

Risk reduction factors of colorectal carcinoma – A Review

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ABSTRACT: In this review, we provide a brief introduction about colorectal carcinoma and risk reduction factors of Colorectal Carcinoma. Colorectal Carcinoma is a kind of cancer which develops in an epithelial cell. Initially it develops in the inner lining and then spread to other layers. Colon Cancer is majorly classified into three types they are colorectal Adenocarcinoma, Gastrointestinal carcinoid tumour and Primary colorectal lymphomas. Some of factors were instructed to protect us from the Colorectal Carcinoma and factors are known as risk reduction factors. This risk reduction factors are listed and explained in the review.

KEYWORDS: Risk reduction factors, Colorectal Carcinoma, Cancer, Adenocarcinoma, Primary colorectal Carcinoma and Gastrointestinal Carcinoid tumour.

FIGURE 1: COLORECTAL CARCINOMA (YVETTE BAZIER)

“Adeno” is a prefix word refers to Adeno endocrine glands. “Carcinoma” is a type of cancer that develops in an epithelial cell layer that lines the internal and external surfaces of Colon and Rectum regions. Adenocarcinoma of the colon or rectum initially develop in the inner lining of the cell and then spread to other layers of large intestine. Thus, it spreads to other organs by the Lymph node (Cancer treatment centre in America). Based on the region of infection, it is majorly classified into three types. They are Colorectal Adenocarcinoma; Gastrointestinal carcinoid tumour and Primary colorectal lymphomas. Figure 1 provides a clear vision on the region and their stages of infection. The American cancer society provided several risk factors of the colorectal carcinoma such as overweight, physical inactivity, red meat in diet, Smoking, heavy alcohol consumption, being older, a personal history of colorectal polyps or colorectal cancer, family history of colorectal cancer or adenomatous polyps, Having an inherited syndrome, Lynch syndrome, Familial adenomatous polyposis (FAP), Peutz-Jeghers Syndrome (PJS), MYH – associated polyposis (MAP). Some of the factors which were instructed to reduce the risk of colorectal carcinoma are listed below.

I. INTRODUCTION:



II. VARIOUS RISK REDUCTION FACTORS OF COLORECTAL CARCINOMA

Sl. No	Factors	References
1	Good BMI	Joo Heon Kim, et, al., TI Lund Nilsen and LJ Vatten Marc Batdou, et, al., Jason A Zell, et, al., Qiwen Ben, et, al.,

2	Regular Exercise	DJ Harriss,et,al., Kathleen Yaus Wolin,et,al., Anna H wu,et,al., AKA Samad,et,al., Graham A Colditz,et,al.,
3	Low Alcohol Consumption	Edward Giovannucci ,et,al., Anna H wu,et,al., Edward Giovannucci and Walter C Willett, Raul Baena and Pedro Salinas. Andrew T Chan and Edward L Giovannucci
4	Fruits and Vegetables	Parviz Ghadirian, et,al., Elio Riboli and Teresa Norat. Mark T Williams and Norman G Hord. Ashley J Vargas and Patricia A Thompson. Edward Giovannucci and Walter C Willett.
5	Whole grains	David R Jacobs Jr, Fereidoon Shahidi, Joanne Slavin . Marjorie L McCullough, Dagfinn Aune,
6	Low in red and processed meats in diet	Sandeep P Nayak, Inés Mármol, AB Miller, Walter C Willett, Edward Giovannucci,
7	Not Smoking	Gregory J Tranah, Nourah Alsheredah and Saeed Akhtar C Pohl, Adeline Seow, Martin Halle,
8	Vitamins	Edward Giovannucci, Erik JM Konings, Jean Wactawski-Wende, Michael Huncharek, Marjorie L McCullough,
9	Calcium	Kana Wu, David ZJ Chu, Cedric Garland, Kana Wu, I Duris,
10	Magnesium	Petra A Wark, Enbo Ma, Petra A Wark,

11	Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	Elizabeth H Ruder, Luis A García Rodríguez and Consuelo Huerta-Alvarez. Louise E McGreavey, Kate Jolly, Farhat VN Din,
12	Hormone replacement therapy for women	Gad Rennert, Heidi D Nelson, Kavita Nanda and Lori A Bastian. Jill R Johnson, Nicole Hebert-Croteau,
13	Sunlight	Michael F Holick DM Freedman, Han van der Rhee, Cedric F Garland and Frank C Garland Richard P Gallagher,

REFERENCES

- [1]. Joo Heon Kim, Sun Young Yoon, Chang-Nam Kim, Joung Hyuck Joo, Sang Kyoung Moon, In Seong Choe, Yong- Kyung Choe, Jae Wha Kim, “ The Bmi- 1 oncoprotein is overexpressed in human colorectal cancer and correlates with the reduced p16INK4a/p14ARF proteins, Cancer letter 203 (2), 217-224, 2004.
- [2]. TI Lund Nilsen and LJ Vatten, “Prospective study of colorectal cancer risk and physical activity, diabetes, blood glucose and BMI: exploring the hyperinsulinaemia hypothesis”, British journal of cancer 84 (3), 417-422, 2001.
- [3]. Colorectal Cancer Causes, Risk Factors, and Prevention, American Cancer Society, cancer.org / 1.800.227.2345.
- [4]. Marc Bardou, Alan N Barkun, Myriam Martel, “Obesity and colorectal cancer”, Gut 62 (6),933-947, 2013.
- [5]. Jason A Zell, Christine E McLaren, Timothy R Morgan, Michael J Lawson, Sheriff Rezk, C Gregory Albers, Wen-Pin Chen, Joseph C Carmichael, Jinah Chung, Ellen Richmond, LM Rodriguez, Eva Szabo, Leslie G Ford, Michael N Pollak, Frank L Meyskens, “A phase IIa trial of metformin for colorectal adenomas and elevated body mass index”, cancer prevention research 13(2), 203-212, 2020.
- [6]. Qiwen Ben, Wei An, Ying Jiang, Xianbao Zhan, Yiqi Du, Quan Cai Cai, Jie Gao, Zhaoshen Li, “Body mass index increases risk for colorectal adenomas based on meta-analysis”, Gastroenterology 142 (4), 762-772, 2012.
- [7]. DJ Harriss, Greg Atkinson, A Batterham, K George, N Tim Cable, Thomas Reilly, Najib Haboubi, Andrew G Renehan, Colorectal Cancer, Lifestyle, Exercise And Research Group, “Lifestyle factors and colorectal cancer risk (2): a systematic review and meta- analysis of associations with leisure-time physical activity”, Colorectal Disease 11 (7), 689-701, 2009.
- [8]. Kathleen Yaus Wolin, Yan Yan, Graham A Colditz, IM Lee, “Physical activity and colon cancer prevention: a meta-analysis”, British journal of cancer 100 (4), 611-616, 2009.
- [9]. Yvette Bazier, “Colorectal cancer: What you need to know”, Medical News Today, January 9, 2018.
- [10]. Anna H Wu, A Paganini-Hill, RK Ross, BE Hendrson, “Alcohol, physical activity and other risk factors for colorectal cancer: a prospective study”, British journal of cancer 55(6), 687-694, 1987.
- [11]. AKA Samad, RS Taylor, T Marshall, Mark AS Chapman, “A meta-analysis of the association of physical activity with reduced risk of colorectal cancer”, Colorectal disease 7(3), 204-213, 2005.
- [12]. Graham A Colditz, Carolyn C Cannuscio, A Lindsay Frazier, “Physical activity and reduced risk of colon cancer: implications for prevention, Cancer Causes & Control 8 (4), 649-667, 1997.
- [13]. Edward Giovannucci, Eric B Rim, Alberto Ascherio, Meir J Stampfer, Graham A

- Colditz, Walter C Willett, "Alcohol, low-methionine-low-folate diets, and risk of colon cancer in men", *JNCI: Journal of the national cancer institute* 87 (4), 265-273, 1995
- [14]. Edward Giovannucci, Walter C Willett, "Dietary factors and risk of colon cancer", *annals of medicine* 26 (6), 443-452, 1994.
- [15]. Raul Baena, Pedro Salinas, "Diet and colorectal cancer", *Maturitas* 80(3), 258-264, 2015,
- [16]. Andrew T Chan, Edward L Giovannucci, "primary prevention of colorectal cancer", *Gastroenterology* 138 (6), 2029- 2043. E10, 2010.
- [17]. Ashley J Vargas, Patricia A Thompson, "Diet and nutrient factors in colorectal cancer risk", *Nutrition in clinical practice* 27 (5), 613-623, 2012.
- [18]. Mark T Williams, Norman G Hord, "The role of dietary factors in cancer prevention: beyond fruits and vegetables", *Nutrition in clinical practice* 20 (4), 451-459, 2005.
- [19]. Elio Riboli, Teresa Norat, "Epidemiologic evidence of the protective effect of fruit and vegetables on cancer risk", *The American journal of clinical nutrition* 78 (3), 559S-569S, 2003.
- [20]. Parviz Ghadirian, Andre Lacroix, Patrick Maisonneuve, Claude Potvin, Denis Gravel, Denis Bernard, Peter Boyle, "Nutritional factors and colon carcinoma: A case-control study involving French Canadians in Montreal, Quebec, Canada", *Cancer: Interdisciplinary international journal of the American Cancer Society* 80(5), 858-864, 1997.
- [21]. Dagfinn Aune, Doris SM Chan, Rosa Lau, Rui Vieira, Darren C Greenwood, Ellen Kampman, Teresa Norat, "Dietary fibre, whole grains, and risk of colorectal cancer: systematic review and dose-response meta-analysis of prospective studies", *Bmj* 343, 2011.
- [22]. Marjorie L McCullough, Andrea S Robertson, Ann Chao, Eric J Jacobs, Meir J Stampfer, David R Jacobs, William R Diver, Eugenia E Calle, Michael J Thun, "A prospective study of whole grains, fruits, vegetables and colon cancer risk", *Cancer Causes & Control* 14 (10), 959-970, 2003.
- [23]. Joanne Slavin, "Whole grains and human health", *Nutrition research reviews* 17 (1), 99-110, 2004.
- [24]. Fereidoon Shahidi, Anoma Chandrasekara, "Millet grain phenolics and their role in disease risk reduction and health promotion: A review", *Journal of Functional Foods* 5 (2), 570-581, 2013.
- [25]. David R Jacobs Jr, Joanne Slavin, Leonard Marquart, "Whole grain intake and cancer: a review of the literature", *Nutrition and cancer* 24 (3), 221-229, 1995.
- [26]. Edward Giovannucci, Eric B Rimm, Meir J Stampfer, Graham A Colditz, Alberto Ascherio, Walter C Willett, "Intake of fat, meat, and fiber in relation to risk of colon cancer in men", *Cancer research* 54 (9), 2390-2397, 1994
- [27]. Walter C Willett, Meir J Stampfer, Graham A Colditz, Bernard A Rosner, Frank E Speizer, "Relation of meat, fat, and fiber intake to the risk of colon cancer in a prospective study among women", *New England journal of medicine* 323 (24), 1664-1672, 1990
- [28]. AB Miller, GR Howe, M Jain, KJP Craib, L Harrison, "Food items and food groups as risk factors in a case- control study of diet and colo- rectal cancer", *International Journal of Cancer* 32 (2), 155-161, 1983
- [29]. Inés Mármol, Cristina Sánchez-de-Diego, Alberto Pradilla Dieste, Elena Cerrada, María Jesús Rodríguez Yoldi, "Colorectal carcinoma: a general overview and future perspectives in colorectal cancer", *International journal of molecular sciences* 18 (1), 197, 2017
- [30]. Sandeep P Nayak, MP Sasi, MP Sreejayan, Syamsundar Mandal, "A case-control study of roles of diet in colorectal carcinoma in a South Indian Population", *Asian Pac J Cancer Prev* 10 (4), 565-8, 2009
- [31]. Martin Halle, Michael H Schoenberg, "Physical activity in the prevention and treatment of colorectal carcinoma", *Deutsches Ärzteblatt International* 106 (44), 722, 2009
- [32]. Adeline Seow, Stella R Quah, Denis Nyam, Paulin T Straughan, Terrence Chua, Tar- Choon Aw, "Food groups and the risk of colorectal carcinoma in an Asian population", *Cancer: Interdisciplinary International Journal of the American Cancer Society* 95 (11), 2390-2396, 2002
- [33]. C Pohl, A Hombach, W Kruis, "Chronic inflammatory bowel disease and cancer", *Hepato-gastroenterology* 47 (31), 57-70, 2000
- [34]. Nourah Alsheredah, Saeed Akhtar, "Diet, obesity and colorectal carcinoma risk: results from a national cancer registry-based

- middle-eastern study”, *BMC cancer* 18 (1), 1227, 2018
- [35]. Gregory J Tranah, Andrew T Chan, Edward Giovannucci, Jing Ma, Charles Fuchs, David J Hunter, “Epoxide hydrolase and CYP2C9 polymorphisms, cigarette smoking, and risk of colorectal carcinoma in the Nurses' Health Study and the Physicians' Health Study”, *Molecular Carcinogenesis: Published in cooperation with the University of Texas MD Anderson Cancer Center* 44 (1), 21-30, 2005
- [36]. Marjorie L McCullough, Andrea S Robertson, Carmen Rodriguez, Eric J Jacobs, Ann Chao, Carolyn Jonas, Eugenia E Calle, Walter C Willett, Michael J Thun, “Calcium, vitamin D, dairy products, and risk of colorectal cancer in the Cancer Prevention Study II Nutrition Cohort (United States)”, *Cancer Causes & Control* 14 (1), 1-12, 2003
- [37]. Michael Huncharek, Joshua Muscat, Bruce Kupelnick, “Colorectal cancer risk and dietary intake of calcium, vitamin D, and dairy products: a meta-analysis of 26,335 cases from 60 observational studies”, *Nutrition and cancer* 61 (1), 47-69, 2008
- [38]. Jean Wactawski-Wende, Jane Morley Kotchen, Garnet L Anderson, Annlouise R Assaf, Robert L Brunner, Mary Jo O'sullivan, Karen L Margolis, Judith K Ockene, Lawrence Phillips, Linda Pottern, Ross L Prentice, John Robbins, Thomas E Rohan, Gloria E Sarto, Santosh Sharma, Marcia L Stefanick, Linda Van Horn, Robert B Wallace, Evelyn Whitlock, Tamsen Bassford, Shirley AA Beresford, Henry R Black, Denise E Bonds, Robert G Brzyski, Bette Caan, Rowan T Chlebowski, Barbara Cochrane, Cedric Garland, Margery Gass, Jennifer Hays, Gerardo Heiss, Susan L Hendrix, Barbara V Howard, Judith Hsia, F Allan Hubbell, Rebecca D Jackson, Karen C Johnson, Howard Judd, Charles L Kooperberg, Lewis H Kuller, Andrea Z LaCroix, Dorothy S Lane, Robert D Langer, Norman L Lasser, Cora E Lewis, Marian C Limacher, JoAnn E Manson, “Calcium plus vitamin D supplementation and the risk of colorectal cancer”, *New England Journal of Medicine* 354 (7), 684-696, 2006
- [39]. Erik JM Konings, R Alexandra Goldbohm, Henny AM Brants, Wim HM Saris, Piet A van den Brandt, “Intake of dietary folate vitamers and risk of colorectal carcinoma: results from The Netherlands Cohort Study”, *Cancer* 95 (7), 1421-1433, 2002
- [40]. Edward Giovannucci, Meir J Stampfer, Graham A Colditz, David J Hunter, Charles Fuchs, Bernard A Rosner, Frank E Speizer, Walter C Willett, “Multivitamin use, folate, and colon cancer in women in the Nurses' Health Study”, *Annals of internal medicine* 129 (7), 517-524, 1998
- [41]. I Duris, D Hruby, B Pekarkova, M Huorka, E Cernakova, T Bezayova, P Ondrejka, “Calcium chemoprevention in colorectal cancer”, *Hepato-gastroenterology* 43 (7), 152-154, 1996
- [42]. Kana Wu, Walter C Willett, Charles S Fuchs, Graham A Colditz, Edward L Giovannucci, “Calcium intake and risk of colon cancer in women and men”, *Journal of the national cancer institute* 94 (6), 437-446, 2002
- [43]. Cedric Garland, Elizabeth Barrett-Connor, ArthurH Rossof, RichardB Shekelle, MichaelH Criqui, Oglesby Paul, “Dietary vitamin D and calcium and risk of colorectal cancer: a 19-year prospective study in men”, *The Lancet* 325 (8424), 307-309, 1985
- [44]. David ZJ Chu, Kari Chansky, David S Alberts, Frank L Meyskens, Cecilia M Fenoglio-Preiser, Saul E Rivkin, Glenn M Mills, Jeffrey K Giguere, Gary E Goodman, James L Abbruzzese, Scott M Lippman, “Adenoma recurrences after resection of colorectal carcinoma: results from the Southwest Oncology Group 9041 calcium chemoprevention pilot study”, *Annals of surgical oncology* 10 (8), 870-875, 2003
- [45]. Kana Wu, Walter C Willett, Charles S Fuchs, Graham A Colditz, Edward L Giovannucci, “Calcium intake and risk of colon cancer in women and men”, *Journal of the national cancer institute* 94 (6), 437-446, 2002
- [46]. Petra A Wark, R Gruber, E Schneider-Gädicke, G Schlimok, J Witte, R Raab, R Pichlmayr, Heinz Pichlmaier, W Schmiegel, P Buggisch, K Höffken, H Hirche, Rudolf Pichimayr, Peter Buggisch, Jens Witte, German Cancer Aid 17-1A Study Group, “Randomised trial of monoclonal antibody for adjuvant therapy of resected Dukes' C colorectal carcinoma”, *The Lancet* 343 (8907), 1177-1183, 1994
- [47]. Petra A Wark, Rosa Lau, Teresa Norat, Ellen Kampman, “Magnesium intake and colorectal tumor risk: a case-control study

- and meta-analysis”, *The American Journal of Clinical Nutrition* 96 (3), 622-631, 2012
- [48]. Enbo Ma, Shizuka Sasazuki, Manami Inoue, Motoki Iwasaki, Norie Sawada, Ribeka Takachi, Shoichiro Tsugane, Japan Public Health Center-based Prospective Study Group, “High dietary intake of magnesium may decrease risk of colorectal cancer in Japanese men”, *The Journal of nutrition* 140 (4), 779-785, 2010
- [49]. Louise E McGreavey, Faye Turner, Gillian Smith, Katherine Boylan, D Timothy Bishop, David Forman, C Roland Wolf, Jennifer H Barrett, Colorectal Cancer Study Group, “No evidence that polymorphisms in CYP2C8, CYP2C9, UGT1A6, PPAR δ and PPAR γ act as modifiers of the protective effect of regular NSAID use on the risk of colorectal carcinoma”, *Pharmacogenetics and genomics* 15 (10), 713-721, 2005
- [50]. Farhat VN Din, Evropi Theodoratou, Susan M Farrington, Albert Tenesa, Rebecca A Barnetson, Roseanne Cetnarskyj, Lesley Stark, Mary E Porteous, Harry Campbell, Malcolm G Dunlop, “Effect of aspirin and NSAIDs on risk and survival from colorectal cancer”, *Gut* 59 (12), 1670-1679, 2010
- [51]. Kate Jolly, Kar K Cheng, Michael JS Langman, “NSAIDs and gastrointestinal cancer prevention”, *Drugs* 62 (6), 945-956, 2002
- [52]. Luis A García Rodríguez, Consuelo Huerta-Alvarez, “Reduced risk of colorectal cancer among long-term users of aspirin and nonaspirin nonsteroidal antiinflammatory drugs”, *Epidemiology*, 88-93, 2001
- [53]. Elizabeth H Ruder, Adeyinka O Laiyemo, Barry I Graubard, Albert R Hollenbeck, Arthur Schatzkin, Amanda J Cross, “Non-steroidal anti-inflammatory drugs and colorectal cancer risk in a large, prospective cohort”, *The American journal of gastroenterology* 106 (7), 1340, 2011
- [54]. Nicole Hebert-Croteau, “A meta-analysis of hormone replacement therapy and colon cancer in women”, *Cancer Epidemiology and Prevention Biomarkers* 7 (8), 653-659, 1998
- [55]. Jill R Johnson, James V Lacey, DeAnn Lazovich, Melissa A Geller, Catherine Schairer, Arthur Schatzkin, Andrew Flood, “Menopausal hormone therapy and risk of colorectal cancer”, *Cancer Epidemiology and Prevention Biomarkers* 18 (1), 196-203, 2009
- [56]. Kavita Nanda, Lori A Bastian, Vic Hasselblad, David L Simel, “Hormone replacement therapy and the risk of colorectal cancer: a meta-analysis”, *Obstetrics & Gynecology* 93 (5), 880-888, 1999
- [57]. Heidi D Nelson, Linda L Humphrey, Peggy Nygren, Steven M Teutsch, Janet D Allan, “Postmenopausal hormone replacement therapy: scientific review”, *Jama* 288 (7), 872-881, 2002
- [58]. Gad Rennert, Hedy S Rennert, Mila Pinchev, Ofer Lavie, Stephen B Gruber, “Use of hormone replacement therapy and the risk of colorectal cancer”, *Journal of clinical oncology* 27 (27), 4542, 2009
- [59]. Hill, Chris D Bajdik, Andrew J Coldman, Shirley Fincham, David I McLean, William J Threlfall, “Sunlight exposure, pigmentation factors, and risk of nonmelanocytic skin cancer: II. Squamous cell carcinoma”, *Archives of dermatology* 131 (2), 164-169, 1995
- [60]. Cedric F Garland, Frank C Garland, “Do sunlight and vitamin D reduce the likelihood of colon cancer?”, *International journal of epidemiology* 9 (3), 227-231, 1980
- [61]. Han van der Rhee, Jan Willem Coebergh, Esther de Vries, “Sunlight, vitamin D and the prevention of cancer: a systematic review of epidemiological studies”, *European journal of cancer prevention* 18 (6), 458-475, 2009
- [62]. DM Freedman, M Dosemeci, K McGlynn, “Sunlight and mortality from breast, ovarian, colon, prostate, and non-melanoma skin cancer: a composite death certificate based case-control study”, *Occupational and Environmental Medicine* 59 (4), 257-262, 2002
- [63]. Michael F Holick, “Vitamin D and sunlight: strategies for cancer prevention and other health benefits”, *Clinical Journal of the American Society of Nephrology* 3 (5), 1548-1554, 2008



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