CURRICULUM VITAE

Name: **Richard Fishel**

Address: Department of Molecular Virology, Immunology, and Medical Genetics; Human Cancer Genetics, 460 W. 12th Ave, Columbus, OH 43210 (Ph: 614-292-2484; email: rfishel@osu.edu)

Field of Research:

The Biophysical Mechanisms, Genetics, Regulation, and Consequences of DNA Repair and Genome Rearrangement in Human Cells

Education/Training:

1976	B.S.	Biology (Honors), University of California, Irvine, California
1980	Ph.D.	Molecular Biology and Biochemistry, University of California, Irvine, California
1980-1984	Postdoc	Biological Chemistry, Harvard Medical School, Boston, MA
1984-1986	Medicine	Molecular Medicine Program, Harvard Medical School, Boston, MA

Academic Appointments:

1980 - 1984	Daymon-Runyon / Walter Winchell & NIH / NRSA Postdoctoral Fellow, Dana-Farber Cancer Institute and Harvard Medical School Boston, Massachusetts
1984 - 1986	Assistant Professor, Molecular Medicine Program, Department of Medicine, Harvard Medical School and Beth Israel Hospital, Boston, Massachusetts
1986 - 1991	Head, Genetic Recombination and Repair Group, National Cancer Institute, Maryland
1991 - 1996	Associate Professor / Professor of Microbiology and Molecular Genetics, University of Vermont Medical School, Burlington, Vermont
1996 - 2004	Professor of Microbiology and Immunology, Head of the Genetics and Molecular Biology Program, Kimmel Cancer Center, Thomas Jefferson University, Philadelphia, PA
2004 - present	Professor and Vice Chair of Molecular Virology, Immunology, and Medical Genetics; Human Genetics Institute, The Ohio State University Medical Center and Comprehensive Cancer Center, Columbus, Ohio
2009 - present	Professor of Physics, The Ohio State University, Columbus, Ohio

Awards and Honors:

Herrera Memorial Award and Lecture for the HNPCC Collaborative Group of America - 2009
German Society of Pathology Basic Science Award and Distinguished Lecture – 2003
American Cancer Society Award for Basic Research Contributions – 2002
Nigro Award and Lecture (first returning), American Association of Colorectal Surgeons, 2002
Creighton University Basic Science Award and Distinguished Lecture – 2002
The P. Meera Khan Memorial Award and Lecture – 2nd Joint Leeds Polyposis Group / International Collaborative Group for HNPCC - 1999
Nigro Award and Lecture, American Association of Colorectal Surgeons, 1997
New Investigator Research Award, National Cancer Institute, 1984 - 1986
National Research Service Award, National Institutes of Health, 1981-1983
Damon Runyon-Walter Winchell Cancer Fund Postdoctoral Fellowship, 1980 -1981
American Cancer Society Fellowship Award, 1980 (declined)
DHEW, PHS Predoctoral Traineeship, 1976-1980
Graduate with Honors in Biological Science, University of California, Irvine, 1976
NIH Summer Research Assistant, University of California, Irvine 1975

Major Committee Assignments:

External Advisory Board, Dan L. Duncan Cancer Center, Baylor College of Medicine, Houston, TX, 2014 - present
Member, Molecular Genetics B Study Section, 2011 – present
Program Review Committee, National Institute of Environmental and Health Sciences, 2007
Scientific Advisory Board, IntergraGen, 2001 - present
Editorial Board, DNA Repair, 2001 – present
Editorial Board, Cancer Biology and Therapy, 2000 – present
Editorial Board, Cancer Research, 2001 – 2006; 2009 – present
NCI Legislative Advisory Committee, 2000
Scientific Advisor – Cancer Genetics, Lexicon Genetics, 1999 - 2002
Member, Career Development Awards Subcommittee - Leukemia Society of America - 1999-2004
Editorial Board, Protein Expression and Purification, Academic Press, 1990 - 2003
Referee, Biological Sciences Section, NSF, 1986 - 1988
Referee, Biophysical Chemistry Study Section, NIH, 1991
Member, Radiation Study Section, DOE, 1991
Member, Physiological Chemistry Study Section (ad hoc), NIH, 1993
Member, Biochemistry Study Section; Molecular Genetics A (ad hoc), NIH, 1993; 2008
Member, Radiation Study Section, NIH, 1994-1999
Member, National Institute of Neurological Disorders and Stroke Site Visit Team, NIH, 1994
Member, Mammalian Genetics Study Section (ad Hoc), NIH, 1994
Member, RFA Consultation Panel, Radiation Effects Branch, NCI, 1995
Member, Study Section Reviewer Reserve, NIH, 1996 – present

Professional Society Memberships:

American Association for the Advancement of Science
Biophysical Society
American Society for Biochemistry and Molecular Biology
International Society for Human Genetics
American Association for Cancer Research

American Society for Microbiology
New York Academy of Science

Invited Lectures and Presentations (since 2003):

Garvan Institute, Sydney, AUSTRALIA – February 4, 2003
15th Lorne Cancer Conference, Lorne, AUSTRALIA – February 13-16, 2003
Society of Toxicology, Salt Lake City, UT – March 11, 2003
European Society of Gastroenterology and Hepatology, Obergurgl, AUSTRIA – March 15-19, 2003
SSAT/DDW Conference, Orlando, FL – May 19, 2003
Midwest DNA Repair Meeting Mayo Clinic, Rochester, MN – May 23-25, 2003
German Society of Pathology, Bamburg, GERMANY – June 9-15, 2003
ICG-HNPCC Meeting, Cleveland, OH – September 3-6, 2003
University of Southern California – Norris Cancer Center, Los Angeles, CA – September 29 – October 1, 2003
University of Pennsylvania, Cell and Molecular Biology Program, Philadelphia, PA – October 28, 2003
University of Connecticut – Farmington, CT – December 3, 2003
University of Sydney – Sydney, AUSTRALIA – January 26-30, 2004
United European Gastroenterology Week, Prague, CZECH REPUBLIC – September 25-29, 2004
ASM DNA Repair Meeting – South Hampton Princess, BURMUDA – November 14-20, 2004
University of Cincinnati Cancer Center, Cincinnati, OH – February 4, 2005
Lineberger Symposium - University of North Carolina, Chapel Hill, NC – May 10-12, 2005
Gordon Research Conference – Second Messengers, Portsmouth, ME – June 12-17, 2005
DNA Repair Conference – Brighton, UNITED KINGDOM – September 19-21, 2005
Leukemia Lymphoma Society - Stohlman Symposium, Scottsdale, AZ – September 23-25, 2005
Robert C. Warner Memorial - University of California at Irvine – November 6, 2005
3R (Replication, Recombination, Repair) Meeting, Osaka, JAPAN – November 13-17, 2005
Radiation Biology Conference, Kyoto, JAPAN – November 21-23, 2005
Department of Pharmacology, Case Western Reserve University, Cleveland, OH – March 21, 2006
Chemical Abstracts, Columbus, Ohio – November 15, 2006
Department of Surgery, University of Pennsylvania, Philadelphia, PA – November 30, 2006
Merck Pharmaceuticals, West Point, PA – February 19, 2007
AACR Colon Cancer Meeting, Boston, MA – November 14-17, 2007
University of Colorado Health Sciences Center, Denver, CO – January 16, 2008
University of Maryland, College Park, MD – January 28, 2008
DNA Replication and Recombination, Santa Fe, NM – February 11-15, 2008
University of Utah, Salt Lake City, UT – April 2, 2008
Penn State University, College Park, PA – April 30, 2008
Medical College of Georgia, Augusta GA – July 17, 2008
Boston University, Boston, MA – July 31, 2008
University of California – Irvine, Irvine, CA – January 27, 2009
American Society of Andrology, Philadelphia, PA – April 4-7, 2009
University of Texas – Southwestern, Dallas, TX – May 18, 2009
ASM DNA Repair, Whistler, BC CANADA – May 30 – June 3, 2009
Molecular Basis for Treating GI Cancer, Gootingen, GERMANY – September 23-24, 2009

Collaboatove Group of America/HNPCC, Honolulu, HI – October 16-19, 2009
International HNPCC Conference, Jerusalem, ISREAL – October 25-28, 2009
University of Virginia, Charlottesville, VA – March 8, 2010
Ludwig Symposium on Colon Cancer, Baltimore, MD – June 1-3, 2010
Johns Hopkins University, Baltimore, MD – September 1, 2010
University of Georgia, Athens, GA – September 24, 2010
University of Illinois, Champaign-Urbana, IL – December 3, 2010
Penn State Medical Center, Hershey, PA – March 9, 2011
Mayo Clinic Cancer Center, Jacksonville, FL – March 23, 2011
University of California – Davis, Medical Center, Sacramento, CA – June 14, 2011
MD Anderson Cancer Institute, Houston, TX – December 2, 2011
Moffitt Cancer Center and University of South Florida, Tampa, FL – January 19, 2012
University of North Carolina Lineberger Cancer Center, Chapel Hill, NC – March 20, 2012
Medical University of South Carolina, Charleston, SC – May 24, 2012
University of California – Irvine, Irvine, CA – November 14, 2012
Cincinnati Children's, Cincinnati, OH – April 22, 2013
Midwest DNA Repair Meeting - Keynote Speaker, Lexington, KY – May 18-20, 2013
Korea Symposium on Current Trends in Biophysics, Jeju, KOREA – August 11-14, 2013
Baylor College of Medicine and Comprehensive Cancer Center, Houston, TX – April 11, 2014
FACEB Meeting - Protein Structure and Analysis, Snowmass, CO – July 27-August 1. 2014
University of Georgia, Athens, GA – September, 2014

Professional Service:

National/International

2014-present	External Advisor Board, Dan L. Duncan Cancer Center, Baylor College of Medicine, Houston, TX
2011-present	Member, Molecular Genetics B Study Section, NIH
2009-present	Editorial Board, Cancer Research
2007	Program Review Committee, National Institutes of Environmental and Health Science
2001-2006	Associate Editor, Cancer Research,
2001-present	Scientific Advisory Board, IntergraGen,
2001-present	Editorial Board, DNA Repair,
2000-present	Editorial Board, Cancer Biology and Therapy
2000-present	NIH, reviewer reserve (served on at least one panel/year)
1999	NCI Legislative Advisory Committee
1999-2004	Career Development Awards Subcommittee - Leukemia Society of America
1998	NCI Program Project Site Visit Member
1996	Genome Study Section, NIH
1995	RFA Consultation Panel, Radiation Effects Branch, NCI
1995	California Breast Cancer Research Program, Study Section Member
1994-1999	Member, Radiation Study Section, NIH
1994	Mammalian Genetics Study Section, NIH, (ad hoc member)
1994	NICHD Program Project Site Visit Member
1993	Biochemistry Study Section, NIH, (ad hoc member)
1993	Biophysical Chemistry Study Section, NIH, (ad hoc member)
1991	Department of Energy Study Section (ad hoc member)
1990-2002	Editorial Board, Protein Expression and Purification, Academic Press

1990	Visiting Professor, Curie Institute, Paris, FRANCE,
1990	Workshop Chair, FACEB Recombination Meeting, Saxons River, VT
1986-present	Grant Reviews: National Science Foundation, American Cancer Society, National Institutes of Health, Champlain/Adirondack Environmental Health Sciences Center, California Breast Cancer Research Program, Leukemia Society of America, Israeli Cancer Research Fund
1986-present	Manuscript Reviews: Nature, Nature Genetics, Nature Methods, Nature Communications, Cell, Molecular Cell, Proceedings of the National Academy of Science USA, Cancer Research, Journal of Biological Chemistry, Nucleic Acids Research, Molecular and Cellular Biology, Biochemistry, Journal of Molecular Biology, Journal of Bacteriology, Mutagenesis, Genetics, Plasmid, Protein Expression and Purification, Journal of the National Cancer Institute, Genomics, Oncogene, American Journal of Human Genetics, Genes and Development, Journal of Clinical Oncology, Gastroenterology, DNA Repair, FEBS Letters,

University and College

2007-present	Member, Molecular Cellular and Developmental Biology Graduate Program
2005-present	Member, OSU Integrated Biomedical Graduate Program
2005-present	Member, OSU Biophysics Graduate Program
2005-2007	OSU Center for Chemical and Structural Biology Steering Committee
1995-2004	Head, Genetics and Molecular Biology Program, Kimmel Cancer Center
1994-1995	Member, Physiology Chair Search Committee
1994-1996	Member, Familial Cancer Program, Vermont Cancer Center
1993-1996	Member, Vermont Cancer Center
1993-1995	Faculty Senate, Research and Scholarship Committee, Elected 1993
1993-1995	Steering Committee, Program in Cell and Molecular Biology Training Grant
1993-1995	Selected Preceptor, Program in Cell and Molecular Biology Training Grant
1993	Preceptor, HELIX Howard Hughes UVM undergraduate research program
1992-1996	University Radiation Safety Committee
1992-1993	Member, Botany/Agricultural Biochemistry Faculty Search Committee
1992-1996	Member, Program in Cell and Molecular Biology

Departmental

2009-present	Colloquium Committee, Physics Department
2005-present	Vice Chair, Department of Molecular Virology, Immunology, and Medical Genetics; Human Cancer Genetics
1996-2004	Executive Committee, Kimmel Cancer Center
1996-2004	Training Committee, Kimmel Cancer Center
1994-1995	Promotions and Tenure Committee
1994-1995	Faculty Search Committee
1993-1995	Undergraduate Advisory Committee
1992-1995	Undergraduate Affairs Committee
1992-1994	Search committee for senior faculty position
1991-1996	Chair, Markey Distinguished Speaker Committee
1991-1995	Graduate admissions committee

PUBLICATIONS (h-index$_{2014}$ = 65)
Peer Reviewed Manuscripts

1.) Wheeler, F.C., **R.A. Fishel**, and R.C. Warner. 1977. Agarose gel electrophoresis of bacteriophage G4 replicative form DNA. *Anal. Biochem*. 78: 260-275.

2.) **Fishel, R.A.**, A.A. James, and R. Kolodner. 1981. Rec-A independent general genetic recombination of plasmids. *Nature* 294:184-186.

3.) **Fishel, R.A.**, and R. Kolodner. 1984. Strains containing mutations in the structural gene for topoisomerase I are recombination deficient. *J. Bacteriol*. 160:1168-1170.

4.) Kolodner, R., **R.A. Fishel,** and M. Howard. 1985. Genetic recombination of bacterial plasmid DNA: effect of RecF pathway mutations on plasmid recombination in *Escherichia coli*. *J. Bacteriol*. 163:1060-1066.

5.) **Fishel, R.A.**, E. Siegel, and R. Kolodner. 1986. Gene conversion in *Escherichia coli*: i) the resolution of heteroallelic mismatched nucleotides by co-repair. *J. Mol. Biol*. 188:147-157

6.) **Fishel, R.A.**, and R.C. Warner. 1986. Novel dimeric configurations of the bacteriophage G4 replicative form DNA. *Virology*. 148:198-209.

7.) **Fishel, R.A.**, K. Detmer, and A. Rich. 1988. Identification of homologous pairing and strand-exchange activity from a human tumor cell line based on Z-DNA affinity chromatography. *Proc. Natl. Acad. Sci. USA* 85:36-40.

8.) **Fishel, R.**, and R. Kolodner. 1989. Gene conversion in *Escherichia coli*: the RecF pathway for the resolution of heteroduplex DNA. *J. Bacteriol*. 171:3046-3052.

9.) Moore, S.P., A. Rich, and **R. Fishel**. 1989. The human recombination strand exchange process. *Genome* 31:45-52.

10.) Kraczkiewicz-Dowjat, A., and **R. Fishel.** 1990. *recB recC* dependent processing of heteroduplex DNA stimulates recombination of an adjacent gene in *Escherichia coli*. *J. Bacteriol*. 172:172-178.

11.) Moore, S.P., and **R. Fishel**. 1990. Purification and characterization of a protein from human cells that promotes homologous pairing of DNA. *J. Biol. Chem*. 265:11108-11117.

12.) Matsumoto, Y., **R. Fishel**, and R.B. Wickner. 1990. A hepatitis virus-like circular single-stranded RNA replicon in *Saccharomyces cerevisiae*. *Proc. Natl. Acad. Sci. USA* 87:7628-7632.

13.) Perkins, A.S., **R. Fishel**, N.A. Jenkins, and N.G. Copeland. 1991. *Evi-1*, a murine zinc finger protooncogene, encodes a sequence-specific DNA binding protein. *Mol. Cell. Biol*. 11:2665-2674.

14.) Moore, S.P., L. Erdile, T. Kelly, and **R. Fishel**. 1991. The human homologous pairing protein HPP-1 is specifically stimulated by the cognate single-stranded binding protein hRP-A. *Proc. Natl. Acad. Sci. USA* 88:9067-9071

15.) **Fishel, R.,** M.K. Derbyshire, S.P. Moore, and C.S.H. Young. 1991. Biochemical studies of homologous and nonhomologous recombination in human cells. *Biochimie*. 73:257-267.

16.) Newhouse, J.R., P.W. Tooley, O.P. Smith, and **R. Fishel**. 1992. Characterization of double-stranded RNA in isolates of *Phytophthora infestans* from Mexico, the Netherlands, and Peru. *Mol. Plant Pathol*. 82:164-169

17.) **Fishel, R.,** M.K. Lescoe, M.R.S. Rao, N. Copland, N. Jenkins, J. Garber, M. Kane and R. Kolodner. 1993. The human mutator gene homologue *MSH2* and its association with hereditary nonpolyposis colon cancer locus. *Cell* 75:1027-1038.

18.) Derbyshire, M.K., L. Epstein, H. Young, and **R. Fishel**. 1994. Non-homologous recombination in human cells. *Mol. Cell. Biol*. 14:156-169.

19.) Bonner, C.E., S.E. Baker, P.T. Morrison, G. Warren, L.G. Smith, M.K. Lescoe, M. Kane, C. Erabino, R. Lipford, A. Lindblom, P. Tannergard, R.j. Bollag, A.R. Godwin, D.C. Ward, M. Nordenskjold, **R. Fishel**, R. Kolodner and R. M. Liskay. 1994. Mutation in the DNA mismatch repair gene homologue hMLH1 associated with hereditary nonpolyposis colon cancer. *Nature* 368:258-261

20.) Bigger, C.A.H., A. Cheh, F. Latif, **R. Fishel**, K.A.Canella, G. Stafford, H. Yagi, D.M. Jerina, and A. Dipple. 1994. DNA strand breaks induced by configurationally isomeric hydrocarbon diol epoxides. *Drug Metabiol. Reviews*. 26:287-299

21.) **Fishel, R.**, A. Ewel, and M.K. Lescoe. 1994. The human MSH2 protein binds to mismatched nucleotides. *Cancer Res*. 54: 5539-5542.

22.) **Fishel, R.**, A. Ewel, S. Lee, M.K. Lescoe and J. Griffith. 1994. Binding of mismatched microsatellite DNA sequences by the human MSH2 protein. *Science*. 266:1403-1405.

23.) Reitmair, A., R. Schmits, A. Ewel, B. Bapat, A. Ganesh, P. Waterhouse, H.-W. Mittrucker, A. Wakeham, J. Peacock, S. Benchimol, B. Liu, A. Thomason, A. Mitri, M. Redston, S. Gallinger, R. Bristol, R. Hills, M. Meuth, W. Ballhausen, **R. Fishel**, T. Mak. 1995. MSH2-deficient mice are viable and susceptible to lymphoid tumor. *Nature Genet*. 11:64-70.

24.) Wilson, T.M., A. Ewel, J.R. Duguid, J.N. Eble, M.K. Lescoe, **R. Fishel**, and M.R. Kelley. 1995. Differential expression of the human MSH2 repair enzyme in small and large intestine. *Cancer Res*. 55:5146-5150.

25.) Roche, J., F. Boldog, M. Robinson, L. Robinson, L. Garcia, M. Swanton, B. Waggoner, **R. Fishel**, W. Franklin, S. Naylor, K. Kok, C. Buys, R. Gemmill and H. Drabkin. 1996. Distinct 3p21.3 deletions in lung cancer: analysis of deleted genes and identification of a new human semaphorin. *Oncogene*. 12:1289-1297.

26.) Mulrooney, S.B., **R. Fishel**, J.A. Hejna, R.C. Warner. 1996. Preparation of Figure-8 DNA

and their use in studies of the kinetics of branch migration. *J. Biol. Chem*. 271:9648-9659.

27.) Aebi, S., B. Kurdi-Haidar, R. Gordon, B. Cenni, H. Zheng, D. Fink, R.D.Christen, C.R. Boland, M. Koi, **R. Fishel**, and S.B. Howell. 1996. Loss of DNA mismatch repair in acquired resistance to cisplatin. *Cancer Res*. 56:3087-3090.

28.) Mello, J.A., S. Acharya, **R. Fishel**, and J.M. Essigman. 1996. The mismatch repair protein hMSH2 binds selectively to DNA adducts of the anticancer drug cisplatin. *Chem. Biol*. 3:579-589.

29.) Acharya, S., T. Wilson, S. Gradia, M. Kane, S. Guerrette, G. Marsischky, R. Kolodner, and **R.Fishel**. 1996. hMSH2 forms specific mispair-binding protein complexes with hMSH3 and hMSH6. *Proc. Nat. Acad. Sci. (USA)*. 93:13629-13634.

30.) Fried, L.M., C. Koumenis, S.R. Peterson, S.L. Green, P. van Zijl, J. Allalunis-Turner, D.J. Chen, **R. Fishel**, A.J. Giaccia, J.M. Brown, and C.U. Kirchgessner. 1996. The DNA damage response in DNA-dependent protein kinase deficient SCID cells: RPA hyperphosporylation and p53 induction. *Proc. Nat. Acad. Sci. (USA)*. 93:13825-13830.

31.) Meyers, M., S. Acharya, E.J. Odegaard, T. Wilson, J.E. Lewis, T.W. Davis, C. Wilson-Van Patten, **R. Fishel**, and D.A. Boothman. 1997. Cell cycle regulation of the DNA mismatch repair genes hMSH2, hMLH1, and hPMS2. *Cancer Res*. 57:206-208.

32.) Rasio, D., Y. Murakumo, D. Robbins, T. Roth, A. Silver,, M. Negrini, C. Schmidt, J.D. Burzak, **R. Fishel** and C. Croce. 1997. Characterization of the human homologue of Rad54: a gene located on chromosome 1p32 at a region of high LOH in breast tumors. *Cancer Res*. 57:2378-2383.

33.) Pearson, C.E., A. Ewel, S. Acharya, **R. Fishel**, and R.R. Sinden. 1997. Human MSH2 binds to trinucleotide repeat DNA structures associated with neurodegenerative diseases. *Hum. Mol. Genet*. 6:1117-1123.

34.) Schmutte, C., R. Baffa, L.M.Veronese, Y. Murakumo and **R. Fishel**. 1997 Human Thymine-DNA Glycosylase Maps at Chromosome 12q24: a Region of High LOH in Gastric Cancer. *Cancer Res*. 57:3010-3015

35.) Reitmair, A, R. Risley, R.G. Bristow, T. Wilson, A. Ganesh, A. Jang, J. Peacock, S. Benchimol, T.W. Mak, R.P. Hill, **R. Fishel**, and M. Meuth. 1997. Mutator Phenotype in *Msh2* Deficient Murine Embryonic Fibroblasts. *Cancer Res*. 57(17):3765-3771.

36.) Cranston, A., T. Bocker, A. Reitmair, J. Palazzo, T. Wilson, T. Mak, and **R. Fishel**. 1997. Female embryonic lethality in mice nullizygous for both *Msh2* and *p53*. *Nature Genet*. 17:114-118.

37.) Dietmaier, W., S. Wallinger, T. Bocker, **R. Fishel** and J. Rüschoff. 1997. DIAGNOSTIC MICROSATELLITE INSTABILITY: definition and correlation with mismatch repair expression. *Cancer Res*. 57:4749-4756.

38.) Bocker T., J. Diermann, W. Friedl, J. Gebert, E. Holinski-Feder, J. Karner-Hanusch, M. von

Knebel-Doeberitz, K. Koelble, G. Moeslein, H.-K.Schackert, H.-C. Wirtz, **R. Fishel**, J. Rüschoff. 1997. MICROSATELLITE INSTABILITY ANALYSIS: a multicenter study for reliability and quality control. *Cancer Res*. 57:4739-4743.

39.) Gradia, S., S. Acharya and **R. Fishel.** 1997. The human mismatch recognition complex hMSH2-hMSH6 functions as a novel molecular switch. *Cell.* 91:995-1005.

40.) Davis, T.W., C. Wilson-van Patten, M. Meyers, T. Wilson, K.A. Kunguni, S. Acharya, M. Koi, C.R. Boland, T.J. Kinsella, **R. Fishel**, and D.A. Boothman. 1998. Defects in the DNA mismatch repair protein hMLH1 alter G_2/M arrest following DNA damage. *Cancer Res*. 58:767-778.

41.) Phung, Q.H., D.B. Winter, A. Cranston, R.E. Tarone, V.H. Bohr, **R. Fishel**, P.J. Gearhart. 1998. Increased hypermutation at G and C nucleotides in immunoglobulin variable genes from mice deficient in the MSH2 mismatch repair protein. *J. Exp. Med.* 187:1745-1751.

42.) Rüschoff, J., S. Wallinger, W. Dietmaier, T. Bocker, F. Hofstädter and **R. Fishel.** 1998. Aspirin suppresses the mutator phenotype associated with Hereditary Non-Polyposis Colorectal Cancer. *Proc. Nat. Acad. Sci. (USA)*. 95:11301-11306.

43.) Schmutte, C., R. Cantinel Marinescu, M.M. Sadoff, S. Guerrette, J. Overhauser and **R. Fishel**. 1998. Human exonuclease I interacts with the mismatch repair protein hMSH2. *Cancer Res*. 58:4537-4542.

44.) Guerrette, S., T. Wilson, S. Gradia and **R. Fishel.** 1998. The interaction domains of hMSH2 with hMSH3 and hMSH2 with hMSH6 and examination of a role in HNPCC. *Mol. Cell. Biol*. 18:6616-6623.

45.) Schmutte, C., R. Cantinel Marinescu, N.G Copeland, N.A. Jenkins, J. Overhauser and **R. Fishel**. 1998. Refined chromosomal localization of the mismatch repair HNPCC genes MSH2 and MSH6. *Cancer Res*. 58:5023-5026.

46.) **Fishel, R**. 1998. Mismatch Repair, Molecular Switches, and Signal Transduction. *Genes and Dev*. 12:2096-2101.

47.) Bocker, T., A. Barusevicius, D. Rasio, S. Guerrette, D. Robbins, C. Schmidt, J. Burczak, C.M. Croce, T.Copeland, A.J. Kovatich, and **R. Fishel**. 1999. hMSH5, a human MutS homolog that participates in the second meiotic division. *Cancer Res*. 59:816-822.

48.) Gradia, S., D. Subramanian, T. Wilson, S. Acharya, A. Makhov, J. Griffith, and **R. Fishel**. 1999. hMSH2-hMSH6 forms a hydrolysis-independent sliding clamp on mismatched DNA. *Molecular Cell.* 3:255-261.

49.) Vora, K.A., K. Tumas-Brundage, V. Lentz, A. Cranston, **R. Fishel** and T. Manser. 1999. Severe attenuation of the B cell immune response in MSH2-deficient mice. *J. Exp. Med*. 189:471-481

50.) Guerrette, S., S. Acharya, and **R. Fishel**. 1999. The interaction of hMLH1-hPMS2 and functional consequences of missense mutations in hMLH1 associated with HNPCC. *J. Biol. Chem*. 274:6336-6341.

51.) Simpkins, S.B., T. Bocker, E.M. Swisher, D.G. Mutch, D.J. Gersell, A. Kovatich, J. Palazzo, **R. Fishel**, and P. Goodfellow. 1999. MLH1 promoter methylation and gene silencing is the primary cause of MSI in sporadic endometrial cancer. *Human Genet*. 8:661-666.

52.) Saleh, A., S.M. Srinivasula, S. Acharya, **R. Fishel**, and E.S. Alnemri. 1999. Cytochrome c and dATP-mediated oligomerization of APAF-1 is a prerequisite for procaspase-9 activation. *J. Biol. Chem*. 274: 17941-17945.

53.) Zhang, H, B. Richards, T. Wilson, M. Lloyd, A. Cranston, A. Thorburn, **R. Fishel**, and M. Meuth. 1999. Apoptosis induced by overexpression of *hMSH2* or *hMLH1*. *Cancer Res*. 59:3021-3027.

54.) Wilson, T., S. Guerrette and **R. Fishel**. 1999. Dissociation of Mismatch Recognition and ATPase Activity by *wild type* hMSH2-hMSH3. *J. Biol. Chem*. 274:21659-21644.

55.) Schmutte, C., G Tombline, M.M. Sadoff, R. Schmutzler, A. v.Deimling, and **R. Fishel**. 1999. Characterization of the human *Rad51* genomic locus and examination of tumors with 15q14-15 LOH. *Cancer Res*. 59:4564-4569.

56.) Cranston, A., and **R. Fishel**. 1999. Female embryonic lethality in *Msh2-Trp53* nullizygous mice is strain dependent. *Mammalian Genome*. 10:1020-1022.

57.) Sevignani, C., A. Cranston, R.V. Iozzo, **R. Fishel**, and B. Calabretta. 1999. Spontaneous and mutagen-induced transformation of primary cultures of p53-/-Msh2-/- colonocytes. *Cancer Res*. 59:5882-5886.

58.) Wallinger S., W. Dietmaier, K. Beyser, T. Bocker, F. Hofstadter, **R. Fishel**, and J. Ruschoff. 1999. Aspirin suppresses microsatellite instability. *Verhandlungen der Deutschen Gesellschaft fur Pathologie*. 83:240-246.

59.) Murakumo, Y., T. Roth, H. Ishii, D. Rasio, S-I. Numata, C.M. Croce, and **R. Fishel**. 2000. hREV7 interacts with the polymerase z catalytic subunit hREV3 and the spindle assembly checkpoint control protein hMAD2. *J. Biol Chem*. 275:4391-4397.

60.) Gradia, S., S. Acharya and **R. Fishel.** 2000. The role of mismatched DNA in activating the hMSH2-hMSH6 molecular switch. *J. Biol Chem*. 275:3922-3930.

61.) Plaschke, J., C. Kruppa, R. Tischler, S. Pistorius, H. Dralle, T. Bocker, H.D. Saeger, J. Rüschoff, **R. Fishel,** and H.K. Schackert. 2000. Sequence analysis of the mismatch repair gene *hMSH6* in the germline of patients with familial and sporadic colorectal cancer. *Int. J. Cancer*. 85:606-613.

62.) Kallal, L., and **R. Fishel**. 2000. Characterization of the *S.cerevisiae* G-protein, Gpa1, and its activator Sst2. *Yeast.* 16:387-400.

63.) Jass, J.R., H. Iino, A. Ruszkiewicz, D. Painter, M.J. Solomon, D. Cohn, K.L. Furlong, M.D. Walsh, J. Palazzo, T. Bocker Edmonston, **R. Fishel**, J. Young, B.A. Leggett. 2000. Neoplastic progression occurs through mutator pathways in hyperplastic polyposis of the colorectum. *Gut*. 47:43-49.

64.) Berardini, M., A. Mazurek and **R. Fishel.** 2000. The Effect of O^6-methylguanine DNA adducts on the Adenosine Nucleotide Switch Functions of hMSH2-hMSH6 and hMSH2-hMSH3. *J. Biol Chem*. 275:27851-27857

65.) Bocker Edmonston, T., K.H. Cuesta, S. Burkholder, A. Barusevicius, D. Rose, A.J. Kovatich, B. Boman, R. Fry, **R. Fishel**, and J.P. Palazzo. 2000. Colorectal Carcinoma with High Microsatellite Instability: defining a distinct immunologic and molecular entity with respect to prognostic markers. *Human Path*. 31:1506-1514.

66.) Murphy, P., G. Petersen, S.N. Thibodeau, and **R. Fishel**. 2000. Genetic Testing for Colon Cancer: Joint Statement of the American College of Medical Genetics and American Society of Human Genetics. *Genet. Med*. 2:362-366.

67.) Schmutte, C., M.M. Sadoff, K.-S. Shim, S. Acharya, and **R. Fishel**. 2001. Interactions of the Human Exonuclease I with DNA Mismatch Repair Proteins. *J. Biol. Chem*. 276:33011-33018.

68.) Murakumo, Y., Y. Ogura, H. Ishii, S-I. Numata, M. Ichihara, C.M. Croce, **R. Fishel**, and M. Takahashi. 2001. Interactions in the Error-prone Postreplication Repair Proteins hREV1, hREV3, and hREV7. *J. Biol. Chem*. 276: 35644-35651

69.) Wang, Q., H. Zhang, S. Guerrette, A. Mazurek, T. Wilson, K. Kajino, **R. Fishel**, and M.I. Greene. 2001. Adenosine Nucleotide Modulated Signaling between hMSH2 and BRCA1. *Oncogene*. 20:4640-4649

70.) Slupianek, A., G. Tombline, C. Schmutte, M. Nieborowska-Skorska, G, Hoser, **R. Fishel**, and T. Skorski. 2001. BCR/ABL Regulates Mammalian RecA Homologs Resulting in Drug Resistance. *Molecular Cell.* 8:795-806.

71.) **Fishel, R.** 2001. The Selection for Mismatch Repair Defects in HNPCC: revising the mutator hypothesis. *Cancer Res*. 61:7369-7374.

72.) Mazurek, A., M. Berardini, and **R. Fishel**. 2002. Recognition and activation of human MutS homologs by 8-oxo-guanine DNA damage. *J. Biol. Chem*. 277:8260-8266.

73.) Müller, A., T. Bocker Edmonston, D.A. Coraco, J.P. Palazzo, H. Becker, J. Rueschoff, and **R Fishel**. 2002. Exclusion of Breast Cancer as an Integral Tumor of HNPCC. *Cancer Res*. 62:1014-1019.

74.) Tombline, G., and **R. Fishel**. 2002. Biochemical Characterization of human RAD51: I. lack of ATP-induced cooperativity during ATP hydrolysis. *J. Biol. Chem*. 277:14417-14425.

75.) Tombline, G., K.-S. Shim, and **R. Fishel**. 2002. Biochemical Characterization of Human RAD51 Protein: II. adenosine nucleotide binding and competition. *J. Biol. Chem*. 277:14426-14433.

76.) Tombline, G., C.D. Heinen, K.-S. Shim, and **R. Fishel**. 2002. Biochemical Characterization of Human RAD51 Protein: III. modulation of the homopolymer by adenosine nucleotides. *J. Biol. Chem*. 277:14434-14442.

77.) Slupianek, A., G. Hoser, I. Majsterek, A. Bronisz, M. Malecki, J. Blasiak, **R. Fishel**, and T. Skorski. 2002. Fusion tyrosine kinases induce drug resistance by stimulation of homology-dependent recombination repair, prolongation of G_2/M phase, and protection from apoptosis. *Mol. Cell. Biol*. 22:4189-201.

78.) Heinen, C., T. Wilson, A. Mazurek, M. Berardini, C. Butz, and **R. Fishel**. 2002. HNPCC mutations in hMSH2 result in reduced hMSH2-hMSH6 molecular switch functions. *Cancer Cell*. 1:469-478.

79.) Jass, J.R., V.L.J. Whitehall, B. Leggett, S.J. Meltzer, N. Matsubara, and **R. Fishel**. 2002. Correspondence re: Laiho, et al., Low-level microsatellite instability in most colorectal carcinomas. *Cancer Res*. 62:5988-5989.

80.) Loader S, C. Shields, J.C. Levenkron , **R. Fishel**, P.T. Rowley. 2002. Patient vs. physician as the target of educational outreach about screening for an inherited susceptibility to colorectal cancer. *Genet Test*. 6:281-90

81.) Hartmann, A., L. Zanardo, T. Bocker-Edmonston, H. Blaszyk, W. Dietmaier, R. Stoehr, J.C. Cheville, K. Junker, W. Wieland, R. Knuechel, J. Rueschoff, F. Hofstaedter, and **R. Fishel**. 2002. Frequent Microsatellite Instability in Sporadic Tumors of the Upper Urinary Tract. *Cancer Res*. 62:6796-6802.

82.) Hansen, L.R.T., T. Thykjaer, T.F. Ørntoft, L..J. Rasmussen, T. Bocker Edmonston, P. Keller, M. Spang-Thomsen, **R. Fishel**, and L.N Petersen. 2003. Expression of mismatch repair genes and mismatch repair deficiency in small cell lung cancer cells. *European J. of Cancer Res.* 39:145601467.

83.) Acharya, S., P. Foster, P. Brooks, and **R. Fishel**. 2003. The coordinated function of *E.coli* MutS and MutL proteins in mismatch repair. *Molecular Cell.* 12:233-246.

84.) Martin ES, R. Cesari, F. Pentimalli, K. Yoder, **R. Fishel**, A.L. Himelstein, S.E Martin, A.K. Godwin, M. Negrini, and C.M. Croce. 2003. The BCSC-1 locus at chromosome 11q23-q24 is a candidate tumor suppressor gene. *Proc Natl Acad Sci (U S A)*. 100:11517-22.

85.) Umar A., CR. Boland, JP. Terdiman, S. Syngal, A. de la Chapelle, J. Ruschoff, **R. Fishel**, NM. Lindor, LJ. Burgart, R. Hamelin, SR Hamilton, RA. Hiatt, J. Jass, A. Lindblom, HT. Lynch, P. Peltomaki, SD. Ramsey, MA. Rodriguez-Bigas, HF. Vasen, ET. Hawk, JC. Barrett, AN. Freedman, and S. Srivastava. 2004. Revised Bethesda Guidelines for hereditary nonpolyposis colorectal cancer (Lynch syndrome) and microsatellite instability. *J. Nat. Cancer Inst*. 96:261-268

86.) Xie, Y., H. Yang, C. Cunanan, K. Okamoto, D. Shibata, J. Pan, D.E. Barnes, T. Lindahl, M. McIlhatton, **R. Fishel,** and J.H Miller. 2004. Deficiencies in mouse Myh and Ogg1 result in tumor predisposition and G to T mutations in codon 12 of the K-ras oncogene in lung tumors. *Cancer Res.* 64:3096-102

87.) Picchio, M.C., E.S. Martin, R. Cesari, G.A. Calin, S. Yendamuri, T. Kuroki, F. Pentimalli F, M. Sarti, K. Yoder, L.R. Kaiser, **R. Fishel,** and C.M. Croce. 2004. Alterations of the tumor suppressor gene Parkin in non-small cell lung cancer. *Clin Cancer Res.*

10:2720-4

88.) Shim, K.-S., G. Tombline, C. Schmutte, and **R. Fishel**. 2004. Human XRCC2 Functions as an ADP exchange factor for hRAD51. *J. Biol. Chem*. 279:30385-30394.

89.) Snowden, T., S. Acharya, C. Butz, M. Berardini, and **R. Fishel**. 2004. hMSH4-hMSH5 recognizes Holliday Junctions and forms a meiosis-specific sliding clamp that embraces homologous chromosomes. *Molecular Cell.* 15:437-451.

90.) Muller, A., T.B. Edmonston, W. Deitmair, R. Buttner, **R. Fishel,** and J. Ruschoff. 2004. MSI-testing in hereditary non-polyposis colorectal carcinoma (HNPCC). *Dis. Markers*. 20:225-236

91.) Charara, M., T.B. Edmonston, S. Burkholder, R. Walters, P. Anne, E. Mitchell, R. Fry, B. Bowman, D. Rose, **R. Fishel**, W. Curran, and J. Palazzo. 2004. Microsatellite status and cell cycle associated markers in rectal cancer patients undergoing combined regimen of 5-FU and CPT-11 chemotherapy and radiotherapy. *Anticancer Res*. 24:3161-3167.

92.) Lenzi, M.L., J. Smith, T. Snowden, M. Kim, **R. Fishel**, B.K. Poulos, and P.E. Cohen. 2005. Extreme heterogeneity in the molecular events leading to the establishment of chiasmata during meiosis I in human. *Am. J. Hum. Genet.* 76:112-127

93.) Meyers, M., M.W. Wagner, A. Mazurek, C. Schmutte, **R. Fishel**, and D.A. Boothman. 2005. DNA mismatch repair-dependent response to flouropyrimidine-generated damage. *J. Biol. Chem*. 280:5516-5526.

94.) Shim, K-S., G. Tombline, C.D. Heinen, N. Charbonneau, C. Schmutte, **R. Fishel**. 2006. Magnesium influences the discrimination and release of ADP by human RAD51. *DNA Repair*. 5:704-717.

95.) Shim, K-S., C. Schmutte, K. Yoder, and **R. Fishel**. 2006. Defining the salt effect on human RAD51 activities. *DNA Repair*. 5:718-730.

96.) Yoder, K., A. Sarasin, K. Kraemer, M. McIlhatton, F. Bushman, and **R. Fishel**. 2006. The DNA repair genes XPB and XPD defend cells from HIV integration. *Proc. Nat. Acad Sci (USA)*. 103:4622-4627.

97.) Yoder, K.E., and **R. Fishel**. 2006. PCR-based detection is unable to consistently distinguish HIV 1LTR circles. *J. Virol, Meth*. 138:201-206.

98.) Su, X., N.K. Jacob, R. Amunugama, D.M. Lucas, A.R. Knapp, C. Ren, M.E. Davis, G. Marcucci, M.R. Parthun, J.C. Byrd, **R. Fishel**, and M.A. Freitas. 2007. Liquid chromatography mass spectrometry profiling of histones. *J Chromatogr B.* 850:440-454.

99.) Ikura, T., S. Tashiro, A. Kakino, H. Shima, N. Jacob, R. Amunugama, K. Yoder, S. Izumi, I. Kuraoka, K. Tanaka, H. Kimura, M. Ikura, S. Nishikubo, T. Ito, A. Muto, K. Miyagawa, S. Takeda, **R. Fishel**, K. Igarashi, K. Kamiya. 2007. DNA damage-dependent acetylation and ubiquitination enhances H2AX mobilization required DNA repair. *Mol Cell Biol*. 27:7028-7040

100.) McIlhatton, M., J. Tyler, S. Burkholder, B. Rigas, L. Kopolovich, and **R. Fishel**. 2007. NO-Aspirin derivatives suppress microsatellite instability in mismatch repair deficient and HNPCC cells. *Cancer Res*. 67:10966-10975.

101.) Snowden, T., K-S. Shim, C. Schmutte, S. Acharya, and **R. Fishel**. 2008. Characterization of the hMSH4-hMSH5 ATPase and its interaction with meiotic recombination machinery. *J. Biol Chem*. 283:145-154

102.) **Fishel,R.,** and J. Groden. 2008. Harnessing mismatch repair to model sporadic cancer. *Nature Meth*. 5:225-226.

103.) Yoder, K. E., and **R. Fishel**. 2008. Real-time quantitative PCR and fast QPCR have similar sensitivity and accuracy with HIV cDNA late reverse transcripts and 2-LTR circles. *J Virol Methods*. 153:253-256

104.) Mazurek, T., C.N. Johnson, M.W. Germann, and **R. Fishel**. 2009. The Sequence Context Effect for hMSH2-hMSH6 Mismatch-Dependent Activation. *Proc. Nat. Acad. Sci (USA)* 106:4177-4182.

105.) Su, X., N.K. Jacob, R. Amunugama, P-H. Hsu, **R. Fishel**, and M.A. Freitas. 2009. Enrichment and characterization of histones by 2D-hydroxylapatite/reverse-phase liquid chromatography mass spectrometry. *Anal. Biochem.* 388:47-55

106.) Charbonneau, N., R. Amunugama, C. Schmutte, K Yoder, and **R. Fishel**. 2009. Evidence that hMLH3 functions primarily in meiosis and in hMSH2-hMSH3 mismatch repair. *Cancer Biol. and Therapy.* 14:1411-1420

107.) Manohar, M., A.M. Mooney, J. North, R.J. Nakkula, J.W. Picking, A. Edon, **R. Fishel**, M.G. Poirier, and J.J. Ottesen. 2009. Acetylation of Histone H3 at the nucleosome dyad alters DNA-histone binding. *J. Biol. Chem.* 284: 23312-23321

108.) Wang, J., N.K. Jacob, K.J. Ladner, A. Beg, J.D. Perko, S.M. Tanner, S. Liyanarachchi, **R. Fishel**, and D.C Guttridge. 2009. RelA/p65 functions to maintain cellular senescence by regulating genomic stability. *EMBO Reports*. 10:1272-1278

109.) Li, L.S., J. C. Morales, M. Veigl, D. Sedwick, S. Greer, M. Meyers, M. Wagner, **R. Fishel**, and D.A. Boothman. 2009. DNA mismatch repair (MMR)-dependent 5-fluorouracil cytotoxicity and the potential for new 'drugable' targets. *Brit J. Pharmacol* 158:679-692

110.) Javaid, S., M. Manohar, N. Punja, A. Mooney, J. Ottesen, M. Poirier, and **R. Fishel**. 2009. Nucleosome remodeling by hMSH2-hMSH6. *Molecular Cell.* 36:1086-1094.

111.) Valeri, N., P. Gasparini, M. Fabbri, C. Braconi, A. Veronese, F. Lovat, B. Adair, I. Vannini, F. Fanini, A. Bottoni, S. Costinean, S.K. Sandhu, G.J. Nuovo, H. Alder, R. Gafa, F. Calore, M. Ferracin, G. Lanza, S. Volinia, M. Negrini, M.A. McIlhatton, D. Amadori, **R. Fishel** and C. M. Croce. 2010. Modulation of mismatch repair and genomic stability by miR-155. *Proc. Nat. Acad. Sci. (USA).* 107: 6982-6987.

112.) Park, J., Y.-M. Jeon, D. In, **R. Fishel**, C. Ban, and J.-B. Lee. 2010. Single molecule

analysis reveals the kinetics and physiological relevance of MutL ssDNA binding. *PLoS One*. 5:e15496

113.) Valeri, N., P. Gasparini, C. Braconi, A. Paone, F. Lovat, M. Fabbri, D. Amadori, H. Alder[1], G.J Nuovo, **R. Fishel** and C.M. Croce. 2010. *miR21* induces resistance to 5-Fluorouracil by down-regulating MSH2. *Proc. Nat. Acad. Sci. (USA)*. 107: 21098-21103

114.) Jeong, C., W.-K. Cho, K.-M. Song, C. Cook, T.-Y. Yoon, C. Ban, **R. Fishel**, J.-B. Lee. 2011. MutS switches between two fundamentally distinct clamps during mismatch repair. *Nat. Struct. Mol. Biol.* 18: 379-385

115.) Yoder, K.E., W. Roddick, P. Hoellerbauer, and **R. Fishel**. 2011. The TFIIH proteins XPB and XPD participate in retroviral cDNA degradation in the nuclear compartment. *Virology.* 410: 291-298.

116.) Yoder, K.E., A. Espeseth, M.T. Russo, R.S. Lloyd, D. Hazuda, R.W. Sobol, and **R. Fishel**. 2011. The host base excision repair pathway is required for efficient lentivirus integration. *PLoS One.* 6:e17862

117.) Espeseth, A.S., **R. Fishel**, D. Hazuda, Q. Huang, M. Xu, K.E. Yoder, and H. Zhou (alphabetical order). 2011. siRNA Screening of a targeted library of DNA repair factors reveals a role for base excision repair in HIV infection. *PLoS One.* 6: e17612

118.) Pabla, N., Z. Ma, M. McIlhatton, **R. Fishel**, and Z. Dong. 2011. hMSH2 recruits ATR to DNA damage sites for activation during DNA damage-induced apoptosis. *J. Biol. Chem.* 286: 10411-10408.

119.) McIlhatton, M.A., J. Tyler, L.A. Kerepesi, T. Bocker-Edmonston, M.H. Kucherlapati, W. Edelmann, R. Kucherlapati, L. Kopelovich and **R. Fishel**. 2011. Aspirin and Low Dose Nitric Oxide-Donating Aspirin Increase Life Span in a Lynch Syndrome Mouse Model. *Cancer Prev. Res.* 4:684-93.

120.) North, J.A., S. Javaid, M. Ferdinand, N. Chatterjee, J. Picking, M. Shoffner, R.J. Nakkula, B. Bartholomew, J.J. Ottesen, **R. Fishel** and M.G. Poirier. 2011. Histone H3(T118) phosphorylation switches the mechanism of SWI/SNF nucleosome remodeling. *Nucl. Acids Res*. 39:6465-6474.

121.) Simon, M., J. Shimko. R. Fortes, M. Ferdinand, M. Manohar, M. Zhang, **R. Fishel**, J.J. Ottesen and M.G. Poirier. 2011. Histone modification modules control nucleosome disassembly. *Proc. Nat. Acad. Sci, (USA)*. 108:12711-6

122.) Amunugama, R. and **R. Fishel**. 2011. Subunit interface residues F129 and H294 of Human RAD51 are essential for recombinase function. *PLoS One.* 6:e23071.

123.) Fortes, R.A., J.A. North, S. Javaid, O.P. Tabbaa, **R. Fishel**, M.G. Poirier and R. Bundschuh. 2011. A quantitative model of nucleosome dynamics and applications to hMSH2-hMSH6 nucleosome disassembly. *Nucl. Acids Res.* 39: 8306-8013

124.) Heinen, C.D., J.L. Cyr, C. Cook, N. Punja, M. Sakato, J.V. Martín-López, M. Hingorani, and **R. Fishel**. 2011. hMSH2 controls ATP processing by hMSH2-hMSH6. *J. Biol.*

Chem. 286:40287-40295.

125.) Amunugama, R., Y. He, S. Wilcox, R. Fortes, R. Bundschuh, K.-S. Shim, Y. Luo, J. Griffith, and **R. Fishel**. 2012. The RAD51 ATP cap regulates nucleoprotein filament stability. *J. Biol. Chem.* 287:8724-36

126.) Cho, W–K., C. Jeong, D–H. Kim, M. Jang, K–M. Song, J. Hanne, C. Ban, **R. Fishel**, J–B. Lee. 2012. ATP alters the diffusion mechanism of MutS on mismatched DNA. *Structure.* 20:1264-1274

127.) Martín-López, J.V., Y. Barrios, V. Medina-Arana, M. Andújar, S. Lee, L. Gu, G-M. Li, J. Rüschoff, E. Salido and **R. Fishel**. 2012. Functional Analysis of the *hMSH2(M688R)* Lynch Syndrome Mutation: a novel tissue-specific dominant negative. *Carcinogenesis.* 33:1647-1654.

128.) North, J.A., J.C. Shimko, S. Javaid, A.M. Mooney, M.A. Shoffner, S.D. Rose, R. Bundschuh, **R. Fishel**, J. Ottesen, and M. Poirier. 2012. Regulation of the nucleosome unwrapping rate controls DNA accessibility. *Nucl. Acids Res.* 40:10215-10227.

129.) North, J.A., R. Amunugama, W-D. Heyer, M. Poirier and **R. Fishel**. 2013. ATP-dependent nucleosome unwrapping catalyzed by human RAD51. *Nucl. Acids Res.* 41:7302-7312.

130.) Amunugama, R., J. Groden and **R. Fishel**. 2013. The HsRAD51B-HsRAD51C stabilizes the HsRAD51 nucleoprotein filament. *DNA Repair.* 9:723-732.

131.) Hanne, J., J. Liu, J-.B. Lee and R**. Fishel**. 2013. Single-molecule FRET studies on DNA mismatch repair. *Int. J. Biophys.* 3:18-38.

132.) Honda, M., Y. Okuno, S.R. Hengel, J.V. Martin-Lopez, C.P. Cook, R. Amunugama, R. Soukup, S. Subramanyam, **R. Fishel** and M. Spies. 2014. hMSH2-hMSH6 recognizes mismatches and forms sliding clamps within a D-loop recombination intermediate. *Proc. Nat. Acad. Sci. (USA)*. 111:E316-25.

Submitted Manuscripts

133.) Liu, J., J. Hanne, B. Britton, M. Shoffner, A.E. Albers, J. Bennett, R. Zatezalo, R. Barfield, D. Rabuka, J.-B. Lee and **R. Fishel**. 2015. Efficient Site Specific Fluorophore Labeling of *E.coli* Mismatch Repair Proteins and Imaging on Single DNA Molecules (submitted)

134.) Martín-López, J.V., C. Lautt, N. Valeri, P. Gasparini, G. Boivin, H. Alder, C.M. Croce, B.J. Aronow, and **R. Fishel**. 2015. Naproxen suppresses tumorigenesis and dramatically increases life-span in a Lynch syndrome mouse model. (submitted).

135.) Hanne, J., J. Park, B.M. Britton, J. Liu, M. Schoffner, P. Klajner, R. Bundschuh, J.-B. Lee and **R. Fishel**. 2015. MutS behaves as a 1-Dimensional Tonk's Gas on DNA.

Book Chapters and Invited Reviews

136.) Warner, R.C., **R.A. Fishel**, and F.C. Wheeler. 1978. Branch migration in recombination. *Cold Spring Harbor Symp. Quant. Biol.* 48:957-968.

137.) **Fishel, R.A.**, and R. Kolodner. 1983. Gene conversion in *Escherichia coli:* the identification of two pathways for the repair of mismatched nucleotides. In: *Cellular Responses to DNA Damage*. Friedberg and Bridges, eds. Alan R. Liss, Inc., New York, NY. Vol. 9, pp. 309-324.

138.) **Fishel, R.A.**, and R. Kolodner. 1984. A cell-free system that catalyzes the repair of symmetrically methylated heteroduplex DNA. *Cold Spring Harbor Symp. Quant. Biol*. 49:603-610.

139.) **Fishel, R.**, and A. Rich. 1988. The role of left-handed Z-DNA in general genetic recombination. In: *Mechanisms and Consequences of DNA Damage Processing*, UCLA Symposia on Molecular and Cellular Biology. E. Friedberg and P. Hanawalt, eds. Alan R. Liss, Inc., New York, NY, pp. 23-32.

140.) **Fishel, R.**, M. Derbyshire, K. Dowjat, C.J. Harris, and S.P. Moore. 1989. Studies on homologous pairing and strand exchange in human cells. In: *Molecular Mechanisms in Replication and Recombination*, UCLA Symposia on Molecular and Cellular Biology C. Richardson and R. Lehman, eds. Alan R. Liss, Inc., New York, NY, pp 343-356.

141.) **Fishel, R.**, P. Anziano, and A. Rich. 1990. Z-DNA affinity chromatography using avidin-biotin linkage. In: Avidin-Biotin Technology, *Methods in Enzymology* Vol. 184. M. Wilchek and E.A. Bayer, eds., Academic Press, Inc., Orlando, FL. **184**:328-340.

142.) **Fishel, R**. 1991. General genetic recombination. In: *Modern Microbial Genetics*. (U. Streips and R. Yasbin, eds.), Alan R. Liss, Inc., New York, NY. pp 99 - 121.

143.) Sweezy, M., and **R. Fishel**. 1994. Multiple Pathways Leading to Genome Instability and Tumorigenesis. In: *DNA Damage: effects on DNA structure and protein recognition*. (Eds: S. Wallace, Y. Kow and B. Van Houten). New York Academy of Science. NY. **726**:165-177.

144.) Kolodner, R., N.R. Hall, J. Lipford, M. F. Kane, M.R.S. Rao, P. Morrison, L. Wirth, P.J. Finan, J. Burn, P. Chapman, C. Earabino, E. Merchant, D.T. Bishop, J. Garber, C.E. Bronner, S.M. Baker, G. Warren, L.G. Smith, A. Lindblom, P. Tannergard, R.J. Bollag, A.R. Godwin, D.C. Ward, M. Nordenskjold, R.M. Liskay, N. Copeland, N. Jenkins, M.K. Lescoe, A. Ewel, S. Lee, J. Griffith and **R. Fishel.** 1995. The Human Mismatch Repair Genes and their Association with Hereditary Non-Polyposis Colon Cancer. *Cold Spring Harbor Symp. Quant. Biol*. 59:331-328.

145.) **Fishel, R.**, M.K. Lescoe, A. Ewel, S. Lee, J. Griffith, P. Morrison, L. Wirth, J. Lipford, M.F. Kane, M.R.S. Rao, P.J. Finan, J. Burn, P. Chapman, C. Earabino, E. Merchant, C.E. Bronner, S.M. Baker, G. Warren, L.G. Smith, A. Lindblom, P. Tannergard, R.J. Bollag, A. R. Godwin, D.C. Ward, M. Nordenskjold, R.M. Liskay, N. Copeland, N. Jenkins, D.T. Bishop, J. Garber, N.R. Hall and R.D. Kolodner. 1995. The Human Mutator Genes hMSH2, hMLH1, hPMS1 and hPMS2 and Hereditary Non-Polyposis Colon Cancer. *Accomplishments in Cancer Research - 1994*. (eds: J.G. Fortner and J.E.

Rhoads). J.B. Lippincott, Philadelphia, PA. pp. 140-153.

146.) **Fishel, R.** 1995. Mismatch Repair, Mutators and Tumorigenesis. *JNIH Res*. 7:50-51.

147.) **Fishel, R.**, and R. Kolodner. 1995. Identification of mismatch repair genes and their role in the development of cancer. *Curr. Op. Genet. Devel*. 5:382-395.

148.) Acharya, S., A. Reitmair, T. Wilson, S. Aebi, R. Schmits, B. Bapat, M. Redstone, A. Mitri, P. Waterhouse, H.-W. Mittrucker, A. Wakeman, B. Liu, A. Thomason, H. Griesser, S. Gallinger, W.G. Ballhausen, A. Ewel, M.K. Lescoe, B. Kurdi-Haidar, R. Gordon, B. Cenni, H. Zheng, C.R. Boland, S. B. Howell, M. Kelley, T. Mak and **R. Fishel**. 1996. Human mutators, DNA repair and the development of Cancer. *Accomplishments in Cancer Research - 1995*. (eds: J.G. Fortner and J.E. Rhoads). J.B. Lippincott, Philadelphia, PA. (in press).

149.) **Fishel, R.** 1996. Genomic instability, mutators, and the development of cancer: is there a role for p53?. *JNIH Res*. 88:1608-1609.

150.) **Fishel, R.,** and T. Wilson. 1997. MutS homologues in mammalian cells. *Curr. Op. Genet. Devel*. 7:105-113.

151.) Bocker, T., J. Rüschoff and **R. Fishel**. 1999. Molecular Diagnostics of Cancer Predisposition – Hereditary Non-Polyposis Colorectal Carcinoma and Mismatch Repair Defects. *Biochem. Biophys. Acta*. 1423:1-10.

152.) **Fishel, R.** 1999. Signaling Mismatch Repair in Cancer. *Nature Medicine*. 11:1239-1241.

153.) Schmutte, C., and **R. Fishel**. 1999. DNA Damage and Chromosomal Instability: First Steps to Carcinogenesis. *Anticancer Research*. 19:4665-4696.

154.) Wang Q., H.T Zhang, **R. Fishel** and M.I Greene. 2000. BRCA1 and Cell Signaling. *Oncogene*. 19:6152-6158.

155.) **Fishel, R.**, S. Acharya, M. Beraradini, T. Bocker, N. Charbineau, A. Cranston, S. Gradia, S. Guerrette, C.D. Heinen, A. Johnson, A. Mazurek, M. Sadoff, T. Snowden, C. Schmutte, G. Tombline, and T. Wilson. 2000. SIGNALING MISMATCH REPAIR: the biochemistry and structure of a molecular switch. *Cold Spring Harbor Symp. Quant. Biol*. 65:217-224.

156.) Müller, A., and **R. Fishel**. 2002. Mismatch Repair and the Hereditary Non-Polyposis Colorectal Cancer Syndrome. *Cancer Invest*. 20:102-109.

157.) Müller, A., K.-S. Shim, **R. Fishel**. 2002. DNA Mismatch Repair and Hereditary Colon Cancer. *Encyclopedia Cancer – Second Edition*, Academic Press, (Ed. Joseph R. Bertino). 2:373-379.

158.) Heinen, C.D., C. Schmutte, and **R. Fishel**. 2002. DNA Repair and Tumorigenesis: lessons from hereditary cancer syndromes. *Cancer Biology and Therapy*. 1:477-485

159.) Boland, C.R., and **R. Fishel**. 2005. Lynch syndrome: form, function, proteins, and

basketball. *Gastroenterology.* 129:751-755

160.) Acharya, S., and **R. Fishel**. 2006. The Mechanism of DNA Mismatch Repair from Bacteria to Human. In: *DNA Damage Recognition.* (Siede, Kow, Doetsch, Ed). pp463

161.) Resnick, K. E., H. Hampel, **R. Fishel**, and D.E. Cohn. 2009. Current and emerging trends in Lynch syndrome identification in women with endometrial cancer. *Gynecol Oncol.* 144:128.134

162.) Amunugama, R., and **R. Fishel**. 2012. Homologous Recombination in Eukaryotes. In: *Prog Mol Biol Transl Sci.* (Doetsch, Ed). 110:155-206

163.) Martín-López, J.V., and **R. Fishel**. 2013. Understanding Lynch Syndrome: the mechanism of mismatch repair. *Familial Cancer* 12:159-168.

164.) Lee, J-.B., W-.K. Cho, J. Park, D. Kim, S.H. Lee, and **R. Fishel**. 2014. Single molecule views of MutS on mismatched DNA. *DNA Repair*. 20:82-93.

165.) Spies, M., and **R. Fishel**. 2014. Mismatch repair during homologous and homeologous recombination. In: *Recombination Mechanism* (Kowalczykowski and Heyer, Ed.) Cold Spring Harbor Press. (in press).

166.) **Fishel, R**., and J,-B. Lee. 2014. Mismatch Repair. In: *DNA Replication, Recombination and Repair : Molecular Mechanisms and Pathology* (Hanaoka and Sugasawa, Ed.) Springer, NY (in press)

PATENTS

1.) Title: Simple Nuclear Extract Production from Cells by Washing with Buffered Saline, then Hypotonic Lysis in Glycerol Solution, Retaining Recombination and Other Activities
Patent Number: US7725307-N
Patent Assignee: US Dept Health & Human Service
Inventor(s): **Fishel, Richard A.**

2.) Title: Human hRad54 DNA and Polypeptide and Agonists, Antibodies, Antagonists, etc.
Patent Number: EP844305-A; EP844305-A2; JP10201489-A
Patent Assignee: Smithkline Beecham Corp; Thomas Jefferson University
Inventor(S): Croce Carlo M; **Fishel Richard A**; et al.

3.) Title: Detection of Polymorphic Genetic Markers of the Form (dC-dA)-(dG-dT) by Amplifying DNA from Five Different Micro-Satellite Loci
Patent Number: DE19712332-A; EP869188-A; DE19712332-A1; EP869188-A2; JP10323199-A; US6150100-A
Patent Assignee: Boehringer Mannheim Gmbh; Roche Diagnostics Gmbh
Inventor(s): Dietmair, Wolfgang; Rueschoff, Josef; **Fishel, Richard A.**

4.) Title: Use of MutS Homologs for Developing Methods and Products for use in the Study, Detection and Treatment of e.g. Tumorigenesis, Apoptosis, Ageing and Foetal Development
Patent Number: WO9910369-A; WO9910369-A1; AU9891251-A; US6333153-B1; US2002058275-A1
Patent Assignee: Thomas Jefferson University
Inventor(S): **Fishel, Richard A**; Gradia, Scott; Acharya, Samir; et al.

5.) Title: Compositions, Kits, and Methods for Effecting Adenine Nucleotide Modulation of DNA Mismatch Recognition Proteins
Patent Number: US 6333153
Patent Assignee: Thomas Jefferson University
Inventor(s): **Fishel, Richard A.;** Gradia, Scott; Acharya, Samir

6.) Title: Screening for Compounds that Modulate a DNA Repair Pathway and/or Retroviral Integration, Useful for Treating Retroviral Infection, Comprises Determining The Amount of a Retroviral cDNA Circularization in the Presence of the Test Compound
Patent Number: WO2003089573-A2; AU2003253593-A1; EP1497470-A2; US2005158724-A1; JP2005529591-W; AU2003253593-A8
Patent Assignee: Fishel Richard A; Yoder Kristine E
Inventor(s): **Fishel Richard A**; Yoder Kristine E

7.) Title: Method for Detection of Alterations in the DNA Mismatch Repair Pathway
Patent Number: US 07229755
Patent Assignee: Dana Farber Cancer Institute Inc; University of Vermont and State Agricultural College
Inventor(s): Kolodner, Richard D.; Reenan, Robert A. G.; **Fishel, Richard A**.

8.) Title: New Isolated Mismatch Repair Gene (MSH2) Nucleotide Segment, Useful For Expressing Gene Products, and for Screening Drugs
Patent Number: US7396678-B1
Patent Assignee: Dana Farber Cancer Institute; University of Vermont and State Agricultural College
Inventor(s): Kolodner, Richard D.; Reenan, Robert A. G.; **Fishel, Richard A.**

9.) Title: Method for Detection of Alterations in the DNA Mismatch Repair Pathway
Patent Number: US 07396678
Patent Assignee: Dana Farber Cancer Institute; University of Vermont and State Agricultural College
Inventor(s): Kolodner, Richard D.; Reenan, Robert A. G.; **Fishel, Richard A.**