secretome analysis identifies novel signal peptide Peptidase-Like 3 (SPPL3) substrates and reveals a role of SPPL3 in multiple golgi glycosylation pathways,” *Mol. Cell. Proteomics*, vol. 14, pp. 1584–1598, 1 June 2015.
- [327] M. A. Cohn, Y. Kee, W. Haas, S. P. Gygi, and A. D. D’Andrea, “UAF1 is a subunit of multiple deubiquitinating enzyme complexes,” *J. Biol. Chem.*, vol. 284, pp. 5343–5351, 20 Feb. 2009.
- [328] M. A. Cohn, P. Kowal, K. Yang, W. Haas, T. T. Huang, S. P. Gygi, and A. D. D’Andrea, “A UAF1-containing multisubunit protein complex regulates the fanconi anemia pathway,” *Mol. Cell*, vol. 28, pp. 786–797, 14 Dec. 2007.
- [329] M. E. Wilkins, X. Li, and T. G. Smart, “Tracking cell surface GABAB receptors using an alpha-bungarotoxin tag,” *J. Biol. Chem.*, vol. 283, pp. 34745–34752, 12 Dec. 2008.
- [330] S. Hannan, M. E. Wilkins, and T. G. Smart, “Sushi domains confer distinct trafficking profiles on GABAB receptors,” *Proc. Natl. Acad. Sci. U. S. A.*, vol. 109, pp. 12171–12176, 24 July 2012.
- [331] J. S. Bonifacino and L. M. Traub, “Signals for sorting of transmembrane proteins to endosomes and lysosomes,” *Annu. Rev. Biochem.*, vol. 72, pp. 395–447, 6 Mar. 2003.
- [332] S. B. Hannan, *Cell Surface Mobility of GABAB Receptors*. PhD thesis, University College London, 2011.
- [333] I. L. Arancibia-Cárcamo, B. P. Fairfax, S. J. Moss, and J. T. Kittler, “Studying the localization, surface stability and endocytosis of neurotransmitter

receptors by antibody labeling and biotinylation approaches," in *The Dynamic Synapse: Molecular Methods in Ionotropic Receptor Biology* (J. T. Kittler and S. J. Moss, eds.), Boca Raton (FL): CRC Press/Taylor & Francis, 5 Jan. 2011.

