

References

- Adams, G. P., McCartney, J. E., Tai, M. S., Oppermann, H., Huston, J. S., Stafford, W. F. d., Bookman, M. A., Fand, I., Houston, L. L. & Weiner, L. M. (1993). Highly specific in vivo tumor targeting by monovalent and divalent forms of 741F8 anti-c-erbB-2 single-chain Fv. *Cancer Res* 53, 4026-34.
- Adams, G. P., Schier, R., McCall, A. M., Simmons, H. H., Horak, E. M., Alpaugh, R. K., Marks, J. D. & Weiner, L. M. (2001). High affinity restricts the localization and tumor penetration of single-chain fv antibody molecules. *Cancer Res* 61, 4750-5.
- Adams, G. P., Shaller, C. C., Chappell, L. L., Wu, C., Horak, E. M., Simmons, H. H., Litwin, S., Marks, J. D., Weiner, L. M. & Brechbiel, M. W. (2000). Delivery of the alpha-emitting radioisotope bismuth-213 to solid tumors via single-chain Fv and diabody molecules. *Nucl Med Biol* 27, 339-46.
- Afanasieva, T. A., Wittmer, M., Vitaliti, A., Ajmo, M., Neri, D. & Klemenz, R. (2003). Single-chain antibody and its derivatives directed against vascular endothelial growth factor: application for antiangiogenic gene therapy. *Gene Ther* 10, 1850-9.
- Amstutz, P., Forrer, P., Zahnd, C. & Pluckthun, A. (2001). In vitro display technologies: novel developments and applications. *Curr Opin Biotechnol* 12, 400-5.
- Arbabi Ghahroudi, M., Desmyter, A., Wyns, L., Hamers, R. & Muyldermaans, S. (1997). Selection and identification of single domain antibody fragments from camel heavy-chain antibodies. *FEBS Lett* 414, 521-6.
- Ashmole, I., Gallimore, P. H. & Roberts, S. (1998). Identification of conserved hydrophobic C-terminal residues of the human papillomavirus type 1 E1E4 protein necessary for E4 oligomerisation in vivo. *Virology* 240, 221-31.
- Atwell, J. L., Breheny, K. A., Lawrence, L. J., McCoy, A. J., Kortt, A. A. & Hudson, P. J. (1999). scFv multimers of the anti-neuraminidase antibody NC10: length of the linker between VH and VL domains dictates precisely the transition between diabodies and triabodies. *Protein Eng* 12, 597-604.
- Atwell, J. L., Pearce, L. A., Lah, M., Gruen, L. C., Kortt, A. A. & Hudson, P. J. (1996). Design and expression of a stable bispecific scFv dimer with affinity for both glycophorin and N9 neuraminidase. *Mol Immunol* 33, 1301-12.
- Baek, H., Suk, K. H., Kim, Y. H. & Cha, S. (2002). An improved helper phage system for efficient isolation of specific antibody molecules in phage display. *Nucleic Acids Res* 30, e18.
- Baldus, S. E., Hanisch, F. G., Kotlarek, G. M., Zirbes, T. K., Thiele, J., Isenberg, J., Karsten, U. R., Devine, P. L. & Dienes, H. P. (1998). Coexpression of MUC1 mucin peptide core and the Thomsen-Friedenreich antigen in colorectal neoplasms. *Cancer* 82, 1019-27.
- Baldus, S. E., Zirbes, T. K., Glossmann, J., Fromm, S., Hanisch, F. G., Monig, S. P., Schroder, W., Schneider, P. M., Flucke, U., Karsten, U., Thiele, J., Holscher, A. H. & Dienes, H. P. (2001). Immunoreactivity of monoclonal antibody BW835 represents a marker of progression and prognosis in early gastric cancer. *Oncology* 61, 147-55.
- Baldus, S. E., Zirbes, T. K., Hanisch, F. G., Kunze, D., Shafizadeh, S. T., Nolden, S., Monig, S. P., Schneider, P. M., Karsten, U., Thiele, J., Holscher, A. H. & Dienes, H. P. (2000). Thomsen-Friedenreich antigen presents as a prognostic factor in colorectal carcinoma: A clinicopathologic study of 264 patients. *Cancer* 88, 1536-43.

- Balint, R. F. & Larrick, J. W. (1993). Antibody engineering by parsimonious mutagenesis. *Gene* 137, 109-18.
- Barbas, C. F. d., Bain, J. D., Hoekstra, D. M. & Lerner, R. A. (1992). Semisynthetic combinatorial antibody libraries: a chemical solution to the diversity problem. *Proc Natl Acad Sci U S A* 89, 4457-61.
- Barbas, C. F. d., Collet, T. A., Amberg, W., Roben, P., Binley, J. M., Hoekstra, D., Cababa, D., Jones, T. M., Williamson, R. A., Pilkington, G. R. & et al. (1993). Molecular profile of an antibody response to HIV-1 as probed by combinatorial libraries. *J Mol Biol* 230, 812-23.
- Barbas, C. F. r., Hu, D., Dunlop, N., Sawyer, L., Cababa, D., Hendry, R. M., Nara, P. L. & Burton, D. R. (1994). In vitro evolution of a neutralizing human antibody to human immunodeficiency virus type 1 to enhance affinity and broaden strain cross-reactivity. *Proc Natl Acad Sci U S A* 91, 3809-13.
- Bass, S., Greene, R. & Wells, J. A. (1990). Hormone phage: an enrichment method for variant proteins with altered binding properties. *Proteins* 8, 309-14.
- Batra, S. K., Jain, M., Wittel, U. A., Chauhan, S. C. & Colcher, D. (2002). Pharmacokinetics and biodistribution of genetically engineered antibodies. *Curr Opin Biotechnol* 13, 603-8.
- Becerril, B., Poul, M. A. & Marks, J. D. (1999). Toward selection of internalizing antibodies from phage libraries. *Biochem Biophys Res Commun* 255, 386-93.
- Behr, T. M., Behe, M., Stabin, M. G., Wehrmann, E., Apostolidis, C., Molinet, R., Strutz, F., Fayyazi, A., Wieland, E., Gratz, S., Koch, L., Goldenberg, D. M. & Becker, W. (1999). High-linear energy transfer (LET) alpha versus low-LET beta emitters in radioimmunotherapy of solid tumors: therapeutic efficacy and dose-limiting toxicity of 213Bi- versus 90Y-labeled CO17-1A Fab' fragments in a human colonic cancer model. *Cancer Res* 59, 2635-43.
- Behr, T. M., Sharkey, R. M., Juweid, M. E., Blumenthal, R. D., Dunn, R. M., Griffiths, G. L., Bair, H. J., Wolf, F. G., Becker, W. S. & Goldenberg, D. M. (1995). Reduction of the renal uptake of radiolabeled monoclonal antibody fragments by cationic amino acids and their derivatives. *Cancer Res* 55, 3825-34.
- Behr, T. M., Sharkey, R. M., Sgouros, G., Blumenthal, R. D., Dunn, R. M., Kolbert, K., Griffiths, G. L., Siegel, J. A., Becker, W. S. & Goldenberg, D. M. (1997). Overcoming the nephrotoxicity of radiometal-labeled immunoconjugates: improved cancer therapy administered to a nude mouse model in relation to the internal radiation dosimetry. *Cancer* 80, 2591-610.
- Beresford, G. W., Pavlinkova, G., Booth, B. J., Batra, S. K. & Colcher, D. (1999). Binding characteristics and tumor targeting of a covalently linked divalent CC49 single-chain antibody. *Int J Cancer* 81, 911-7.
- Better, M., Chang, C. P., Robinson, R. R. & Horwitz, A. H. (1988). Escherichia coli secretion of an active chimeric antibody fragment. *Science* 240, 1041-3.
- Beuth, J., Ko, H. L., Schirrmacher, V., Uhlenbruck, G. & Pulverer, G. (1988). Inhibition of liver tumor cell colonization in two animal tumor models by lectin blocking with D-galactose or arabinogalactan. *Clin Exp Metastasis* 6, 115-20.
- Binetruy-Tournaire, R., Demangel, C., Malavaud, B., Vassy, R., Rouyre, S., Kraemer, M., Plouet, J., Derbin, C., Perret, G. & Mazie, J. C. (2000). Identification of a peptide blocking vascular endothelial growth factor (VEGF)-mediated angiogenesis. *Embo J* 19, 1525-33.

- Bird, R. E., Hardman, K. D., Jacobson, J. W., Johnson, S., Kaufman, B. M., Lee, S. M., Lee, T., Pope, S. H., Riordan, G. S. & Whitlow, M. (1988). Single-chain antigen-binding proteins [published erratum appears in *Science* 1989 Apr 28;244(4903):409]. *Science* 242, 423-6.
- Boder, E. T., Midelfort, K. S. & Wittrup, K. D. (2000). Directed evolution of antibody fragments with monovalent femtomolar antigen-binding affinity. *Proc Natl Acad Sci U S A* 97, 10701-5.
- Boder, E. T. & Wittrup, K. D. (1997). Yeast surface display for screening combinatorial polypeptide libraries. *Nat Biotechnol* 15, 553-7.
- Borsi, L., Balza, E., Bestagno, M., Castellani, P., Carnemolla, B., Biro, A., Leprini, A., Sepulveda, J., Burrone, O., Neri, D. & Zardi, L. (2002). Selective targeting of tumoral vasculature: comparison of different formats of an antibody (L19) to the ED-B domain of fibronectin. *Int J Cancer* 102, 75-85.
- Bothmann, H. & Pluckthun, A. (1998). Selection for a periplasmic factor improving phage display and functional periplasmic expression. *Nat Biotechnol* 16, 376-80.
- Bovin, N. V. (1998). Polyacrylamide-based glycoconjugates as tools in glycobiology. *Glycoconj J* 15, 431-46.
- Braunagel, M. & Little, M. (1997). Construction of a semisynthetic antibody library using trinucleotide oligos. *Nucleic Acids Res* 25, 4690-1.
- Brissette, J. L. & Russel, M. (1990). Secretion and membrane integration of a filamentous phage-encoded morphogenetic protein. *J Mol Biol* 211, 565-80.
- Brockhausen, I. (2000). O-linked chain glycosyltransferases. *Methods Mol Biol* 125, 273-93.
- Brockhausen, I., Romero, P. A. & Herscovics, A. (1991). Glycosyltransferase changes upon differentiation of CaCo-2 human colonic adenocarcinoma cells. *Cancer Res* 51, 3136-42.
- Brockhausen, I., Yang, J. M., Burchell, J., Whitehouse, C. & Taylor-Papadimitriou, J. (1995). Mechanisms underlying aberrant glycosylation of MUC1 mucin in breast cancer cells. *Eur J Biochem* 233, 607-17.
- Burton, D. R., Pyati, J., Koduri, R., Sharp, S. J., Thornton, G. B., Parren, P. W., Sawyer, L. S., Hendry, R. M., Dunlop, N., Nara, P. L. & et al. (1994). Efficient neutralization of primary isolates of HIV-1 by a recombinant human monoclonal antibody. *Science* 266, 1024-7.
- Butschak, G. & Karsten, U. (2002). Isolation and characterization of thomsen-friedenreich-specific antibodies from human serum. *Tumour Biol* 23, 113-22.
- Cai, X. & Garen, A. (1995). Anti-melanoma antibodies from melanoma patients immunized with genetically modified autologous tumor cells: selection of specific antibodies from single-chain Fv fusion phage libraries. *Proc Natl Acad Sci U S A* 92, 6537-41.
- Cao, Y., Karsten, U., Otto, G. & Bannasch, P. (1999). Expression of MUC1, Thomsen-Friedenreich antigen, Tn, sialosyl-Tn, and alpha2,6-linked sialic acid in hepatocellular carcinomas and preneoplastic hepatocellular lesions. *Virchows Arch* 434, 503-9.
- Cao, Y., Karsten, U., Zerban, H. & Bannasch, P. (2000). Expression of MUC1, Thomsen-Friedenreich-related antigens, and cytokeratin 19 in human renal cell carcinomas and tubular clear cell lesions. *Virchows Arch* 436, 119-26.
- Cao, Y., Karsten, U. R., Liebrich, W., Haensch, W., Springer, G. F. & Schlag, P. M. (1995). Expression of Thomsen-Friedenreich-related antigens in primary and metastatic colorectal carcinomas. A reevaluation. *Cancer* 76, 1700-8.

- Cao, Y., Stosiek, P., Springer, G. F. & Karsten, U. (1996). Thomsen-Friedenreich-related carbohydrate antigens in normal adult human tissues: a systematic and comparative study. *Histochem Cell Biol* 106, 197-207.
- Carcamo, J., Ravera, M. W., Brissette, R., Dedova, O., Beasley, J. R., Alam-Moghe, A., Wan, C., Blume, A. & Manddecki, W. (1998). Unexpected frameshifts from gene to expressed protein in a phage- displayed peptide library. *Proc Natl Acad Sci U S A* 95, 11146-51.
- Carter, P. & Merchant, A. M. (1997). Engineering antibodies for imaging and therapy. *Curr Opin Biotechnol* 8, 449-54.
- Chen, G., Hayhurst, A., Thomas, J. G., Harvey, B. R., Iverson, B. L. & Georgiou, G. (2001). Isolation of high-affinity ligand-binding proteins by periplasmic expression with cytometric screening (PECS). *Nat Biotechnol* 19, 537-42.
- Chothia, C. & Lesk, A. M. (1987). Canonical structures for the hypervariable regions of immunoglobulins. *J Mol Biol* 196, 901-17.
- Chothia, C., Lesk, A. M., Gherardi, E., Tomlinson, I. M., Walter, G., Marks, J. D., Llewelyn, M. B. & Winter, G. (1992). Structural repertoire of the human VH segments. *J Mol Biol* 227, 799-817.
- Chothia, C., Lesk, A. M., Tramontano, A., Levitt, M., Smith-Gill, S. J., Air, G., Sheriff, S., Padlan, E. A., Davies, D., Tulip, W. R. & et al. (1989). Conformations of immunoglobulin hypervariable regions [see comments]. *Nature* 342, 877-83.
- Clackson, T., Hoogenboom, H. R., Griffiths, A. D. & Winter, G. (1991). Making antibody fragments using phage display libraries. *Nature* 352, 624-8 issn: 0028-0836.
- Clarke, K., Lee, F. T., Brechbiel, M. W., Smyth, F. E., Old, L. J. & Scott, A. M. (2000). In vivo biodistribution of a humanized anti-Lewis Y monoclonal antibody (hu3S193) in MCF-7 xenografted BALB/c nude mice. *Cancer Res* 60, 4804-11.
- Click, E. M. & Webster, R. E. (1997). Filamentous phage infection: required interactions with the TolA protein. *J Bacteriol* 179, 6464-71.
- Click, E. M. & Webster, R. E. (1998). The TolQRA proteins are required for membrane insertion of the major capsid protein of the filamentous phage f1 during infection. *J Bacteriol* 180, 1723-8.
- Cloutier, S. M., Couty, S., Terskikh, A., Marguerat, L., Crivelli, V., Pugnieres, M., Mani, J., Leisinger, H., Mach, J. P. & Deperthes, D. (2000). Streptobody, a high avidity molecule made by tetramerization of in vivo biotinylated, phage display-selected scFv fragments on streptavidin. *Mol Immunol* 37, 1067-77.
- Coloma, M. J. & Morrison, S. L. (1997). Design and production of novel tetravalent bispecific antibodies. *Nat Biotechnol* 15, 159-63.
- Coltart, D. M., Royyuru, A. K., Williams, L. J., Glunz, P. W., Sames, D., Kuduk, S. D., Schwarz, J. B., Chen, X. T., Danishefsky, S. J. & Live, D. H. (2002). Principles of mucin architecture: structural studies on synthetic glycopeptides bearing clustered mono-, di-, tri-, and hexasaccharide glycodomains. *J Am Chem Soc* 124, 9833-44.
- Cooke, S. P., Boxer, G. M., Lawrence, L., Pedley, R. B., Spencer, D. I., Begent, R. H. & Chester, K. A. (2001). A strategy for antitumor vascular therapy by targeting the vascular endothelial growth factor: receptor complex. *Cancer Res* 61, 3653-9.
- Crameri, A., Cwirla, S. & Stemmer, W. P. (1996). Construction and evolution of antibody-phage libraries by DNA shuffling. *Nat Med* 2, 100-2.
- Dahlenborg, K., Hultman, L., Carlsson, R. & Jansson, B. (1997). Human monoclonal antibodies specific for the tumour associated Thomsen-Friedenreich antigen. *Int J Cancer* 70, 63-71.

- Daugherty, P. S., Chen, G., Olsen, M. J., Iverson, B. L. & Georgiou, G. (1998). Antibody affinity maturation using bacterial surface display. *Protein Eng* 11, 825-32.
- Davies, E. L., Smith, J. S., Birkett, C. R., Manser, J. M., Anderson-Dear, D. V. & Young, J. R. (1995). Selection of specific phage-display antibodies using libraries derived from chicken immunoglobulin genes. *J Immunol Methods* 186, 125-35.
- Davies, J. & Riechmann, L. (1995). Antibody VH domains as small recognition units. *Biotechnology (N Y)* 13, 475-9.
- de Kruif, J., Boel, E. & Logtenberg, T. (1995). Selection and application of human single chain Fv antibody fragments from a semi-synthetic phage antibody display library with designed CDR3 regions. *J Mol Biol* 248, 97-105 issn: 0022-2836.
- de Wildt, R. M., Finnern, R., Ouwehand, W. H., Griffiths, A. D., van Venrooij, W. J. & Hoet, R. M. (1996). Characterization of human variable domain antibody fragments against the U1 RNA-associated A protein, selected from a synthetic and patient- derived combinatorial V gene library. *Eur J Immunol* 26, 629-39.
- de Wildt, R. M., Tomlinson, I. M., Ong, J. L. & Holliger, P. (2002). Isolation of receptor-ligand pairs by capture of long-lived multivalent interaction complexes. *Proc Natl Acad Sci U S A* 99, 8530-5.
- Demartis, S., Tarli, L., Borsi, L., Zardi, L. & Neri, D. (2001). Selective targeting of tumour neovasculature by a radiohalogenated human antibody fragment specific for the ED-B domain of fibronectin. *Eur J Nucl Med* 28, 534-9.
- DeNardo, G. L., Bradt, B. M., Mirick, G. R. & DeNardo, S. J. (2003). Human antiglobulin response to foreign antibodies: therapeutic benefit? *Cancer Immunol Immunother* 52, 309-16.
- DeNardo, S. J., Kroger, L. A. & DeNardo, G. L. (1999). A new era for radiolabeled antibodies in cancer? *Curr Opin Immunol* 11, 563-9.
- Deng, L. W., Malik, P. & Perham, R. N. (1999). Interaction of the globular domains of pIII protein of filamentous bacteriophage fd with the F-pilus of escherichia coli [In Process Citation]. *Virology* 253, 271-7.
- Deng, L. W. & Perham, R. N. (2002). Delineating the site of interaction on the pIII protein of filamentous bacteriophage fd with the F-pilus of Escherichia coli. *J Mol Biol* 319, 603-14.
- Deng, S. J., MacKenzie, C. R., Sadowska, J., Michniewicz, J., Young, N. M., Bundle, D. R. & Narang, S. A. (1994). Selection of antibody single-chain variable fragments with improved carbohydrate binding by phage display. *J Biol Chem* 269, 9533-8.
- Dolezal, O., Pearce, L. A., Lawrence, L. J., McCoy, A. J., Hudson, P. J. & Kortt, A. A. (2000). ScFv multimers of the anti-neuraminidase antibody NC10: shortening of the linker in single-chain Fv fragment assembled in V(L) to V(H) orientation drives the formation of dimers, trimers, tetramers and higher molecular mass multimers. *Protein Eng* 13, 565-74.
- Fairbrother, W. J., Christinger, H. W., Cochran, A. G., Fuh, G., Keenan, C. J., Quan, C., Shriver, S. K., Tom, J. Y., Wells, J. A. & Cunningham, B. C. (1998). Novel peptides selected to bind vascular endothelial growth factor target the receptor-binding site [In Process Citation]. *Biochemistry* 37, 17754-64.
- FitzGerald, K., Holliger, P. & Winter, G. (1997). Improved tumour targeting by disulphide stabilized diabodies expressed in *Pichia pastoris*. *Protein Eng* 10, 1221-5.
- Folkman, J. (2003). Angiogenesis and apoptosis. *Semin Cancer Biol* 13, 159-67.
- Friedenreich, V. (1930). Hemagglutination Phenomenon. *Levin & Munksgaard, Copenhagen*.

- Fukuda, M. (2002). Roles of mucin-type O-glycans in cell adhesion. *Biochim Biophys Acta* 1573, 394-405.
- Fukuda, M., Lauffenburger, M., Sasaki, H., Rogers, M. E. & Dell, A. (1987). Structures of novel sialylated O-linked oligosaccharides isolated from human erythrocyte glycophorins. *J Biol Chem* 262, 11952-7.
- Gahmberg, C. G., Ekblom, M. & Andersson, L. C. (1984). Differentiation of human erythroid cells is associated with increased O-glycosylation of the major sialoglycoprotein, glycophorin A. *Proc Natl Acad Sci U S A* 81, 6752-6.
- Gao, C., Mao, S., Lo, C. H., Wirsching, P., Lerner, R. A. & Janda, K. D. (1999). Making artificial antibodies: A format for phage display of combinatorial heterodimeric arrays [In Process Citation]. *Proc Natl Acad Sci U S A* 96, 6025-30.
- Garrard, L. J. & Henner, D. J. (1993). Selection of an anti-IGF-1 Fab from a Fab phage library created by mutagenesis of multiple CDR loops. *Gene* 128, 103-9 issn: 0378-1119.
- Georgiou, G., Stathopoulos, C., Daugherty, P. S., Nayak, A. R., Iverson, B. L. & Curtiss, R. r. (1997). Display of heterologous proteins on the surface of microorganisms: from the screening of combinatorial libraries to live recombinant vaccines. *Nat Biotechnol* 15, 29-34.
- Glaser, S. M., Yelton, D. E. & Huse, W. D. (1992). Antibody engineering by codon-based mutagenesis in a filamentous phage vector system. *J Immunol* 149, 3903-13.
- Glinsky, V. V., Glinsky, G. V., Rittenhouse-Olson, K., Huflejt, M. E., Glinskii, O. V., Deutscher, S. L. & Quinn, T. P. (2001). The role of Thomsen-Friedenreich antigen in adhesion of human breast and prostate cancer cells to the endothelium. *Cancer Res* 61, 4851-7.
- Goel, A., Colcher, D., Baranowska-Kortylewicz, J., Augustine, S., Booth, B. J., Pavlinkova, G. & Batra, S. K. (2000). Genetically engineered tetravalent single-chain Fv of the pancarcinoma monoclonal antibody CC49: improved biodistribution and potential for therapeutic application. *Cancer Res* 60, 6964-71.
- Goldenberg, D. M. (2003). Advancing role of radiolabeled antibodies in the therapy of cancer. *Cancer Immunol Immunother* 52, 281-96.
- Goletz, S., Cao, Y., Danielczyk, A., Ravn, P., Schöber, U. & Karsten, U. (2003). Thomsen-Friedenreich Antigen: The "Hidden" tumour antigen. *Glycobiology and Medicine (Kluver press)*, 147-162.
- Goletz, S., Christensen, P. A., Kristensen, P., Blohm, D., Tomlinson, I., Winter, G. & Karsten, U. (2002). Selection of large diversities of antiidiotypic antibody fragments by phage display. *J Mol Biol* 315, 1087-97.
- Graff, C. P. & Wittrup, K. D. (2003). Theoretical analysis of antibody targeting of tumor spheroids: importance of dosage for penetration, and affinity for retention. *Cancer Res* 63, 1288-96.
- Gram, H., Marconi, L. A., Barbas, C. F. d., Collet, T. A., Lerner, R. A. & Kang, A. S. (1992). In vitro selection and affinity maturation of antibodies from a naive combinatorial immunoglobulin library. *Proc Natl Acad Sci U S A* 89, 3576-80.
- Graus, Y. F., de Baets, M. H., Parren, P. W., Berrih-Aknin, S., Wokke, J., van Breda Vriesman, P. J. & Burton, D. R. (1997). Human anti-nicotinic acetylcholine receptor recombinant Fab fragments isolated from thymus-derived phage display libraries from myasthenia gravis patients reflect predominant specificities in serum and block the action of pathogenic serum antibodies. *J Immunol* 158, 1919-29.

- Graus, Y. F., Verschuuren, J. J., Degenhardt, A., van Breda Vriesman, P. J., De Baets, M. H., Posner, J. B., Burton, D. R. & Dalmau, J. (1998). Selection of recombinant anti-HuD Fab fragments from a phage display antibody library of a lung cancer patient with paraneoplastic encephalomyelitis. *J Neuroimmunol* 82, 200-9.
- Griffiths, A. D., Williams, S. C., Hartley, O., Tomlinson, I. M., Waterhouse, P., Crosby, W. L., Kontermann, R. E., Jones, P. T., Low, N. M., Allison, T. J. & et al. (1994). Isolation of high affinity human antibodies directly from large synthetic repertoires. *EMBO-J* 13, 3245-60 issn: 0261-4189.
- Gruber, M., Schodin, B. A., Wilson, E. R. & Kranz, D. M. (1994). Efficient tumor cell lysis mediated by a bispecific single chain antibody expressed in Escherichia coli. *J Immunol* 152, 5368-74.
- Guy-Caffey, J. K., Rapoza, M. P., Jolley, K. A. & Webster, R. E. (1992). Membrane localization and topology of a viral assembly protein. *J Bacteriol* 174, 2460-5.
- Halin, C., Niesner, U., Villani, M. E., Zardi, L. & Neri, D. (2002). Tumor-targeting properties of antibody-vascular endothelial growth factor fusion proteins. *Int J Cancer* 102, 109-16.
- Hanes, J., Jermytus, L., Weber-Bornhauser, S., Bosshard, H. R. & Pluckthun, A. (1998). Ribosome display efficiently selects and evolves high-affinity antibodies in vitro from immune libraries. *Proc Natl Acad Sci U S A* 95, 14130-5.
- Hanes, J. & Pluckthun, A. (1997). In vitro selection and evolution of functional proteins by using ribosome display. *Proc Natl Acad Sci U S A* 94, 4937-42.
- Hanes, J., Schaffitzel, C., Knappik, A. & Pluckthun, A. (2000). Picomolar affinity antibodies from a fully synthetic naive library selected and evolved by ribosome display. *Nat Biotechnol* 18, 1287-92.
- Hawkins, R. E., Russell, S. J. & Winter, G. (1992). Selection of phage antibodies by binding affinity. Mimicking affinity maturation. *J Mol Biol* 226, 889-96.
- Heitner, T., Moor, A., Garrison, J. L., Marks, C., Hasan, T. & Marks, J. D. (2001). Selection of cell binding and internalizing epidermal growth factor receptor antibodies from a phage display library. *J Immunol Methods* 248, 17-30.
- Holliger, P., Brissinck, J., Williams, R. L., Thielemans, K. & Winter, G. (1996). Specific killing of lymphoma cells by cytotoxic T-cells mediated by a bispecific diabody. *Protein Eng* 9, 299-305.
- Holliger, P., Prospero, T. & Winter, G. (1993). "Diabodies": small bivalent and bispecific antibody fragments. *Proc Natl Acad Sci U S A* 90, 6444-8.
- Holliger, P., Riechmann, L. & Williams, R. L. (1999). Crystal Structure of the Two N-terminal Domains of g3p from Filamentous Phage fd at 1.9 #: Evidence for Conformational Lability. *J Mol Biol* 288, 649-657.
- Holliger, P., Wing, M., Pound, J. D., Bohlen, H. & Winter, G. (1997). Retargeting serum immunoglobulin with bispecific diabodies. *Nat Biotechnol* 15, 632-6.
- Holliger, P. & Winter, G. (1993). Engineering bispecific antibodies. *Curr Opin Biotechnol* 4, 446-9.
- Hoogenboom, H. R. (1997). Designing and optimizing library selection strategies for generating high-affinity antibodies. *Trends Biotechnol* 15, 62-70.
- Hoogenboom, H. R. & Chames, P. (2000). Natural and designer binding sites made by phage display technology. *Immunol Today* 21, 371-8.
- Hoogenboom, H. R., de Bruine, A. P., Hufton, S. E., Hoet, R. M., Arends, J. W. & Roovers, R. C. (1998). Antibody phage display technology and its applications. *Immunotechnology* 4, 1-20.

- Hoogenboom, H. R. & Winter, G. (1992). By-passing immunisation. Human antibodies from synthetic repertoires of germline VH gene segments rearranged in vitro. *J-Mol-Biol* 227, 381-8 issn: 0022-2836.
- Hu, S., Shively, L., Raubitschek, A., Sherman, M., Williams, L. E., Wong, J. Y., Shively, J. E. & Wu, A. M. (1996). Minibody: A novel engineered anti-carcinoembryonic antigen antibody fragment (single-chain Fv-CH3) which exhibits rapid, high-level targeting of xenografts. *Cancer Res* 56, 3055-61.
- Hudson, P. J. (1999). Recombinant antibody constructs in cancer therapy. *Curr Opin Immunol* 11, 548-57.
- Hudson, P. J. & Kortt, A. A. (1999). High avidity scFv multimers; diabodies and triabodies. *J Immunol Methods* 231, 177-89.
- Hudson, P. J. & Souriau, C. (2003). Engineered antibodies. *Nat Med* 9, 129-34.
- Huie, M. A., Cheung, M. C., Muench, M. O., Becerril, B., Kan, Y. W. & Marks, J. D. (2001). Antibodies to human fetal erythroid cells from a nonimmune phage antibody library. *Proc Natl Acad Sci U S A* 98, 2682-7.
- Iliades, P., Kortt, A. A. & Hudson, P. J. (1997). Triabodies: single chain Fv fragments without a linker form trivalent trimers. *FEBS Lett* 409, 437-41.
- Inouye, M., Arnheim, N. & Sternglanz, R. (1973). Bacteriophage T7 lysozyme is an N-acetylmuramyl-L-alanine amidase. *J Biol Chem* 248, 7247-52.
- Irazoqui, F. J., Jansson, B., Lopez, P. H. & Nores, G. A. (2001). Correlative fine specificity of several Thomsen-Friedenreich disaccharide-binding proteins with an effect on tumor cell proliferation. *J Biochem (Tokyo)* 130, 33-7.
- Irving, R. A., Kortt, A. A. & Hudson, P. J. (1996). Affinity maturation of recombinant antibodies using *E. coli* mutator cells. *Immunotechnology* 2, 127-43.
- Itzkowitz, S. H., Yuan, M., Montgomery, C. K., Kjeldsen, T., Takahashi, H. K., Bigbee, W. L. & Kim, Y. S. (1989). Expression of Tn, sialosyl-Tn, and T antigens in human colon cancer. *Cancer Res* 49, 197-204.
- Jackson, H., Bacon, L., Pedley, R. B., Derbyshire, E., Field, A., Osbourn, J. & Allen, D. (1998). Antigen specificity and tumour targeting efficiency of a human carcinoembryonic antigen-specific scFv and affinity-matured derivatives. *Br J Cancer* 78, 181-8.
- Jackson, J. R., Sathe, G., Rosenberg, M. & Sweet, R. (1995). In vitro antibody maturation. Improvement of a high affinity, neutralizing antibody against IL-1 beta. *J Immunol* 154, 3310-9.
- Jain, R. K. (1987). Transport of molecules in the tumor interstitium: a review. *Cancer Res* 47, 3039-51.
- Jain, R. K. & Baxter, L. T. (1988). Mechanisms of heterogeneous distribution of monoclonal antibodies and other macromolecules in tumors: significance of elevated interstitial pressure. *Cancer Res* 48, 7022-32.
- Jensen, K. B., Jensen, O. N., Ravn, P., Clark, B. F. & Kristensen, P. (2003). Identification of Keratinocyte-specific Markers Using Phage Display and Mass Spectrometry. *Mol Cell Proteomics* 2, 61-9.
- Juweid, M., Neumann, R., Paik, C., Perez-Bacete, M. J., Sato, J., van Osdol, W. & Weinstein, J. N. (1992). Micropharmacology of monoclonal antibodies in solid tumors: direct experimental evidence for a binding site barrier. *Cancer Res* 52, 5144-53.
- Karsten, U. (1984). Calibration of hybridoma antibody assays by polyclonal supernatants produced in vitro. *Biomed Biochim Acta* 43, 829-33.

- Karsten, U. (2002). CD176 Workshop Panel report. *Leucocyte Typing VII. D. Mason et al. Eds Oxford University Press, Oxford*, 202-203.
- Karsten, U., Butschak, G., Cao, Y., Goletz, S. & Hanisch, F. G. (1995). A new monoclonal antibody (A78-G/A7) to the Thomsen-Friedenreich pan-tumor antigen. *Hybridoma* 14, 37-44.
- Kettleborough, C. A., Ansell, K. H., Allen, R. W., Rosell-Vives, E., Gussow, D. H. & Bendig, M. M. (1994). Isolation of tumor cell-specific single-chain Fv from immunized mice using phage-antibody libraries and the re-construction of whole antibodies from these antibody fragments. *Eur J Immunol* 24, 952-8.
- Kilpatrick, D. C. (2002). Mannan-binding lectin: clinical significance and applications. *Biochim Biophys Acta* 1572, 401-13.
- King, D. J., Turner, A., Farnsworth, A. P., Adair, J. R., Owens, R. J., Pedley, R. B., Baldock, D., Proudfoot, K. A., Lawson, A. D., Beeley, N. R. & et al. (1994). Improved tumor targeting with chemically cross-linked recombinant. *Cancer Res* 54, 6176-85.
- Kipriyanov, S. M., Moldenhauer, G. & Little, M. (1997). High level production of soluble single chain antibodies in small-scale Escherichia coli cultures. *J Immunol Methods* 200, 69-77.
- Kipriyanov, S. M., Moldenhauer, G., Schuhmacher, J., Cochlovius, B., Von der Lieth, C. W., Matys, E. R. & Little, M. (1999). Bispecific tandem diabody for tumor therapy with improved antigen binding and pharmacokinetics. *J Mol Biol* 293, 41-56.
- Kipriyanov, S. M., Moldenhauer, G., Strauss, G. & Little, M. (1998). Bispecific CD3 x CD19 diabody for T cell-mediated lysis of malignant human B cells. *Int J Cancer* 77, 763-72.
- Kjaer, S., Wind, T., Ravn, P., Ostergaard, M., Clark, B. F. & Nissim, A. (2001). Generation and epitope mapping of high-affinity scFv to eukaryotic elongation factor 1A by dual application of phage display. *Eur J Biochem* 268, 3407-15.
- Klein, J. L., Nguyen, T. H., Laroque, P., Kopher, K. A., Williams, J. R., Wessels, B. W., Dillehay, L. E., Frincke, J., Order, S. E. & Leichner, P. K. (1989). Yttrium-90 and iodine-131 radioimmunoglobulin therapy of an experimental human hepatoma. *Cancer Res* 49, 6383-9.
- Klenk, E. & Uhlenbruch, G. (1960). Über neuraminidasesäurehaltige Mucoide aus Menschenerythrocytenstroma, ein Beitrag zur Chemie der Agglutinogene. *Z Physiol Chem.* 319, 151-160.
- Knappik, A., Ge, L., Honegger, A., Pack, P., Fischer, M., Wellnhofer, G., Hoess, A., Wolle, J., Pluckthun, A. & Virnekas, B. (2000). Fully Synthetic Human Combinatorial Antibody Libraries (HuCAL) Based on Modular Consensus Frameworks and CDRs Randomized with Trinucleotides. *J Mol Biol* 296, 57-86.
- Kobayashi, H., Le, N., Kim, I. S., Kim, M. K., Pie, J. E., Drumm, D., Paik, D. S., Waldmann, T. A., Paik, C. H. & Carrasquillo, J. A. (1999). The pharmacokinetic characteristics of glycolated humanized anti-Tac Fabs are determined by their isoelectric points. *Cancer Res* 59, 422-30.
- Kobayashi, N., Soderlind, E. & Borrebaeck, C. A. (1997). Analysis of assembly of synthetic antibody fragments: expression of functional scFv with predefined specificity. *Biotechniques* 23, 500-3.
- Kohler, G. & Milstein, C. (1975). Continuous cultures of fused cells secreting antibody of predefined specificity. *Nature* 256, 495-7.
- Kontermann, R. E., Wing, M. G. & Winter, G. (1997). Complement recruitment using bispecific diabodies. *Nat Biotechnol* 15, 629-31.

- Kortt, A. A., Dolezal, O., Power, B. E. & Hudson, P. J. (2001). Dimeric and trimeric antibodies: high avidity scFvs for cancer targeting. *Biomol Eng* 18, 95-108.
- Kortt, A. A., Lah, M., Oddie, G. W., Gruen, C. L., Burns, J. E., Pearce, L. A., Atwell, J. L., McCoy, A. J., Howlett, G. J., Metzger, D. W., Webster, R. G. & Hudson, P. J. (1997). Single-chain Fv fragments of anti-neuraminidase antibody NC10 containing five- and ten-residue linkers form dimers and with zero-residue linker a trimer. *Protein Eng* 10, 423-33.
- Kristensen, P., Ravn, P., Jensen, K. B. & Jensen, K. (2000). Applying phage display technology in aging research. *Biogerontology* 1, 67-78.
- Kristensen, P. & Winter, G. (1998). Proteolytic selection for protein folding using filamentous bacteriophages. *Fold Des* 3, 321-8.
- Kuan, C. T., Wikstrand, C. J., Archer, G., Beers, R., Pastan, I., Zalutsky, M. R. & Bigner, D. D. (2000). Increased binding affinity enhances targeting of glioma xenografts by EGFRvIII-specific scFv. *Int J Cancer* 88, 962-9.
- Kumamoto, K., Goto, Y., Sekikawa, K., Takenoshita, S., Ishida, N., Kawakita, M. & Kannagi, R. (2001). Increased expression of UDP-galactose transporter messenger RNA in human colon cancer tissues and its implication in synthesis of Thomsen-Friedenreich antigen and sialyl Lewis A/X determinants. *Cancer Res* 61, 4620-7.
- Kurucz, I., Titus, J. A., Jost, C. R., Jacobus, C. M. & Segal, D. M. (1995). Retargeting of CTL by an efficiently refolded bispecific single-chain Fv dimer produced in bacteria. *J Immunol* 154, 4576-82.
- Lang, I. M., Barbas, C. F., 3rd & Schleef, R. R. (1996). Recombinant rabbit Fab with binding activity to type-1 plasminogen activator inhibitor derived from a phage-display library against human alpha-granules. *Gene* 172, 295-8.
- Langkilde, N. C., Wolf, H., Clausen, H. & Orntoft, T. F. (1992). Human urinary bladder carcinoma glycoconjugates expressing T-(Gal beta(1-3)GalNAc alpha 1-O-R) and T-like antigens: a comparative study using peanut agglutinin and poly- and monoclonal antibodies. *Cancer Res* 52, 5030-6.
- Lawrence, L. J., Kortt, A. A., Iliades, P., Tulloch, P. A. & Hudson, P. J. (1998). Orientation of antigen binding sites in dimeric and trimeric single chain Fv antibody fragments. *FEBS Lett* 425, 479-84.
- Linderoth, N. A., Simon, M. N. & Russel, M. (1997). The filamentous phage pIV multimer visualized by scanning transmission electron microscopy. *Science* 278, 1635-8.
- Lindmo, T., Boven, E., Cuttitta, F., Fedorko, J. & Bunn, P. A., Jr. (1984). Determination of the immunoreactive fraction of radiolabeled monoclonal antibodies by linear extrapolation to binding at infinite antigen excess. *J Immunol Methods* 72, 77-89.
- Litvinov, S. V. & Hilkens, J. (1993). The epithelial sialomucin, episialin, is sialylated during recycling. *J Biol Chem* 268, 21364-71.
- Lorimer, I. A., Keppler-Hafkemeyer, A., Beers, R. A., Pegram, C. N., Bigner, D. D. & Pastan, I. (1996). Recombinant immunotoxins specific for a mutant epidermal growth factor receptor: targeting with a single chain antibody variable domain isolated by phage display. *Proc Natl Acad Sci U S A* 93, 14815-20.
- Lotan, R., Skutelsky, E., Danon, D. & Sharon, N. (1975). The purification, composition, and specificity of the anti-T lectin from peanut (*Arachis hypogaea*). *J Biol Chem* 250, 8518-23.
- Low, N. M., Holliger, P. H. & Winter, G. (1996). Mimicking somatic hypermutation: affinity maturation of antibodies displayed on bacteriophage using a bacterial mutator strain. *J Mol Biol* 260, 359-68.

- Lubkowski, J., Hennecke, F., Pluckthun, A. & Wlodawer, A. (1998). The structural basis of phage display elucidated by the crystal structure of the N-terminal domains of g3p. *Nat Struct Biol* 5, 140-7.
- Lubkowski, J., Hennecke, F., Pluckthun, A. & Wlodawer, A. (1999). Filamentous phage infection: crystal structure of g3p in complex with its coreceptor, the C-terminal domain of TolA [In Process Citation]. *Structure Fold Des* 7, 711-22.
- MacCallum, R. M., Martin, A. C. & Thornton, J. M. (1996). Antibody-antigen interactions: contact analysis and binding site topography. *J Mol Biol* 262, 732-45.
- Malby, R. L., McCoy, A. J., Kortt, A. A., Hudson, P. J. & Colman, P. M. (1998). Three-dimensional structures of single-chain Fv-neuraminidase complexes. *J Mol Biol* 279, 901-10.
- Mao, S., Gao, C., Lo, C. H., Wirsching, P., Wong, C. H. & Janda, K. D. (1999). Phage-display library selection of high-affinity human single-chain antibodies to tumor-associated carbohydrate antigens sialyl Lewisx and Lewisx. *Proc Natl Acad Sci U S A* 96, 6953-6958.
- Marks, J. D., Griffiths, A. D., Malmqvist, M., Clackson, T. P., Bye, J. M. & Winter, G. (1992). By-passing immunization: building high affinity human antibodies by chain shuffling. *Biotechnology (N Y)* 10, 779-83.
- Marks, J. D., Hoogenboom, H. R., Bonnert, T. P., McCafferty, J., Griffiths, A. D. & Winter, G. (1991). By-passing immunization. Human antibodies from V-gene libraries. *J Mol Biol* 222, 581-97.
- Marvin, D. A. (1998). Filamentous phage structure, infection and assembly. *Curr Opin Struct Biol* 8, 150-8.
- McCafferty, J., Griffiths, A. D., Winter, G. & Chiswell, D. J. (1990). Phage antibodies: filamentous phage displaying antibody variable domains. *Nature* 348, 552-4.
- McGuinness, B. T., Walter, G., FitzGerald, K., Schuler, P., Mahoney, W., Duncan, A. R. & Hoogenboom, H. R. (1996). Phage diabody repertoires for selection of large numbers of bispecific antibody fragments. *nature biotechnology* 14, 1149-1154.
- Milenic, D. E., Yokota, T., Filpula, D. R., Finkelman, M. A., Dodd, S. W., Wood, J. F., Whitlow, M., Snoy, P. & Schlom, J. (1991). Construction, binding properties, metabolism, and tumor targeting of a single-chain Fv derived from the pancarcinoma monoclonal antibody CC49. *Cancer Res* 51, 6363-71.
- Milstein, C. & Waldmann, H. (1999). Optimism after much pessimism: what next? *Curr Opin Immunol* 11, 589-91.
- Muller, K. M., Arndt, K. M., Strittmatter, W. & Pluckthun, A. (1998). The first constant domain (C(H)1 and C(L)) of an antibody used as heterodimerization domain for bispecific miniantibodies. *FEBS Lett* 422, 259-64.
- Napier, M. P., Sharma, S. K., Springer, C. J., Bagshawe, K. D., Green, A. J., Martin, J., Stribbling, S. M., Cushen, N., O'Malley, D. & Begent, R. H. (2000). Antibody-directed enzyme prodrug therapy: efficacy and mechanism of action in colorectal carcinoma. *Clin Cancer Res* 6, 765-72.
- Nissim, A., Hoogenboom, H. R., Tomlinson, I. M., Flynn, G., Midgley, C., Lane, D. & Winter, G. (1994). Antibody fragments from a 'single pot' phage display library as immunochemical reagents. *Embo J* 13, 692-8.
- Novogrodsky, A., Lotan, R., Ravid, A. & Sharon, N. (1975). Peanut agglutinin, a new mitogen that binds to galactosyl sites exposed after neuraminidase treatment. *J Immunol* 115, 1243-8.

- Olafsen, T., Rasmussen, I. B., Norderhaug, L., Bruland, O. S. & Sandlie, I. (1998). IgM secretory tailpiece drives multimerisation of bivalent scFv fragments in eukaryotic cells. *Immunotechnology* 4, 141-53.
- Osbourn, J. K., Field, A., Wilton, J., Derbyshire, E., Earnshaw, J. C., Jones, P. T., Allen, D. & McCafferty, J. (1996). Generation of a panel of related human scFv antibodies with high affinities for human CEA. *Immunotechnology* 2, 181-96.
- Pack, P. & Pluckthun, A. (1992). Miniantibodies: use of amphipathic helices to produce functional, flexibly linked dimeric FV fragments with high avidity in Escherichia coli. *Biochemistry* 31, 1579-84.
- Pastan, I. (2003). Immunotoxins containing Pseudomonas exotoxin A: a short history. *Cancer Immunol Immunother* 52, 338-41.
- Patrick, M. R., Chester, K. A. & Pietersz, G. A. (1998). In vitro characterization of a recombinant 32P-phosphorylated anti-(carcinoembryonic antigen) single-chain antibody. *Cancer Immunol Immunother* 46, 229-37.
- Pavlinkova, G., Beresford, G., Booth, B. J., Batra, S. K. & Colcher, D. (1999a). Charge-modified single chain antibody constructs of monoclonal antibody CC49: generation, characterization, pharmacokinetics, and biodistribution analysis. *Nucl Med Biol* 26, 27-34.
- Pavlinkova, G., Booth, B. J., Batra, S. K. & Colcher, D. (1999b). Radioimmunotherapy of human colon cancer xenografts using a dimeric single-chain Fv antibody construct. *Clin Cancer Res* 5, 2613-9.
- Pavlinkova, G., Colcher, D., Booth, B. J., Goel, A. & Batra, S. K. (2000). Pharmacokinetics and biodistribution of a light-chain-shuffled CC49 single-chain Fv antibody construct. *Cancer Immunol Immunother* 49, 267-75.
- Perisic, O., Webb, P. A., Holliger, P., Winter, G. & Williams, R. L. (1994). Crystal structure of a diabody, a bivalent antibody fragment. *Structure* 2, 1217-26.
- Pietersz, G. A., Wenjun, L., Krauer, K., Baker, T., Wreschner, D. & McKenzie, I. F. (1997). Comparison of the biological properties of two anti-mucin-1 antibodies prepared for imaging and therapy. *Cancer Immunol Immunother* 44, 323-8.
- Pini, A., Spreafico, A., Botti, R., Neri, D. & Neri, P. (1997). Hierarchical affinity maturation of a phage library derived antibody for the selective removal of cytomegalovirus from plasma. *J Immunol Methods* 206, 171-82.
- Pini, A., Viti, F., Santucci, A., Carnemolla, B., Zardi, L., Neri, P. & Neri, D. (1998). Design and use of a phage display library. Human antibodies with subnanomolar affinity against a marker of angiogenesis eluted from a two-dimensional gel. *J Biol Chem* 273, 21769-76.
- Pluckthun, A. & Pack, P. (1997). New protein engineering approaches to multivalent and bispecific antibody fragments. *Immunotechnology* 3, 83-105.
- Postema, E. J., Boerman, O. C., Oyen, W. J., Raemaekers, J. M. & Corstens, F. H. (2001). Radioimmunotherapy of B-cell non-Hodgkin's lymphoma. *Eur J Nucl Med* 28, 1725-35.
- Power, B. E., Caine, J. M., Burns, J. E., Shapira, D. R., Hattarki, M. K., Tahtis, K., Lee, F. T., Smyth, F. E., Scott, A. M., Kortt, A. A. & Hudson, P. J. (2001). Construction, expression and characterisation of a single-chain diabody derived from a humanised anti-Lewis Y cancer targeting antibody using a heat-inducible bacterial secretion vector. *Cancer Immunol Immunother* 50, 241-50.

- Power, B. E., Doughty, L., Shapira, D. R., Burns, J. E., Bayly, A. M., Caine, J. M., Liu, Z., Scott, A. M., Hudson, P. J. & Kortt, A. A. (2003). Noncovalent scFv multimers of tumor-targeting anti-Lewis(y) hu3S193 humanized antibody. *Protein Sci* 12, 734-47.
- Power, B. E. & Hudson, P. J. (2000). Synthesis of high avidity antibody fragments (scFv multimers) for cancer imaging. *J Immunol Methods* 242, 193-204.
- Powers, D. B., Amersdorfer, P., Poul, M., Nielsen, U. B., Shalaby, M. R., Adams, G. P., Weiner, L. M. & Marks, J. D. (2001). Expression of single-chain Fv-Fc fusions in *Pichia pastoris*. *J Immunol Methods* 251, 123-35.
- Rapoza, M. P. & Webster, R. E. (1993). The filamentous bacteriophage assembly proteins require the bacterial SecA protein for correct localization to the membrane. *J Bacteriol* 175, 1856-9.
- Rapoza, M. P. & Webster, R. E. (1995). The products of gene I and the overlapping in-frame gene XI are required for filamentous phage assembly. *J Mol Biol* 248, 627-38.
- Ravn, P., Kjaer, S., Jensen, K. H., Wind, T., Jensen, K. B., Kristensen, P., Brosh, R. M., Orren, D. K., Bohr, V. A. & Clark, B. F. (2000). Identification of phage antibodies toward the Werner protein by selection on Western blots. *Electrophoresis* 21, 509-16.
- Reilly, R. M., Maiti, P. K., Kiarash, R., Prashar, A. K., Fast, D. G., Entwistle, J., Dan, Narang, S. A., Foote, S. & Kaplan, H. A. (2001). Rapid imaging of human melanoma xenografts using an scFv fragment of the human monoclonal antibody H11 labelled with 111In. *Nucl Med Commun* 22, 587-95.
- Reiter, Y., Schuck, P., Boyd, L. F. & Plaksin, D. (1999). An antibody single-domain phage display library of a native heavy chain variable region: isolation of functional single-domain VH molecules with a unique interface [In Process Citation]. *J Mol Biol* 290, 685-98.
- Rheinheimer, M., Hardt, C., Ilag, L. L., Kufer, P., Gruber, R., Hoess, A., Lupas, A., Rottenberger, C., Pluckthun, A. & Pack, P. (1996). Multivalent antibody fragments with high functional affinity for a tumor-associated carbohydrate antigen. *J Immunol* 157, 2989-97.
- Riechmann, L. & Holliger, P. (1997). The C-terminal domain of TolA is the coreceptor for filamentous phage infection of *E. coli*. *Cell* 90, 351-60.
- Robert, B., Dorvillius, M., Buchegger, F., Garambois, V., Mani, J. C., Pugnieres, M., Mach, J. P. & Pelegrin, A. (1999). Tumor targeting with newly designed biparatopic antibodies directed against two different epitopes of the carcinoembryonic antigen (CEA). *Int J Cancer* 81, 285-91.
- Rogers, B. E., Franano, F. N., Duncan, J. R., Edwards, W. B., Anderson, C. J., Connell, J. M. & Welch, M. J. (1995). Identification of metabolites of 111In-diethylenetriaminepentaacetic acid-monoclonal antibodies and antibody fragments in vivo. *Cancer Res* 55, 5714s-5720s.
- Rondot, S., Koch, J., Breitling, F. & Dubel, S. (2001). A helper phage to improve single-chain antibody presentation in phage display. *Nat Biotechnol* 19, 75-8.
- Roovers, R. C., van der Linden, E., Zijlstra, H., de Bruine, A., Arends, J. W. & Hoogenboom, H. R. (2001). Evidence for a bias toward intracellular antigens in the local humoral anti-tumor immune response of a colorectal cancer patient revealed by phage display. *Int J Cancer* 93, 832-40.
- Russel, M. (1993). Protein-protein interactions during filamentous phage assembly. *J Mol Biol* 231, 689-97.
- Russel, M., Linderoth, N. A. & Sali, A. (1997). Filamentous phage assembly: variation on a protein export theme. *Gene* 192, 23-32.

- Ryabova, L. A., Desplancq, D., Spirin, A. S. & Pluckthun, A. (1997). Functional antibody production using cell-free translation: effects of protein disulfide isomerase and chaperones. *Nat Biotechnol* 15, 79-84.
- Sanz, L., Garcia-Bermejo, L., Blanco, F. J., Kristensen, P., Feijoo, M., Suarez, E., Blanco, B. & Alvarez-Vallina, L. (2003). A novel cell binding site in the coiled-coil domain of laminin involved in capillary morphogenesis. *Embo J* 22, 1508-17.
- Sanz, L., Kristensen, P., Blanco, B., Facteau, S., Russell, S. J., Winter, G. & Alvarez-Vallina, L. (2002). Single-chain antibody-based gene therapy: inhibition of tumor growth by in situ production of phage-derived human antibody fragments blocking functionally active sites of cell-associated matrices. *Gene Ther* 9, 1049-53.
- Sanz, L., Kristensen, P., Russell, S. J., Ramirez Garcia, J. R. & Alvarez-Vallina, L. (2001). Generation and characterization of recombinant human antibodies specific for native laminin epitopes: potential application in cancer therapy. *Cancer Immunol Immunother* 50, 557-65.
- Scott, A. M., Geleick, D., Rubira, M., Clarke, K., Nice, E. C., Smyth, F. E., Stockert, E., Richards, E. C., Carr, F. J., Harris, W. J., Armour, K. L., Rood, J., Kypridis, A., Kronina, V., Murphy, R., Lee, F. T., Liu, Z., Kitamura, K., Ritter, G., Laughton, K., Hoffman, E., Burgess, A. W. & Old, L. J. (2000). Construction, production, and characterization of humanized anti-Lewis Y monoclonal antibody 3S193 for targeted immunotherapy of solid tumors. *Cancer Res* 60, 3254-61.
- Shi, Z. R., Tsao, D. & Kim, Y. S. (1983). Subcellular distribution, synthesis, and release of carcinoembryonic antigen in cultured human colon adenocarcinoma cell lines. *Cancer Res* 43, 4045-9.
- Shigeoka, H., Karsten, U., Okuno, K. & Yasutomi, M. (1999). Inhibition of liver metastases from neuraminidase-treated colon 26 cells by an anti-Thomsen-Friedenreich-specific monoclonal antibody. *Tumour Biol* 20, 139-46.
- Singh, R., Campbell, B. J., Yu, L. G., Fernig, D. G., Milton, J. D., Goodlad, R. A., FitzGerald, A. J. & Rhodes, J. M. (2001). Cell surface-expressed Thomsen-Friedenreich antigen in colon cancer is predominantly carried on high molecular weight splice variants of CD44. *Glycobiology* 11, 587-92.
- Skerra, A. & Pluckthun, A. (1988). Assembly of a functional immunoglobulin Fv fragment in Escherichia coli. *Science* 240, 1038-41.
- Smith, G. P. (1985). Filamentous fusion phage: novel expression vectors that display cloned antigens on the virion surface. *Science* 228, 1315-7.
- Springer, G. F. (1984). T and Tn, general carcinoma autoantigens. *Science* 224, 1198-206.
- Springer, G. F. (1997). Immunoreactive T and Tn epitopes in cancer diagnosis, prognosis, and immunotherapy. *J Mol Med* 75, 594-602.
- Springer, G. F., Desai, P. R. & Banatwala, I. (1975). Blood group MN antigens and precursors in normal and malignant human breast glandular tissue. *J Natl Cancer Inst* 54, 335-9.
- Stahn, R. & Zeisig, R. (2000). Cell adhesion inhibition by glycoliposomes: effects of vesicle diameter and ligand density. *Tumour Biol* 21, 176-86.
- Stein, R., Chen, S., Grossman, W. & Goldenberg, D. M. (1989). Human lung carcinoma monoclonal antibody specific for the Thomsen-Friedenreich antigen. *Cancer Res* 49, 32-7.
- Stein, R., Juweid, M., Mattes, M. J. & Goldenberg, D. M. (1999). Carcinoembryonic antigen as a target for radioimmunotherapy of human medullary thyroid carcinoma: antibody

- processing, targeting, and experimental therapy with 131I and 90Y labeled MAbs. *Cancer Biother Radiopharm* 14, 37-47.
- Steuden, I., Duk, M., Czerwinski, M., radzikowski, C. & lisowska, E. (1985). The monoclonal Antibody, Anti-Asialoglycophorin from human Erythrocytes, Specific for beta-D-Gal-1-3-alfa-D-GalNAc-chains (Thomsen-Friedenreich Receptors). *Glycoconjugate J* 2, 303-314.
- Tahtis, K., Lee, F. T., Smyth, F. E., Power, B. E., Renner, C., Brechbiel, M. W., Old, L. J., Hudson, P. J. & Scott, A. M. (2001). Biodistribution properties of (111)indium-labeled C-functionalized trans-cyclohexyl diethylenetriaminepentaacetic acid humanized 3S193 diabody and F(ab')₂ constructs in a breast carcinoma xenograft model. *Clin Cancer Res* 7, 1061-72.
- Takanami, I. (1999). Expression of Thomsen-Friedenreich antigen as a marker of poor prognosis in pulmonary adenocarcinoma. *Oncol Rep* 6, 341-4.
- Tan, S. M., Chung, M. C., Kon, O. L., Thiel, S., Lee, S. H. & Lu, J. (1996). Improvements on the purification of mannan-binding lectin and demonstration of its Ca(2+)-independent association with a C1s-like serine protease. *Biochem J* 319 (Pt 2), 329-32.
- Tarli, L., Balza, E., Viti, F., Borsi, L., Castellani, P., Berndorff, D., Dinkelborg, L., Neri, D. & Zardi, L. (1999). A high-affinity human antibody that targets tumoral blood vessels. *Blood* 94, 192-8.
- Thomas, J. G. & Baneyx, F. (1997). Divergent effects of chaperone overexpression and ethanol supplementation on inclusion body formation in recombinant Escherichia coli. *Protein Expr Purif* 11, 289-96.
- Todorovska, A., Roovers, R. C., Dolezal, O., Kortt, A. A., Hoogenboom, H. R. & Hudson, P. J. (2001). Design and application of diabodies, triabodies and tetrabodies for cancer targeting. *J Immunol Methods* 248, 47-66.
- Tomita, M. & Marchesi, V. T. (1975). Amino-acid sequence and oligosaccharide attachment sites of human erythrocyte glycophorin. *Proc Natl Acad Sci U S A* 72, 2964-8.
- Tomlinson, I. M., Cox, J. P., Gherardi, E., Lesk, A. M. & Chothia, C. (1995). The structural repertoire of the human V kappa domain. *Embo J* 14, 4628-38.
- Trail, P. A., King, H. D. & Dubowchik, G. M. (2003). Monoclonal antibody drug immunoconjugates for targeted treatment of cancer. *Cancer Immunol Immunother* 52, 328-37.
- Trikha, M., Yan, L. & Nakada, M. T. (2002). Monoclonal antibodies as therapeutics in oncology. *Curr Opin Biotechnol* 13, 609-14.
- Tsai, S. W., Li, L., Williams, L. E., Anderson, A. L., Raubitschek, A. A. & Shively, J. E. (2001). Metabolism and renal clearance of 111In-labeled DOTA-conjugated antibody fragments. *Bioconjug Chem* 12, 264-70.
- van Osdol, W., Fujimori, K. & Weinstein, J. N. (1991). An analysis of monoclonal antibody distribution in microscopic tumor nodules: consequences of a "binding site barrier". *Cancer Res* 51, 4776-84.
- van Spriel, A. B., van Ojik, H. H. & van De Winkel, J. G. (2000). Immunotherapeutic perspective for bispecific antibodies. *Immunol Today* 21, 391-7.
- Vaughan, T. J., Williams, A. J., Pritchard, K., Osbourn, J. K., Pope, A. R., Earnshaw, J. C., McCafferty, J., Hodits, R. A., Wilton, J. & Johnson, K. S. (1996). Human Antibodies with Sub-nanomolar Affinities Isolated from a Large Non-immunized Phage Display Library. *Nature Biotechnology* 14, 309-315.

- Viti, F., Tarli, L., Giovannoni, L., Zardi, L. & Neri, D. (1999). Increased binding affinity and valence of recombinant antibody fragments lead to improved targeting of tumoral angiogenesis. *Cancer Res* 59, 347-52.
- von Mehren, M., Adams, G. P. & Weiner, L. M. (2003). Monoclonal antibody therapy for cancer. *Annu Rev Med* 54, 343-69.
- Waibel, R., Alberto, R., Willuda, J., Finnern, R., Schibli, R., Stichelberger, A., Egli, A., Abram, U., Mach, J. P., Pluckthun, A. & Schubiger, P. A. (1999). Stable one-step technetium-99m labeling of His-tagged recombinant proteins with a novel Tc(I)-carbonyl complex. *Nat Biotechnol* 17, 897-901.
- Wall, J. G. & Pluckthun, A. (1995). Effects of overexpressing folding modulators on the in vivo folding of heterologous proteins in Escherichia coli. *Curr Opin Biotechnol* 6, 507-16.
- Webster, R. E. (1996). Biology of the filamentous Bacteriophage. In "Phage display of peptides and proteins - a laboratory manual", B. Kay, J. Winter, and J. McCafferty, eds. (San Diego: Academic Press), pp. 1-16.
- Weinstein, J. N. & van Osdol, W. (1992). Early intervention in cancer using monoclonal antibodies and other biological ligands: micropharmacology and the "binding site barrier". *Cancer Res* 52, 2747s-2751s.
- Williams, L. E., Wu, A. M., Yazaki, P. J., Liu, A., Raubitschek, A. A., Shively, J. E. & Wong, J. Y. (2001). Numerical selection of optimal tumor imaging agents with application to engineered antibodies. *Cancer Biother Radiopharm* 16, 25-35.
- Willuda, J., Honegger, A., Waibel, R., Schubiger, P. A., Stahel, R., Zangemeister-Wittke, U. & Pluckthun, A. (1999). High thermal stability is essential for tumor targeting of antibody fragments: engineering of a humanized anti-epithelial glycoprotein-2 (epithelial cell adhesion molecule) single-chain Fv fragment. *Cancer Res* 59, 5758-67.
- Willuda, J., Kubetzko, S., Waibel, R., Schubiger, P. A., Zangemeister-Wittke, U. & Pluckthun, A. (2001). Tumor targeting of mono-, di-, and tetravalent anti-p185(HER-2) minibodies multimerized by self-associating peptides. *J Biol Chem* 276, 14385-92.
- Winter, G., Griffiths, A. D., Hawkins, R. E. & Hoogenboom, H. R. (1994). Making antibodies by phage display technology. *Annu Rev Immunol* 12, 433-55.
- Winter, G. & Harris, W. J. (1993). Humanized antibodies. *Immunol Today* 14, 243-6.
- Wong, J. Y., Williams, L. E., Yamauchi, D. M., Odom-Maryon, T., Esteban, J. M., Neumaier, M., Wu, A. M., Johnson, D. K., Primus, F. J., Shively, J. E. & et al. (1995). Initial experience evaluating 90yttrium-radiolabeled anti-carcinoembryonic antigen chimeric T84.66 in a phase I radioimmunotherapy trial. *Cancer Res* 55, 5929s-5934s.
- Wong, J. Y. C., Chu, D. Z., Yamauchi, D. M., Williams, L. E., Liu, A., Wilczynski, S., Wu, A. M., Shively, J. E., Doroshow, J. H. & Raubitschek, A. A. (2000). A phase I radioimmunotherapy trial evaluating 90yttrium-labeled anti-carcinoembryonic antigen (CEA) chimeric T84.66 in patients with metastatic CEA-producing malignancies. *Clin Cancer Res* 6, 3855-63.
- Worthy lake, R., Opresko, L. K. & Wiley, H. S. (1999). ErbB-2 amplification inhibits down-regulation and induces constitutive activation of both ErbB-2 and epidermal growth factor receptors. *J Biol Chem* 274, 8865-74.
- Wu, A. M., Chen, W., Raubitschek, A., Williams, L. E., Neumaier, M., Fischer, R., Hu, S. Z., Odom-Maryon, T., Wong, J. Y. & Shively, J. E. (1996). Tumor localization of anti-CEA single-chain Fvs: improved targeting by non-covalent dimers. *Immunotechnology* 2, 21-36.

- Wu, A. M., Yazaki, P. J., Tsai, S., Nguyen, K., Anderson, A. L., McCarthy, D. W., Welch, M. J., Shively, J. E., Williams, L. E., Raubitschek, A. A., Wong, J. Y., Toyokuni, T., Phelps, M. E. & Gambhir, S. S. (2000). High-resolution microPET imaging of carcinoembryonic antigen-positive xenografts by using a copper-64-labeled engineered antibody fragment. *Proc Natl Acad Sci U S A* 97, 8495-500.
- Yamanaka, H. I., Inoue, T. & Ikeda-Tanaka, O. (1996). Chicken monoclonal antibody isolated by a phage display system. *J Immunol* 157, 1156-62.
- Yang, W. P., Green, K., Pinz Sweeney, S., Briones, A. T., Burton, D. R. & Barbas, C. F. r. (1995). CDR walking mutagenesis for the affinity maturation of a potent human anti-HIV-1 antibody into the picomolar range. *J Mol Biol* 254, 392-403 issn: 0022-2836.
- Yazaki, P. J., Wu, A. M., Tsai, S. W., Williams, L. E., Ikler, D. N., Wong, J. Y., Shively, J. E. & Raubitschek, A. A. (2001). Tumor targeting of radiometal labeled anti-CEA recombinant T84.66 diabody and t84.66 minibody: comparison to radioiodinated fragments. *Bioconjug Chem* 12, 220-8.
- Yokota, T., Milenic, D. E., Whitlow, M. & Schlom, J. (1992). Rapid tumor penetration of a single-chain Fv and comparison with other immunoglobulin forms. *Cancer Res* 52, 3402-8.
- Yu, L. G., Jansson, B., Fernig, D. G., Milton, J. D., Smith, J. A., Gerasimenko, O. V., Jones, M. & Rhodes, J. M. (1997). Stimulation of proliferation in human colon cancer cells by human monoclonal antibodies against the TF antigen (galactose beta1-3 N-acetyl-galactosamine). *Int J Cancer* 73, 424-31.
- Yu, L. G., Milton, J. D., Fernig, D. G. & Rhodes, J. M. (2001). Opposite effects on human colon cancer cell proliferation of two dietary Thomsen-Friedenreich antigen-binding lectins. *J Cell Physiol* 186, 282-7.
- Zhou, H., Fisher, R. J. & Papas, T. S. (1994). Optimization of primer sequences for mouse scFv repertoire display library construction. *Nucleic Acids Res* 22, 888-9.
- Zuo, Z., Jimenez, X., Witte, L. & Zhu, Z. (2000). An efficient route to the production of an IgG-like bispecific antibody. *Protein Eng* 13, 361-7.