
Bibliography

Aberle,H., Bauer,A., Stappert,J., Kispert,A., and Kemler,R. (1997). [beta]-catenin is a target for the ubiquitin-proteasome pathway. *EMBO J.* *16*, 3797-3804.

Allen,J.L. and Douglas,M.G. (1989). Organization of the nuclear pore complex in *Saccharomyces cerevisiae*. *J. Ultrastruct. Mol Struct. Res.* *102*, 95-108.

An,W.G., Kanekal,M., Simon,M.C., Maltepe,E., Blagosklonny,M.V., and Neckers,L.M. (1998). Stabilization of wild-type p53 by hypoxia-inducible factor 1alpha. *Nature* *392*, 405-408.

Antonijczuk,K., Kroftova,O.S., Varghese,A.H., Antonijczuk,A., Henjum,D.C., Korza,G., Ozols,J., and Sunderman,F.W., Jr. (1995). The 40 kDa ⁶³Ni(2+)-binding protein (pNiXc) on western blots of *Xenopus laevis* oocytes and embryos is the monomer of fructose-1,6-bisphosphate aldolase A. *Biochim. Biophys. Acta* *1247*, 81-89.

Arrouijal,F.Z., Hildebrand,H.F., Vophi,H., and Marzin,D. (1990). Genotoxic activity of nickel subsulphide alpha-Ni₃S₂. *Mutagenesis* *5*, 583-589.

Asato,N., Soestbergen,M., and Sunderman,F.W., Jr. (1975). Binding of ⁶³Ni (II) to ultrafiltrable constituents of rabbit serum in vivo and in vitro. *Clin. Chem.* *21*, 521-527.

Ashton-Rickardt,P.G. (1989). High frequency of APC loss in sporadic colorectal carcinoma due to breaks clustered in 5q21-22. *Oncogene* *4*, 1169-1174.

Bal,W., Christodoulou,J., Sadler,P.J., and Tucker,A. (1998). Multi-metal binding site of serum albumin. *J. Inorg. Biochem.* *70*, 33-39.

Bal,W., Jezowska-Bojczuk,M., and Kasprzak,K.S. (1997). Binding of nickel(II) and copper(II) to the N-terminal sequence of human protamine HP2. *Chem. Res. Toxicol.* *10*, 906-914.

Bal,W., Karantza,V., Moudrianakis,E.N., and Kasprzak,K.S. (1999). Interaction of Nickel(II) with histones: in vitro binding of nickel(II) to the core histone tetramer. *Arch. Biochem. Biophys.* *364*, 161-166.

Bal,W., Kozłowski,H., and Kasprzak,K.S. (2000). Molecular models in nickel carcinogenesis. *J. Inorg. Biochem.* *79*, 213-218.

Bal,W., Lukszo,J., and Kasprzak,K.S. (1997). Mediation of oxidative DNA damage by nickel(II) and copper(II) complexes with the N-terminal sequence of human protamine HP2. *Chem. Res. Toxicol.* *10*, 915-921.

Bal,W., Lukszo,J., Białkowski,K., and Kasprzak,K.S. (1998). Interactions of Nickel(II) with histones: interactions of Nickel(II) with CH₃CO-Thr-Glu-Ser-His-His-Lys-NH₂, a peptide modeling the potential metal binding site in the "C-Tail" region of histone H2A. *Chem. Res. Toxicol.* *11*, 1014-1023.

Bal,W., Lukszo,J., Jezowska-Bojczuk,M., and Kasprzak,K.S. (1995). Interactions of nickel(II) with histones. Stability and solution structure of complexes with CH₃CO-Cys-Ala-Ile-His-NH₂, a putative metal binding sequence of histone H3. *Chem. Res. Toxicol.* *8*, 683-692.

Bal,W., Wojcik,J., Maciejczyk,M., Grochowski,P., and Kasprzak,K.S. (2000). Induction of a secondary structure in the N-terminal pentadecapeptide of human protamine HP2 through Ni(II) coordination. An NMR study. *Chem. Res. Toxicol.* *13*, 823-830.

Banziger,C. (2006). Wntless, a conserved membrane protein dedicated to the secretion of Wnt proteins from signaling cells. *Cell* *125*, 509-522.

Baptiste,E., Charlebois,R.L., MacLeod,D., and Brochier,C. (2005). The two tempos of nuclear pore complex evolution: highly adapting proteins in an ancient frozen structure. *Genome Biol* *6*, R85.

Barkai,N. and Leibler,S. (1997). Robustness in simple biochemical networks. *Nature* *387*, 913-917.

Barker,N. (2007). Identification of stem cells in small intestine and colon by marker gene Lgr5. *Nature* *449*, 1003-1007.

Barker,N. and Clevers,H. (2006). Mining the Wnt pathway for cancer therapeutics. *Nature Rev. Drug Discov.* *5*, 997-1014.

Barker,N., Hurlstone,A., Musisi,H., Miles,A., Bienz,M., and Clevers,H. (2001). The chromatin remodelling factor Brg-1 interacts with beta-catenin to promote target gene activation. *EMBO J.* 20, 4935-4943.

Bartscherer,K. and Boutros,M. (2008). Regulation of Wnt protein secretion and its role in gradient formation. *EMBO Rep.* 9, 977-982.

Bartscherer,K., Pelte,N., Ingelfinger,D., and Boutros,M. (2006). Secretion of Wnt ligands requires Evi, a conserved transmembrane protein. *Cell* 125, 523-533.

Bayliss,R., Littlewood,T., and Stewart,M. (2000). Structural basis for the interaction between FxFG nucleoporin repeats and importin-beta in nuclear trafficking. *Cell* 102, 99-108.

Behrens,J. (1996). Functional interaction of [beta]-catenin with the transcription factor LEF-1. *Nature* 382, 638-642.

Behrens,J. (1998). Functional interaction of an axin homolog, conductin, with [beta]-catenin, APC, and GSK3[beta]. *Science* 280, 596-599.

Berg,J.M. (1986). Potential metal-binding domains in nucleic acid binding proteins. *Science* 232, 485-487.

Beroud,C. and Soussi,T. (1996). APC gene: database of germline and somatic mutations in human tumors and cell lines. *Nucleic Acids Res.* 24, 121-124.

Bienz,M. and Clevers,H. (2000). Linking colorectal cancer to Wnt signaling. *Cell* 103, 311-320.

Bischoff,F.R. and Gorlich,D. (1997). RanBP1 is crucial for the release of RanGTP from importin [beta]-related nuclear transport factors. *FEBS Lett.* 419, 249-254.

Bischoff,F.R. and Ponstingl,H. (1991). Catalysis of guanine nucleotide exchange on Ran by the mitotic regulator RCC1. *Nature* 354, 80-82.

Bischoff,F.R., Krebber,H., Smirnova,E., Dong,W., and Ponstingl,H. (1995). Co-activation of RanGTPase and inhibition of GTP dissociation by Ran-GTP binding protein RanBP1. *EMBO J.* 14, 705-715.

Bodoor,K., Shaikh,S., Salina,D., Raharjo,W.H., Bastos,R., Lohka,M., and Burke,B. (1999). Sequential recruitment of NPC proteins to the nuclear periphery at the end of mitosis. *J. Cell Sci. 112 (Pt 13)*, 2253-2264.

Boutros,M., Paricio,N., Strutt,D.I., and Mlodzik,M. (1998). Dishevelled activates JNK and discriminates between JNK pathways in planar polarity and wingless signaling. *Cell 94*, 109-118.

Brodav,L., Peng,W., Kuo,M.H., Salnikow,K., Zoroddu,M., and Costa,M. (2000). Nickel compounds are novel inhibitors of histone H4 acetylation. *Cancer Res. 60*, 238-241.

Brookes,M.J., Boulton,J., Roberts,K., Cooper,B.T., Hotchin,N.A., Matthews,G., Iqbal,T., and Tselepis,C. (2008). A role for iron in Wnt signalling. *Oncogene 27*, 966-975.

Castaño J, Raurell I, Piedra JA, Miravet S, Duñach M, and García de Herreros A. (2002). Beta-catenin N- and C-terminal tails modulate the coordinated binding of adherens junction proteins to beta-catenin. *J. Biol Chem. 277*, 31541-31550.

Callan,W.M. and Sunderman,F.W., Jr. (1973). Species variations in binding of 63 Ni(II) by serum albumin. *Res. Commun. Chem. Pathol. Pharmacol. 5*, 459-472.

Carmeliet,P., Dor,Y., Herbert,J.M., Fukumura,D., Brusselmans,K., Dewerchin,M., Neeman,M., Bono,F., Abramovitch,R., Maxwell,P., Koch,C.J., Ratcliffe,P., Moons,L., Jain,R.K., Collen,D., and Keshert,E. (1998). Role of HIF-1alpha in hypoxia-mediated apoptosis, cell proliferation and tumour angiogenesis. *Nature 394*, 485-490.

Castano,J., Raurell,I., Piedra,J.A., Miravet,S., Dunach,M., and Garcia de,H.A. Cavallo,R.A. (1998). Drosophila Tcf and Groucho interact to repress Wingless signalling activity. *Nature 395*, 604-608.

Chakraborty,P.K., Lee,W.K., Molitor,M., Wolff,N.A., and Thevenod,F. (2010). Cadmium induces Wnt signaling to upregulate proliferation and survival genes in sub-confluent kidney proximal tubule cells. *Mol Cancer 9*, 102.

Chiocca,S.M., Sterner,D.A., Biggart,N.W., and Murphy,E.C., Jr. (1991). Nickel mutagenesis: alteration of the MuSVts110 thermosensitive splicing phenotype by a nickel-induced duplication of the 3' splice site. *Mol Carcinog.* *4*, 61-71.

Conway,K. and Costa,M. (1989). Nonrandom chromosomal alterations in nickel-transformed Chinese hamster embryo cells. *Cancer Res.* *49*, 6032-6038.

Coogan,T.P., Latta,D.M., Snow,E.T., and Costa,M. (1989). Toxicity and carcinogenicity of nickel compounds. *Crit Rev Toxicol.* *19*, 341-384.

Costa,M., Simmons-Hansen,J., Bedrossian,C.W., Bonura,J., and Caprioli,R.M. (1981). Phagocytosis, cellular distribution, and carcinogenic activity of particulate nickel compounds in tissue culture. *Cancer Res.* *41*, 2868-2876.

Cronshaw,J.M., Krutchinsky,A.N., Zhang,W., Chait,B.T., and Matunis,M.J. (2002). Proteomic analysis of the mammalian nuclear pore complex. *J. Cell Biol* *158*, 915-927.

Crowe,J., Dobeli,H., Gentz,R., Hochuli,E., Stuber,D., and Henco,K. (1994). 6xHis-Ni-NTA chromatography as a superior technique in recombinant protein expression/purification. *Methods Mol Biol* *31*, 371-387.

Daigle,N., Beaudouin,J., Hartnell,L., Imreh,G., Hallberg,E., Lippincott-Schwartz,J., and Ellenberg,J. (2001). Nuclear pore complexes form immobile networks and have a very low turnover in live mammalian cells. *J. Cell Biol* *154*, 71-84.

Daniels,D.L. and Weis,W.I. (2002). ICAT inhibits beta-catenin binding to Tcf/Lef-family transcription factors and the general coactivator p300 using independent structural modules. *Mol Cell* *10*, 573-584.

Daniels,D.L. and Weis,W.I. (2005). [beta]-catenin directly displaces Groucho/TLE repressors from Tcf/Lef in Wnt-mediated transcription activation. *Nature Struct. Mol. Biol.* *12*, 364-371.

Davidson,G. (2005). Casein kinase 1 [gamma] couples Wnt receptor activation to cytoplasmic signal transduction. *Nature* *438*, 867-872.

Dawlaty,M.M., Malureanu,L., Jeganathan,K.B., Kao,E., Sustmann,C., Tahk,S., Shuai,K., Grosschedl,R., and van Deursen,J.M. (2008). Resolution of sister centromeres requires RanBP2-mediated SUMOylation of topoisomerase IIalpha. *Cell* *133*, 103-115.

Denkhaus,E. and Salnikow,K. (2002). Nickel essentiality, toxicity, and carcinogenicity. *Crit Rev Oncol. Hematol.* *42*, 35-56.

Donaldson,L.W., Skrynnikov,N.R., Choy,W.Y., Muhandiram,D.R., Sarkar,B., Forman-Kay,J.D., and Kay,L.E. (2001). Structural characterization of proteins with an attached ATCUN motif by paramagnetic relaxation enhancement NMR spectroscopy. *J. Am. Chem. Soc.* *123*, 9843-9847.

Drees,F., Pokutta,S., Yamada,S., Nelson,W.J., and Weis,W.I. (2005). Alpha-catenin is a molecular switch that binds E-cadherin-beta-catenin and regulates actin-filament assembly. *Cell* *123*, 903-915.

Eaton,S. (2008). Retromer retrieves wntless. *Dev. Cell* *14*, 4-6.

Eaton,S., Wepf,R., and Simons,K. (1996). Roles for Rac1 and Cdc42 in planar polarization and hair outgrowth in the wing of *Drosophila*. *J. Cell Biol* *135*, 1277-1289.

Eklof,S.K., Fridman,S.G., and Weis,W.I. (2001). Molecular mechanisms of beta-catenin recognition by adenomatous polyposis coli revealed by the structure of an APC-beta-catenin complex. *EMBO J.* *20*, 6203-6212.

Eleftheriou,A., Yoshida,M., and Henderson,B.R. (2001). Nuclear export of human beta-catenin can occur independent of CRM1 and the adenomatous polyposis coli tumor suppressor. *J. Biol Chem.* *276*, 25883-25888.

Essers,M.A., de Vries-Smits,L.M., Barker,N., Polderman,P.E., Burgering,B.M., and Korswagen,H.C. (2005). Functional interaction between beta-catenin and FOXO in oxidative stress signaling. *Science* *308*, 1181-1184.

Fagotto,F., Gluck,U., and Gumbiner,B.M. (1998). Nuclear localization signal-independent and importin/karyopherin-independent nuclear import of beta-catenin. *Curr. Biol.* 8, 181-190.

Fanto,M., Weber,U., Strutt,D.I., and Mlodzik,M. (2000). Nuclear signaling by Rac and Rho GTPases is required in the establishment of epithelial planar polarity in the *Drosophila* eye. *Curr. Biol* 10, 979-988.

Ferreira,P.A., Nakayama,T.A., and Travis,G.H. (1997). Interconversion of red opsin isoforms by the cyclophilin-related chaperone protein Ran-binding protein 2. *Proc. Natl Acad. Sci. U. S. A* 94, 1556-1561.

Ferreira,P.A., Nakayama,T.A., Pak,W.L., and Travis,G.H. (1996). Cyclophilin-related protein RanBP2 acts as chaperone for red/green opsin. *Nature* 383, 637-640.

Finch,P.W. (1997). Purification and molecular cloning of a secreted, Frizzled-related antagonist of Wnt action. *Proc. Natl Acad. Sci. USA* 94, 6770-6775.

Fiserova,J., Kiseleva,E., and Goldberg,M.W. (2009). Nuclear envelope and nuclear pore complex structure and organization in tobacco BY-2 cells. *Plant J.* 59, 243-255.

Fodde,R., Edelmann,W., Yang,K., van,L.C., Carlson,C., Renault,B., Breukel,C., Alt,E., Lipkin,M., Khan,P.M., and . (1994). A targeted chain-termination mutation in the mouse *Apc* gene results in multiple intestinal tumors. *Proc. Natl Acad. Sci. U. S. A* 91, 8969-8973.

Folkman,J. (1971). Tumor angiogenesis: therapeutic implications. *N. Engl. J. Med.* 285, 1182-1186.

Galea,M.A., Eleftheriou,A., and Henderson,B.R. (2001). ARM domain-dependent nuclear import of adenomatous polyposis coli protein is stimulated by the B56 alpha subunit of protein phosphatase 2A. *J. Biol Chem.* 276, 45833-45839.

Garayoa,M., Martinez,A., Lee,S., Pio,R., An,W.G., Neckers,L., Trepel,J., Montuenga,L.M., Ryan,H., Johnson,R., Gassmann,M., and Cuttitta,F. (2000). Hypoxia-inducible factor-1 (HIF-1) up-regulates adrenomedullin expression in

human tumor cell lines during oxygen deprivation: a possible promotion mechanism of carcinogenesis. *Mol Endocrinol.* *14*, 848-862.

Glennon, J.D. and Sarkar, B. (1982). Nickel(II) transport in human blood serum. Studies of nickel(II) binding to human albumin and to native-sequence peptide, and ternary-complex formation with L-histidine. *Biochem. J.* *203*, 15-23.

Goebeler, M., Meinardus-Hager, G., Roth, J., Goerdt, S., and Sorg, C. (1993). Nickel chloride and cobalt chloride, two common contact sensitizers, directly induce expression of intercellular adhesion molecule-1 (ICAM-1), vascular cell adhesion molecule-1 (VCAM-1), and endothelial leukocyte adhesion molecule (ELAM-1) by endothelial cells. *J. Invest Dermatol.* *100*, 759-765.

Goebeler, M., Roth, J., Brocker, E.B., Sorg, C., and Schulze-Osthoff, K. (1995). Activation of nuclear factor-kappa B and gene expression in human endothelial cells by the common haptens nickel and cobalt. *J. Immunol.* *155*, 2459-2467.

Gorlich, D. and Kutay, U. (1999). Transport between the cell nucleus and the cytoplasm. *Annu. Rev Cell Dev. Biol.* *15*, 607-660.

Gorlich, D., Prehn, S., Laskey, R.A., and Hartmann, E. (1994). Isolation of a protein that is essential for the first step of nuclear protein import. *Cell* *79*, 767-778.

Graham, T.A., Clements, W.K., Kimelman, D., and Xu, W. (2002). The crystal structure of the beta-catenin/ICAT complex reveals the inhibitory mechanism of ICAT. *Mol Cell* *10*, 563-571.

Graham, T.A., Weaver, C., Mao, F., Kimelman, D., and Xu, W. (2000). Crystal structure of a beta-catenin/Tcf complex. *Cell* *103*, 885-896.

Grbac-Ivankovic, S., Antonijczuk, K., Varghese, A.H., Plowman, M.C., Antonijczuk, A., Korza, G., Ozols, J., and Sunderman, F.W., Jr. (1994). Lipovitellin 2 beta is the 31 kD Ni(2+)-binding protein (pNiXb) in *Xenopus* oocytes and embryos. *Mol Reprod. Dev.* *38*, 256-263.

Groden, J. (1991). Identification and characterization of the familial adenomatous polyposis coli gene. *Cell* *66*, 589-600.

Groden,J., Thliveris,A., Samowitz,W., Carlson,M., Gelbert,L., Albertsen,H., Joslyn,G., Stevens,J., Spirio,L., Robertson,M., and . (1991). Identification and characterization of the familial adenomatous polyposis coli gene. *Cell* 66, 589-600.

Guttinger,S., Laurell,E., and Kutay,U. (2009). Orchestrating nuclear envelope disassembly and reassembly during mitosis. *Nat Rev Mol Cell Biol* 10, 178-191.

Habas,R., Dawid,I.B., and He,X. (2003). Coactivation of Rac and Rho by Wnt/Frizzled signaling is required for vertebrate gastrulation. *Genes Dev.* 17, 295-309.

Habas,R., Kato,Y., and He,X. (2001). Wnt/Frizzled activation of Rho regulates vertebrate gastrulation and requires a novel Formin homology protein Daam1. *Cell* 107, 843-854.

Hamada,M., Haeger,A., Jeganathan,K.B., van Ree,J.H., Malureanu,L., Walde,S., Joseph,J., Kehlenbach,R.H., and van Deursen,J.M. (2011). Ran-dependent docking of importin- β to RanBP2/Nup358 filaments is essential for protein import and cell viability. *J. Cell Biol* 194, 597-612.

Hardin,J. and King,R.S. (2008). The long and the short of Wnt signaling in *C. elegans*. *Curr. Opin. Genet. Dev.* 18, 362-367.

He,T.C. (1998). Identification of c-MYC as a target of the APC pathway. *Science* 281, 1509-1512.

Heck,J.D. and Costa,M. (1982). Surface reduction of amorphous NiS particles potentiates their phagocytosis and subsequent induction of morphological transformation in Syrian hamster embryo cells. *Cancer Lett.* 15, 19-26.

Heiss,K., Junkes,C., Guerreiro,N., Swamy,M., Camacho-Carvajal,M.M., Schamel,W.W., Haidl,I.D., Wild,D., Weltzien,H.U., and Thierse,H.J. (2005). Subproteomic analysis of metal-interacting proteins in human B cells. *Proteomics.* 5, 3614-3622.

Henderson,B.R. (2000). Nuclear-cytoplasmic shuttling of APC regulates beta-catenin subcellular localization and turnover. *Nat Cell Biol* 2, 653-660.

Henderson,B.R. and Fagotto,F. (2002). The ins and outs of APC and beta-catenin nuclear transport. *EMBO Rep.* 3, 834-839.

Hendriksen,J., Fagotto,F., van,d., V, van Schie,M., Noordermeer,J., and Fornerod,M. (2005). RanBP3 enhances nuclear export of active (beta)-catenin independently of CRM1. *J. Cell Biol.* 171, 785-797.

Hernandez-Boussard,T., Rodriguez-Tome,P., Montesano,R., and Hainaut,P. (1999). IARC p53 mutation database: a relational database to compile and analyze p53 mutations in human tumors and cell lines. International Agency for Research on Cancer. *Hum. Mutat.* 14, 1-8.

Herrero,M.C., Alvarez,C., Cartana,J., Blade,C., and Arola,L. (1993). Nickel effects on hepatic amino acids. *Res. Commun. Chem. Pathol. Pharmacol.* 79, 243-248.

Hoffmans,R., Stadeli,R., and Basler,K. (2005). Pygopus and legless provide essential transcriptional coactivator functions to armadillo/beta-catenin. *Curr. Biol* 15, 1207-1211.

Hofmann,K. (2000). A superfamily of membrane-bound O-acyltransferases with implications for wnt signaling. *Trends Biochem. Sci.* 25, 111-112.

Hostynek,J.J. (2002). Nickel-induced hypersensitivity: etiology, immune reactions, prevention and therapy. *Arch. Dermatol. Res.* 294, 249-267.

Hsieh,J.C. (1999). A new secreted protein that binds to Wnt proteins and inhibits their activities. *Nature* 398, 431-436.

Huang,X., Kitahara,J., Zhitkovich,A., Dowjat,K., and Costa,M. (1995). Heterochromatic proteins specifically enhance nickel-induced 8-oxo-dG formation. *Carcinogenesis* 16, 1753-1759.

Huang,X., Klein,C.B., and Costa,M. (1994). Crystalline Ni3S2 specifically enhances the formation of oxidants in the nuclei of CHO cells as detected by dichlorofluorescein. *Carcinogenesis* 15, 545-548.

Huber,A.H. and Weis,W.I. (2001). The structure of the [beta]-catenin/E-cadherin complex and the molecular basis of diverse ligand recognition by [beta]-catenin. *Cell* 105, 391-402.

Huber,A.H., Nelson,W.J., and Weis,W.I. (1997). Three-dimensional structure of the armadillo repeat region of beta-catenin. *Cell* 90, 871-882.

Hulsken,J., Birchmeier,W., and Behrens,J. (1994). E-cadherin and APC compete for the interaction with [beta]-catenin and the cytoskeleton. *J. Cell Biol.* 127, 2061-2069.

Hutten,S., Flotho,A., Melchior,F., and Kehlenbach,R.H. (2008). The Nup358-RanGAP complex is required for efficient importin alpha/beta-dependent nuclear import. *Mol Biol Cell* 19, 2300-2310.

Inomata,M., Ochiai,A., Akimoto,S., Kitano,S., and Hirohashi,S. (1996). Alteration of beta-catenin expression in colonic epithelial cells of familial adenomatous polyposis patients. *Cancer Res.* 56, 2213-2217.

Iovine,M.K., Watkins,J.L., and Wente,S.R. (1995). The GLFG repetitive region of the nucleoporin Nup116p interacts with Kap95p, an essential yeast nuclear import factor. *J. Cell Biol* 131, 1699-1713.

Itoh,K., Krupnik,V.E., and Sokol,S.Y. (1998). Axis determination in *Xenopus* involves biochemical interactions of axin, glycogen synthase kinase 3 and [beta]-catenin. *Curr. Biol.* 8, 591-594.

Ivan,M., Kondo,K., Yang,H., Kim,W., Valiando,J., Ohh,M., Salic,A., Asara,J.M., Lane,W.S., and Kaelin,W.G., Jr. (2001). HIFalpha targeted for VHL-mediated destruction by proline hydroxylation: implications for O₂ sensing. *Science* 292, 464-468.

Jaakkola,P., Mole,D.R., Tian,Y.M., Wilson,M.I., Gielbert,J., Gaskell,S.J., Kriegsheim,A., Hebestreit,H.F., Mukherji,M., Schofield,C.J., Maxwell,P.H., Pugh,C.W., and Ratcliffe,P.J. (2001). Targeting of HIF-alpha to the von Hippel-Lindau ubiquitylation complex by O₂-regulated prolyl hydroxylation. *Science* 292, 468-472.

Jewell,U.R., Kvietikova,I., Scheid,A., Bauer,C., Wenger,R.H., and Gassmann,M. (2001). Induction of HIF-1alpha in response to hypoxia is instantaneous. *FASEB J.* *15*, 1312-1314.

Jho,E.H., Zhang,T., Domon,C., Joo,C.K., Freund,J.N., and Costantini,F. (2002). Wnt/beta-catenin/Tcf signaling induces the transcription of Axin2, a negative regulator of the signaling pathway. *Mol Cell Biol* *22*, 1172-1183.

Jiang,J. and Struhl,G. (1998). Regulation of the Hedgehog and Wingless signalling pathways by the F-box/WD40-repeat protein Slimb. *Nature* *391*, 493-496.

Joseph,J. (2006). Ran at a glance. *J Cell Sci.* *119*, 3481-384.

Joseph,J. and Dasso,M. (2008). The nucleoporin Nup358 associates with and regulates interphase microtubules. *FEBS Lett.* *582*, 190-196.

Joseph,J., Liu,S.T., Jablonski,S.A., Yen,T.J., and Dasso,M. (2004). The RanGAP1-RanBP2 complex is essential for microtubule-kinetochore interactions in vivo. *Curr. Biol* *14*, 611-617.

Joseph,J., Tan,S.H., Karpova,T.S., McNally,J.G., and Dasso,M. (2002). SUMO-1 targets RanGAP1 to kinetochores and mitotic spindles. *J. Cell Biol* *156*, 595-602.

Joslyn,G., Carlson,M., Thliveris,A., Albertsen,H., Gelbert,L., Samowitz,W., Groden,J., Stevens,J., Spirio,L., Robertson,M., and . (1991). Identification of deletion mutations and three new genes at the familial polyposis locus. *Cell* *66*, 601-613.

Kasprzak,K.S. (1991). The role of oxidative damage in metal carcinogenicity. *Chem. Res. Toxicol.* *4*, 604-615.

Kasprzak,K.S. and Poirier,L.A. (1985). Effects of calcium(II) and magnesium(II) on nickel(II) uptake and stimulation of thymidine incorporation into DNA in the lungs of strain A mice. *Carcinogenesis* *6*, 1819-1821.

Kasprzak,K.S., Sunderman,F.W., Jr., and Salnikow,K. (2003). Nickel carcinogenesis. *Mutat. Res.* *533*, 67-97.

Kasprzak,K.S., Waalkes,M.P., and Poirier,L.A. (1986). Antagonism by essential divalent metals and amino acids of nickel(II)-DNA binding in vitro. *Toxicol. Appl. Pharmacol.* 82, 336-343.

Kinzler,K.W. and Vogelstein,B. (1996). Lessons from hereditary colorectal cancer. *Cell* 87, 159-170.

Kiseleva,E., Allen,T.D., Rutherford,S., Bucci,M., Wentz,S.R., and Goldberg,M.W. (2004). Yeast nuclear pore complexes have a cytoplasmic ring and internal filaments. *J. Struct. Biol* 145, 272-288.

Kiseleva,E., Goldberg,M.W., Daneholt,B., and Allen,T.D. (1996). RNP export is mediated by structural reorganization of the nuclear pore basket. *J. Mol Biol* 260, 304-311.

Klein,C.B., Frenkel,K., and Costa,M. (1991). The role of oxidative processes in metal carcinogenesis. *Chem. Res. Toxicol.* 4, 592-604.

Klein,T.J. and Mlodzik,M. (2005). Planar cell polarization: an emerging model points in the right direction. *Annu. Rev Cell Dev. Biol* 21, 155-176.

Koike,M., Kose,S., Furuta,M., Taniguchi,N., Yokoya,F., Yoneda,Y., and Imamoto,N. (2004). beta-Catenin shows an overlapping sequence requirement but distinct molecular interactions for its bidirectional passage through nuclear pores. *J. Biol. Chem.* 279, 34038-34047.

Kondo,K., Ozaki,T., Nakamura,Y., and Sakiyama,S. (1995). DAN gene product has an affinity for Ni²⁺. *Biochem. Biophys. Res. Commun.* 216, 209-215.

Korinek,V. (1997). Constitutive transcriptional activation by a [beta]-catenin-Tcf complex in APC^{-/-} colon carcinoma. *Science* 275, 1784-1787.

Korinek,V. (1998). Depletion of epithelial stem-cell compartments in the small intestine of mice lacking Tcf-4. *Nature Genet.* 19, 379-383.

Korinek,V., Barker,N., Morin,P.J., van,W.D., de,W.R., Kinzler,K.W., Vogelstein,B., and Clevers,H. (1997). Constitutive transcriptional activation by a beta-catenin-Tcf complex in APC^{-/-} colon carcinoma. *Science* 275, 1784-1787.

Kotyza,J., Varghese,A.H., Korza,G., and Sunderman,F.W., Jr. (1998). Interactions of serine proteinases with pNiXa, a serpin of *Xenopus* oocytes and embryos. *Biochim. Biophys. Acta* 1382, 266-276.

Kramps,T. (2002). Wnt/wingless signaling requires BCL9/legless-mediated recruitment of pygopus to the nuclear [beta]-catenin-TCF complex. *Cell* 109, 47-60.

Kramps,T., Peter,O., Brunner,E., Nellen,D., Froesch,B., Chatterjee,S., Murone,M., Zullig,S., and Basler,K. (2002). Wnt/wingless signaling requires BCL9/legless-mediated recruitment of pygopus to the nuclear beta-catenin-TCF complex. *Cell* 109, 47-60.

Kraus,C., Liehr,T., Hulsken,J., Behrens,J., Birchmeier,W., Grzeschik,K.H., and Ballhausen,W.G. (1994). Localization of the human beta-catenin gene (CTNNB1) to 3p21: a region implicated in tumor development. *Genomics* 23, 272-274.

Krezel,A., Szczepanik,W., Sokolowska,M., Jezowska-Bojczuk,M., and Bal,W. (2003). Correlations between complexation modes and redox activities of Ni(II)-GSH complexes. *Chem. Res. Toxicol.* 16, 855-864.

Kuehn,K., Fraser,C.B., and Sunderman,F.W., Jr. (1982). Phagocytosis of particulate nickel compounds by rat peritoneal macrophages in vitro. *Carcinogenesis* 3, 321-326.

Lando,D., Peet,D.J., Whelan,D.A., Gorman,J.J., and Whitelaw,M.L. (2002). Asparagine hydroxylation of the HIF transactivation domain a hypoxic switch. *Science* 295, 858-861.

Laussac,J.P. and Sarkar,B. (1984). Characterization of the copper(II)- and nickel(II)-transport site of human serum albumin. Studies of copper(II) and nickel(II) binding to peptide 1-24 of human serum albumin by ¹³C and ¹H NMR spectroscopy. *Biochemistry* 23, 2832-2838.

Lee,S.J., Imamoto,N., Sakai,H., Nakagawa,A., Kose,S., Koike,M., Yamamoto,M., Kumasaka,T., Yoneda,Y., and Tsukihara,T. (2000). The adoption of a twisted structure of importin-beta is essential for the protein-protein interaction required for nuclear transport. *J. Mol. Biol.* *302*, 251-264.

Lee,Y.W., Klein,C.B., Kargacin,B., Salnikow,K., Kitahara,J., Dowjat,K., Zhitkovich,A., Christie,N.T., and Costa,M. (1995). Carcinogenic nickel silences gene expression by chromatin condensation and DNA methylation: a new model for epigenetic carcinogens. *Mol Cell Biol* *15*, 2547-2557.

Li,L., Yuan,H., Xie,W., Mao,J., Caruso,A.M., McMahon,A., Sussman,D.J., and Wu,D. (1999). Dishevelled proteins lead to two signaling pathways. Regulation of LEF-1 and c-Jun N-terminal kinase in mammalian cells. *J. Biol Chem.* *274*, 129-134.

Li,W., Zhao,Y., and Chou,I.N. (1993). Alterations in cytoskeletal protein sulfhydryls and cellular glutathione in cultured cells exposed to cadmium and nickel ions. *Toxicology* *77*, 65-79.

Li,X. (2005). Sclerostin binds to LRP5/6 and antagonizes canonical Wnt signaling. *J. Biol. Chem.* *280*, 19883-19887.

Lin,X. and Perrimon,N. (1999). Dally cooperates with *Drosophila* Frizzled 2 to transduce Wingless signalling. *Nature* *400*, 281-284.

Logan,C.Y. and Nusse,R. (2004). The Wnt signaling pathway in development and disease. *Annu. Rev. Cell Dev. Biol.* *20*, 781-810.

Luger,K., Mader,A.W., Richmond,R.K., Sargent,D.F., and Richmond,T.J. (1997). Crystal structure of the nucleosome core particle at 2.8 Å resolution. *Nature* *389*, 251-260.

Macara,I.G. (2001). Transport into and out of the nucleus. *Microbiol. Mol Biol Rev* *65*, 570-94, table.

Maehle,L., Metcalf,R.A., Ryberg,D., Bennett,W.P., Harris,C.C., and Haugen,A. (1992). Altered p53 gene structure and expression in human epithelial cells after exposure to nickel. *Cancer Res.* *52*, 218-221.

- Mao,J. (2001). Low-density lipoprotein receptor-related protein-5 binds to Axin and regulates the canonical Wnt signaling pathway. *Mol. Cell* 7, 801-809.
- Marlow,F., Topczewski,J., Sepich,D., and Solnica-Krezel,L. (2002). Zebrafish Rho kinase 2 acts downstream of Wnt11 to mediate cell polarity and effective convergence and extension movements. *Curr. Biol* 12, 876-884.
- Martello,G. (2007). MicroRNA control of Nodal signalling. *Nature* 449, 183-188.
- McCrea,P.D., Turck,C.W., and Gumbiner,B. (1991). A homolog of the armadillo protein in *Drosophila* (plakoglobin) associated with E-cadherin. *Science* 254, 1359-1361.
- McDonald,S.L. and Silver,A. (2009). The opposing roles of Wnt-5a in cancer. *Br. J. Cancer* 101, 209-214.
- McMahon,A.P. and Moon,R.T. (1989). Ectopic expression of the proto-oncogene *int-1* in *Xenopus* embryos leads to duplication of the embryonic axis. *Cell* 58, 1075-1084.
- McNeill,L.A., Hewitson,K.S., Claridge,T.D., Seibel,J.F., Horsfall,L.E., and Schofield,C.J. (2002). Hypoxia-inducible factor asparaginyl hydroxylase (FIH-1) catalyses hydroxylation at the beta-carbon of asparagine-803. *Biochem. J.* 367, 571-575.
- Meier,I., Xu,X.M., Brkljacic,J., Zhao,Q., and Wang,H.J. (2008). Going green: plants' alternative way to position the Ran gradient. *J. Microsc.* 231, 225-233.
- Melillo,G., Musso,T., Sica,A., Taylor,L.S., Cox,G.W., and Varesio,L. (1995). A hypoxia-responsive element mediates a novel pathway of activation of the inducible nitric oxide synthase promoter. *J. Exp. Med.* 182, 1683-1693.
- Miller,J.R., Hocking,A.M., Brown,J.D., and Moon,R.T. (1999). Mechanism and function of signal transduction by the Wnt/beta-catenin and Wnt/Ca²⁺ pathways. *Oncogene* 18, 7860-7872.

- Molenaar,M. (1996). XTcf-3 transcription factor mediates [beta]-catenin-induced axis formation in *Xenopus* embryos. *Cell* 86, 391-399.
- Moon,R.T., Bowerman,B., Boutros,M., and Perrimon,N. (2002). The promise and perils of Wnt signaling through beta-catenin. *Science* 296, 1644-1646.
- Moon,R.T., Kohn,A.D., De Ferrari,G.V., and Kaykas,A. (2004). WNT and [beta]-catenin signalling: diseases and therapies. *Nature Rev. Genet.* 5, 691-701.
- Morin,P.J. (1997). Activation of [beta]-catenin-Tcf signaling in colon cancer by mutations in [beta]-catenin or APC. *Science* 275, 1787-1790.
- Mosimann,C., Hausmann,G., and Basler,K. (2006). Parafibromin/Hyrax activates Wnt/Wg target gene transcription by direct association with beta-catenin/Armadillo. *Cell* 125, 327-341.
- Munemitsu,S., Albert,I., Souza,B., Rubinfeld,B., and Polakis,P. (1995). Regulation of intracellular beta-catenin levels by the adenomatous polyposis coli (APC) tumor-suppressor protein. *Proc. Natl. Acad. Sci. U. S. A* 92, 3046-3050.
- Murawala,P., Tripathi,M.M., Vyas,P., Salunke,A., and Joseph,J. (2009). Nup358 interacts with APC and plays a role in cell polarization. *J. Cell Sci.* 122, 3113-3122.
- Nathke,I.S., Adams,C.L., Polakis,P., Sellin,J.H., and Nelson,W.J. (1996). The adenomatous polyposis coli tumor suppressor protein localizes to plasma membrane sites involved in active cell migration. *J. Cell Biol* 134, 165-179.
- Nagafuchi,A. (2001). Molecular architecture of adherens junctions. *Curr. Opin. Cell Biol* 13, 600-603.
- Neufeld,K.L., Nix,D.A., Bogerd,H., Kang,Y., Beckerle,M.C., Cullen,B.R., and White,R.L. (2000). Adenomatous polyposis coli protein contains two nuclear export signals and shuttles between the nucleus and cytoplasm. *Proc. Natl Acad. Sci. U. S. A* 97, 12085-12090.

Nishisho,I., Nakamura,Y., Miyoshi,Y., Miki,Y., Ando,H., Horii,A., Koyama,K., Utsunomiya,J., Baba,S., and Hedge,P. (1991). Mutations of chromosome 5q21 genes in FAP and colorectal cancer patients. *Science* 253, 665-669.

Nomoto,S. and Sunderman,F.W., Jr. (1988). Presence of nickel in alpha-2 macroglobulin isolated from human serum by high performance liquid chromatography. *Ann. Clin. Lab Sci.* 18, 78-84.

Nomoto,S., McNeely,M.D., and Sunderman,F.W., Jr. (1971). Isolation of a nickel alpha 2-macroglobulin from rabbit serum. *Biochemistry* 10, 1647-1651.

Nusse,R. (1991). A new nomenclature for int-1 and related genes: the Wnt gene family. *Cell* 64, 231.

Nusse,R. and Varmus,H.E. (1982). Many tumors induced by the mouse mammary tumor virus contain a provirus integrated in the same region of the host genome. *Cell* 31, 99-109.

Nusslein-Volhard,C. and Wieschaus,E. (1980). Mutations affecting segment number and polarity in *Drosophila*. *Nature* 287, 795-801.

Ocwieja,K.E., Brady,T.L., Ronen,K., Huegel,A., Roth,S.L., Schaller,T., James,L.C., Towers,G.J., Young,J.A., Chanda,S.K., Konig,R., Malani,N., Berry,C.C., and Bushman,F.D. (2011). HIV integration targeting: a pathway involving Transportin-3 and the nuclear pore protein RanBP2. *PLoS Pathog.* 7, e1001313.

Ohh,M., Park,C.W., Ivan,M., Hoffman,M.A., Kim,T.Y., Huang,L.E., Pavletich,N., Chau,V., and Kaelin,W.G. (2000). Ubiquitination of hypoxia-inducible factor requires direct binding to the beta-domain of the von Hippel-Lindau protein. *Nat Cell Biol* 2, 423-427.

Oshima,M., Oshima,H., Kitagawa,K., Kobayashi,M., Itakura,C., and Taketo,M. (1995). Loss of Apc heterozygosity and abnormal tissue building in nascent intestinal polyps in mice carrying a truncated Apc gene. *Proc. Natl Acad. Sci. U. S. A* 92, 4482-4486.

Oshiro,S., Nozawa,K., Hori,M., Zhang,C., Hashimoto,Y., Kitajima,S., and Kawamura,K. (2002). Modulation of iron regulatory protein-1 by various metals. *Biochem. Biophys. Res. Commun.* *290*, 213-218.

Ozaki,T., Nakamura,Y., Enomoto,H., Hirose,M., and Sakiyama,S. (1995). Overexpression of DAN gene product in normal rat fibroblasts causes a retardation of the entry into the S phase. *Cancer Res.* *55*, 895-900.

Parker,D.S., Jemison,J., and Cadigan,K.M. (2002). Pygopus, a nuclear PHD-finger protein required for Wntless signaling in *Drosophila*. *Development* *129*, 2565-2576.

Patel,S.S., Belmont,B.J., Sante,J.M., and Rexach,M.F. (2007). Natively unfolded nucleoporins gate protein diffusion across the nuclear pore complex. *Cell* *129*, 83-96.

Patierno,S.R., Sugiyama,M., Basilion,J.P., and Costa,M. (1985). Preferential DNA-protein cross-linking by NiCl₂ in magnesium-insoluble regions of fractionated Chinese hamster ovary cell chromatin. *Cancer Res.* *45*, 5787-5794.

Peifer,M. and Polakis,P. (2000). Wnt signaling in oncogenesis and embryogenesis--a look outside the nucleus. *Science* *287*, 1606-1609.

Peranen,J., Auvinen,P., Virta,H., Wepf,R., and Simons,K. (1996). Rab8 promotes polarized membrane transport through reorganization of actin and microtubules in fibroblasts. *J. Cell Biol* *135*, 153-167.

Peskin,A.V. and Shlyahova,L. (1986). Cell nuclei generate DNA-nicking superoxide radicals. *FEBS Lett.* *194*, 317-321.

Peters,J.M., McKay,R.M., McKay,J.P., and Graff,J.M. (1999). Casein kinase I transduces Wnt signals. *Nature* *401*, 345-350.

Polakis,P. (2000). Wnt signaling and cancer. *Genes Dev.* *14*, 1837-1851.

Predki,P.F., Harford,C., Brar,P., and Sarkar,B. (1992). Further characterization of the N-terminal copper(II)- and nickel(II)-binding motif of proteins. Studies of metal binding to chicken serum albumin and the native sequence peptide. *Biochem. J.* *287* (Pt 1), 211-215.

Price,M.A. (2006). CKI, there's more than one: casein kinase I family members in Wnt and Hedgehog signaling. *Genes Dev.* 20, 399-410.

Prieve,M.G. and Waterman,M.L. (1999). Nuclear localization and formation of beta-catenin-lymphoid enhancer factor 1 complexes are not sufficient for activation of gene expression. *Mol Cell Biol* 19, 4503-4515.

Rabut,G., Doye,V., and Ellenberg,J. (2004). Mapping the dynamic organization of the nuclear pore complex inside single living cells. *Nat Cell Biol* 6, 1114-1121.

Ragsdale,S.W. (1998). Nickel biochemistry. *Curr. Opin. Chem. Biol* 2, 208-215.

Rao,T.P. and Kuhl,M. (2010). An updated overview on Wnt signaling pathways: a prelude for more. *Circ. Res.* 106, 1798-1806.

Requena,J.R., Chao,C.C., Levine,R.L., and Stadtman,E.R. (2001). Glutamic and amino adipic semialdehydes are the main carbonyl products of metal-catalyzed oxidation of proteins. *Proc. Natl Acad. Sci. U. S. A* 98, 69-74.

Reverter,D. and Lima,C.D. (2005). Insights into E3 ligase activity revealed by a SUMO-RanGAP1-Ubc9-Nup358 complex. *Nature* 435, 687-692.

Reya,T. and Clevers,H. (2005). Wnt signalling in stem cells and cancer. *Nature* 434, 843-850.

Riggleman,B., Schedl,P., and Wieschaus,E. (1990). Spatial expression of the *Drosophila* segment polarity gene *armadillo* is posttranscriptionally regulated by *wingless*. *Cell* 63, 549-560.

Rijsewijk,F., Schuermann,M., Wagenaar,E., Parren,P., Weigel,D., and Nusse,R. (1987). The *Drosophila* homolog of the mouse mammary oncogene *int-1* is identical to the segment polarity gene *wingless*. *Cell* 50, 649-657.

Roberts,K. and Northcote,D.H. (1970). Structure of the nuclear pore in higher plants. *Nature* 228, 385-386.

Rodriguez,R.E., Misra,M., North,S.L., and Kasprzak,K.S. (1991). Nickel-induced lipid peroxidation in the liver of different strains of mice and its relation to nickel effects on antioxidant systems. *Toxicol. Lett.* 57, 269-281.

Rolfs,A., Kvietikova,I., Gassmann,M., and Wenger,R.H. (1997). Oxygen-regulated transferrin expression is mediated by hypoxia-inducible factor-1. *J. Biol Chem.* 272, 20055-20062.

Roose,J. (1998). The Xenopus Wnt effector XTcf-3 interacts with Groucho-related transcriptional repressors. *Nature* 395, 608-612.

Rosin-Arbesfeld,R., Cliffe,A., Brabletz,T., and Bienz,M. (2003). Nuclear export of the APC tumour suppressor controls beta-catenin function in transcription. *EMBO J.* 22, 1101-1113.

Rosin-Arbesfeld,R., Townsley,F., and Bienz,M. (2000). The APC tumour suppressor has a nuclear export function. *Nature* 406, 1009-1012.

Rout,M.P. and Aitchison,J.D. (2000). Pore relations: nuclear pore complexes and nucleocytoplasmic exchange. *Essays Biochem.* 36, 75-88.

Rubinfeld,B. (1997). Stabilization of [beta]-catenin by genetic defects in melanoma cell lines. *Science* 275, 1790-1792.

Ryan,K.J. and Wentz,S.R. (2000). The nuclear pore complex: a protein machine bridging the nucleus and cytoplasm. *Curr. Opin. Cell Biol* 12, 361-371.

Sahu,R.K., Katsifis,S.P., Kinney,P.L., and Christie,N.T. (1989). Effects of nickel sulfate, lead sulfate, and sodium arsenite alone and with UV light on sister chromatid exchanges in cultured human lymphocytes. *Mol Toxicol.* 2, 129-136.

Saitoh,H., Pu,R., Cavenagh,M., and Dasso,M. (1997). RanBP2 associates with Ubc9p and a modified form of RanGAP1. *Proc. Natl Acad. Sci. U. S. A* 94, 3736-3741.

Salnikow,K., An,W.G., Melillo,G., Blagosklonny,M.V., and Costa,M. (1999). Nickel-induced transformation shifts the balance between HIF-1 and p53 transcription factors. *Carcinogenesis* 20, 1819-1823.

Salnikow,K., Davidson,T., and Costa,M. (2002). The role of hypoxia-inducible signaling pathway in nickel carcinogenesis. *Environ. Health Perspect.* 110 Suppl 5, 831-834.

Salnikow,K., Davidson,T., Kluz,T., Chen,H., Zhou,D., and Costa,M. (2003). GeneChip analysis of signaling pathways effected by nickel. *J. Environ. Monit.* 5, 206-209.

Salnikow,K., Davidson,T., Zhang,Q., Chen,L.C., Su,W., and Costa,M. (2003). The involvement of hypoxia-inducible transcription factor-1-dependent pathway in nickel carcinogenesis. *Cancer Res.* 63, 3524-3530.

Salnikow,K., Gao,M., Voitkun,V., Huang,X., and Costa,M. (1994). Altered oxidative stress responses in nickel-resistant mammalian cells. *Cancer Res.* 54, 6407-6412.

Salnikow,K., Su,W., Blagosklonny,M.V., and Costa,M. (2000). Carcinogenic metals induce hypoxia-inducible factor-stimulated transcription by reactive oxygen species-independent mechanism. *Cancer Res.* 60, 3375-3378.

Salnikow,K. and Zhitkovich,A. (2008). Genetic and epigenetic mechanisms in metal carcinogenesis and cocarcinogenesis: nickel, arsenic, and chromium. *Chem. Res. Toxicol.* 21, 28-44.

Sazer,S. and Dasso,M. (2000). The ran decathlon: multiple roles of Ran. *J. Cell Sci.* 113 (Pt 7), 1111-1118.

Schwarz-Romond,T. (2007). The DIX domain of Dishevelled confers Wnt signaling by dynamic polymerization. *Nature Struct. Mol. Biol.* 14, 484-492.

Semenov,M.V., Habas,R., Macdonald,B.T., and He,X. (2007). SnapShot: Noncanonical Wnt Signaling Pathways. *Cell* 131, 1378.

Semenza,G.L. (2000). Expression of hypoxia-inducible factor 1: mechanisms and consequences. *Biochem. Pharmacol.* 59, 47-53.

Semenza,G.L. (2001). HIF-1, O(2), and the 3 PHDs: how animal cells signal hypoxia to the nucleus. *Cell* 107, 1-3.

Semenza,G.L., Roth,P.H., Fang,H.M., and Wang,G.L. (1994). Transcriptional regulation of genes encoding glycolytic enzymes by hypoxia-inducible factor 1. *J. Biol Chem.* 269, 23757-23763.

Sen,P. and Costa,M. (1986). Incidence and localization of sister chromatid exchanges induced by nickel and chromium compounds. *Carcinogenesis* 7, 1527-1533.

Sheldahl,L.C., Park,M., Malbon,C.C., and Moon,R.T. (1999). Protein kinase C is differentially stimulated by Wnt and Frizzled homologs in a G-protein-dependent manner. *Curr. Biol* 9, 695-698.

Sheldahl,L.C., Slusarski,D.C., Pandur,P., Miller,J.R., Kuhl,M., and Moon,R.T. (2003). Dishevelled activates Ca²⁺ flux, PKC, and CamKII in vertebrate embryos. *J. Cell Biol* 161, 769-777.

Shiao,Y.H., Lee,S.H., and Kasprzak,K.S. (1998). Cell cycle arrest, apoptosis and p53 expression in nickel(II) acetate-treated Chinese hamster ovary cells. *Carcinogenesis* 19, 1203-1207.

Shitashige,M., Satow,R., Honda,K., Ono,M., Hirohashi,S., and Yamada,T. (2008). Regulation of Wnt signaling by the nuclear pore complex. *Gastroenterology* 134, 1961-71, 1971.

Siegfried,E., Chou,T.B., and Perrimon,N. (1992). wingless signaling acts through zeste-white 3, the Drosophila homolog of glycogen synthase kinase-3, to regulate engrailed and establish cell fate. *Cell* 71, 1167-1179.

Sierra,J., Yoshida,T., Joazeiro,C.A., and Jones,K.A. (2006). The APC tumor suppressor counteracts beta-catenin activation and H3K4 methylation at Wnt target genes. *Genes Dev.* 20, 586-600.

Smith,S. and de,L.T. (1999). Cell cycle dependent localization of the telomeric PARP, tankyrase, to nuclear pore complexes and centrosomes. *J. Cell Sci.* *112* (Pt *21*), 3649-3656.

Solanas,G., Miravet,S., Casagolda,D., Castano,J., Raurell,I., Corrionero,A., de Herreros,A.G., and Dunach,M. (2004). beta-Catenin and plakoglobin N- and C-tails determine ligand specificity. *J. Biol Chem.* *279*, 49849-49856.

Stadeli,R., Hoffmans,R., and Basler,K. (2006). Transcription under the control of nuclear Arm/beta-catenin. *Curr. Biol* *16*, R378-R385.

Stadtman,E.R. (1993). Oxidation of free amino acids and amino acid residues in proteins by radiolysis and by metal-catalyzed reactions. *Annu. Rev Biochem.* *62*, 797-821.

Stadtman,E.R. and Berlett,B.S. (1988). Fenton chemistry revisited: amino acid oxidation. *Basic Life Sci.* *49*, 131-136.

Standeven,A.M. and Wetterhahn,K.E. (1991). Is there a role for reactive oxygen species in the mechanism of chromium(VI) carcinogenesis? *Chem. Res. Toxicol.* *4*, 616-625.

Strawn,L.A., Shen,T., Shulga,N., Goldfarb,D.S., and Wentz,S.R. (2004). Minimal nuclear pore complexes define FG repeat domains essential for transport. *Nat Cell Biol* *6*, 197-206.

Su,L.K., Kinzler,K.W., Vogelstein,B., Preisinger,A.C., Moser,A.R., Luongo,C., Gould,K.A., and Dove,W.F. (1992). Multiple intestinal neoplasia caused by a mutation in the murine homolog of the APC gene. *Science* *256*, 668-670.

Sunderman,F.W., Jr., Varghese,A.H., Kroftova,O.S., Grbac-Ivankovic,S., Kotyza,J., Datta,A.K., Davis,M., Bal,W., and Kasprzak,K.S. (1996). Characterization of pNiXa, a serpin of *Xenopus laevis* oocytes and embryos, and its histidine-rich, Ni(II)-binding domain. *Mol Reprod. Dev.* *44*, 507-524.

Sutter,C.H., Laughner,E., and Semenza,G.L. (2000). Hypoxia-inducible factor 1alpha protein expression is controlled by oxygen-regulated ubiquitination that is disrupted by deletions and missense mutations. *Proc. Natl Acad. Sci. U. S. A* 97, 4748-4753.

Tago,K., Nakamura,T., Nishita,M., Hyodo,J., Nagai,S., Murata,Y., Adachi,S., Ohwada,S., Morishita,Y., Shibuya,H., and Akiyama,T. (2000). Inhibition of Wnt signaling by ICAT, a novel beta-catenin-interacting protein. *Genes Dev.* 14, 1741-1749.

Tahinci,E. and Symes,K. (2003). Distinct functions of Rho and Rac are required for convergent extension during *Xenopus* gastrulation. *Dev. Biol* 259, 318-335.

Takemaru,K., Yamaguchi,S., Lee,Y.S., Zhang,Y., Carthew,R.W., and Moon,R.T. (2003). Chibby, a nuclear beta-catenin-associated antagonist of the Wnt/Wingless pathway. *Nature* 422, 905-909.

Takemaru,K.I. and Moon,R.T. (2000). The transcriptional coactivator CBP interacts with beta-catenin to activate gene expression. *J. Cell Biol* 149, 249-254.

Tanaka,K., Okabayashi,K., Asashima,M., Perrimon,N., and Kadowaki,T. (2000). The evolutionarily conserved porcupine gene family is involved in the processing of the Wnt family. *Eur. J. Biochem.* 267, 4300-4311.

Templeton,D.M. and Sarkar,B. (1985). Peptide and carbohydrate complexes of nickel in human kidney. *Biochem. J.* 230, 35-42.

Thompson,B., Townsley,F., Rosin-Arbesfeld,R., Musisi,H., and Bienz,M. (2002). A new nuclear component of the Wnt signalling pathway. *Nature Cell Biol.* 4, 367-373.

Townsley,F.M., Cliffe,A., and Bienz,M. (2004). Pygopus and Legless target Armadillo/beta-catenin to the nucleus to enable its transcriptional co-activator function. *Nat Cell Biol* 6, 626-633.

Tran,E.J. and Wentz,S.R. (2006). Dynamic nuclear pore complexes: life on the edge. *Cell* 125, 1041-1053.

Tsuda,M. (1999). The cell-surface proteoglycan Dally regulates Wingless signalling in *Drosophila*. *Nature* 400, 276-280.

van de Wetering,M., Cavallo,R., Dooijes,D., van,B.M., van,E.J., Loureiro,J., Ypma,A., Hursh,D., Jones,T., Bejsovec,A., Peifer,M., Mortin,M., and Clevers,H. (1997). Armadillo coactivates transcription driven by the product of the *Drosophila* segment polarity gene dTCF. *Cell* 88, 789-799.

Van,S.M. and Sunderman,F.W., Jr. (1972). ⁶³Ni complexes in rabbit serum and urine after injection of ⁶³NiCl₂. *Clin. Chem.* 18, 1478-1484.

Veeman,M.T., Axelrod,J.D., and Moon,R.T. (2003). A second canon. Functions and mechanisms of beta-catenin-independent Wnt signaling. *Dev. Cell* 5, 367-377.

Wallingford,J.B. (2005). The developmental biology of Dishevelled: an enigmatic protein governing cell fate and cell polarity.

Wallingford,J.B., Fraser,S.E., and Harland,R.M. (2002). Convergent extension: the molecular control of polarized cell movement during embryonic development. *Dev. Cell* 2, 695-706.

Wallingford,J.B. and Habas,R. (2005). The developmental biology of Dishevelled: an enigmatic protein governing cell fate and cell polarity. *Development* 132, 4421-4436.

Walther,T.C., Pickersgill,H.S., Cordes,V.C., Goldberg,M.W., Allen,T.D., Mattaj,I.W., and Fornerod,M. (2002). The cytoplasmic filaments of the nuclear pore complex are dispensable for selective nuclear protein import. *J. Cell Biol* 158, 63-77.

Weghorst,C.M., Dragnev,K.H., Buzard,G.S., Thorne,K.L., Vandeborne,G.F., Vincent,K.A., and Rice,J.M. (1994). Low incidence of point mutations detected in the p53 tumor suppressor gene from chemically induced rat renal mesenchymal tumors. *Cancer Res.* 54, 215-219.

Wehrli,M. (2000). arrow encodes an LDL-receptor-related protein essential for Wingless signalling. *Nature* 407, 527-530.

Weidinger,G., Thorpe,C.J., Wuennenberg-Stapleton,K., Ngai,J., and Moon,R.T. (2005). The Sp1-related transcription factors sp5 and sp5-like act downstream of Wnt/beta-catenin signaling in mesoderm and neuroectoderm patterning. *Curr. Biol* 15, 489-500.

Willert,K., Brown,J.D., Danenberg,E., Duncan,A.W., Weissman,I.L., Reya,T., Yates,J.R., III, and Nusse,R. (2003). Wnt proteins are lipid-modified and can act as stem cell growth factors. *Nature* 423, 448-452.

Willert,K. and Jones,K.A. (2006). Wnt signaling: is the party in the nucleus? *Genes Dev.* 20, 1394-1404.

Wu,G., Xu,G., Schulman,B.A., Jeffrey,P.D., Harper,J.W., and Pavletich,N.P. (2003). Structure of a beta-TrCP1-Skp1-beta-catenin complex: destruction motif binding and lysine specificity of the SCF(beta-TrCP1) ubiquitin ligase. *Mol Cell* 11, 1445-1456.

Wu,J., Matunis,M.J., Kraemer,D., Blobel,G., and Coutavas,E. (1995). Nup358, a cytoplasmically exposed nucleoporin with peptide repeats, Ran-GTP binding sites, zinc fingers, a cyclophilin A homologous domain, and a leucine-rich region. *J. Biol Chem.* 270, 14209-14213.

Xing,Y., Clements,W.K., Kimelman,D., and Xu,W. (2003). Crystal structure of a [beta]-catenin/axin complex suggests a mechanism for the [beta]-catenin destruction complex. *Genes Dev.* 17, 2753-2764.

Xing,Y., Takemaru,K.I., Liu,J., Berndt,J.D., Zheng,J.J., Moon,R.T., and Xu,W. (2008). Crystal Structure of a Full-Length [beta]-Catenin. *Structure* 16, 478-487.

Xu,X.M., Meulia,T., and Meier,I. (2007). Anchorage of plant RanGAP to the nuclear envelope involves novel nuclear-pore-associated proteins. *Curr. Biol* 17, 1157-1163.

Yamada,S., Pokutta,S., Drees,F., Weis,W.I., and Nelson,W.J. (2005). Deconstructing the cadherin-catenin-actin complex. *Cell* 123, 889-901.

Yamanaka,H., Moriguchi,T., Masuyama,N., Kusakabe,M., Hanafusa,H., Takada,R., Takada,S., and Nishida,E. (2002). JNK functions in the non-canonical Wnt pathway to regulate convergent extension movements in vertebrates. *EMBO Rep.* 3, 69-75.

Yaseen,N.R. and Blobel,G. (1999). Two distinct classes of Ran-binding sites on the nucleoporin Nup-358. *Proc. Natl Acad. Sci. U. S. A* 96, 5516-5521.

Yokoya,F., Imamoto,N., Tachibana,T., and Yoneda,Y. (1999). beta-catenin can be transported into the nucleus in a Ran-unassisted manner. *Mol. Biol. Cell* 10, 1119-1131.

Yokoyama,N., Hayashi,N., Seki,T., Pante,N., Ohba,T., Nishii,K., Kuma,K., Hayashida,T., Miyata,T., Aebi,U., and . (1995). A giant nucleopore protein that binds Ran/TC4. *Nature* 376, 184-188.

Yost,C., Torres,M., Miller,J.R., Huang,E., Kimelman,D., and Moon,R.T. (1996). The axis-inducing activity, stability, and subcellular distribution of beta-catenin is regulated in *Xenopus* embryos by glycogen synthase kinase 3. *Genes Dev.* 10, 1443-1454.

Yu,F., White,S.B., Zhao,Q., and Lee,F.S. (2001). HIF-1alpha binding to VHL is regulated by stimulus-sensitive proline hydroxylation. *Proc. Natl Acad. Sci. U. S. A* 98, 9630-9635.

Zeng,L. (1997). The mouse Fused locus encodes Axin, an inhibitor of the Wnt signaling pathway that regulates embryonic axis formation. *Cell* 90, 181-192.

Zeng,X. (2005). A dual-kinase mechanism for Wnt co-receptor phosphorylation and activation. *Nature* 438, 873-877.

Zhai,L., Chaturvedi,D., and Cumberledge,S. (2004). *Drosophila* wnt-1 undergoes a hydrophobic modification and is targeted to lipid rafts, a process that requires porcupine. *J. Biol Chem.* 279, 33220-33227.

Zhang,R., Mehla,R., and Chauhan,A. (2010). Perturbation of host nuclear membrane component RanBP2 impairs the nuclear import of human immunodeficiency virus -1 preintegration complex (DNA). *PLoS One.* 5, e15620.

Zoroddu,M.A., Schinocca,L., Kowalik-Jankowska,T., Kozlowski,H., Salnikow,K., and Costa,M. (2002). Molecular mechanisms in nickel carcinogenesis: modeling Ni(II) binding site in histone H4. *Environ. Health Perspect.* 110 Suppl 5, 719-723.