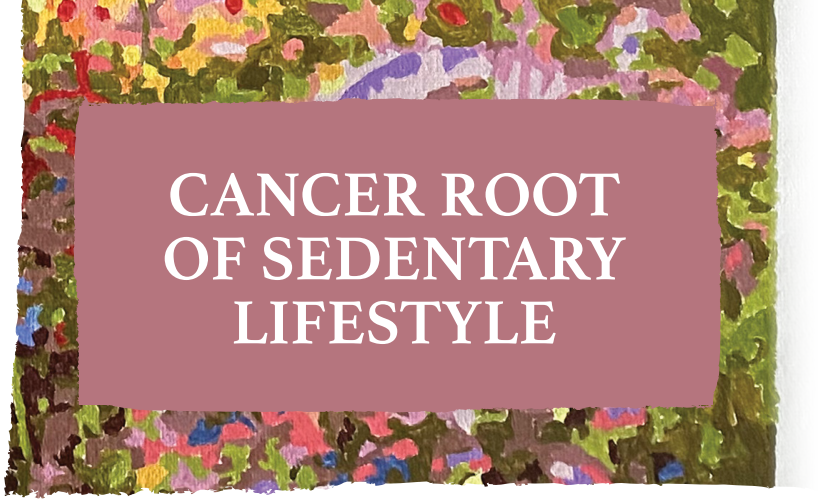
Healing Cancer at the Root
HYPERION
Functional Medicine



CANCER ROOT OF SEDENTARY LIFESTYLE

According to the Sedentary Behavior Research Network, behaviors identified as sedentary include activities that do not increase energy levels substantially above the resting level. Daily activities like sleeping, sitting, lying down, and watching television, and other forms of screen-based entertainment are in this category[1]. Many of us sit for hours scrolling through the internet, texting, and playing games on our phones. Many also sit for hours at their jobs.

Sedentary behavior has been shown to increase the risk of colon, endometrial, and lung cancers. Another risk cancer risk factor, obesity, has been established as a risk factor for 13 different types of cancer:

- Endometrial
- Postmenopausal Breast Cancer
- Colorectal
- Esophageal
- Kidney
- Meningioma
- Pancreatic
- Gastric
- Liver
- Multiple Myeloma
- Ovarian
- Gallbladder
- Thyroid Cancer

There is strong evidence that physical activity reduces the risk for bladder, breast, colon, endometrial, esophageal, and gastric cancers. In addition, there is moderate evidence that higher levels of physical activity decrease the occurrence of renal, ovarian, pancreatic, and lung cancers. Sedentary behavior, and obesity are related to cancer incidence because of increasing insulin sensitivity, leading to metabolic syndrome and chronic inflammation[2].

Research has shown bed rest altered more than 4500 genes and down regulated 34 pathways associated with mitochondrial function. This research also revealed that physical activity restores major losses in mitochondrial genetic expression in a relatively short period of time. Bed rest changed gene expression of several insulin resistance and diabetes genes[3]. In some cases, for patients who are bedridden, assisted movements increasing oxygenation could be helpful.

© 2024 Hyperion Functional Medicine, LLC. All Rights Reserved.

Insulin and insulin-like growth factor are endocrine hormones with important roles in glucose metabolism, and lead to cancer cell proliferation, cancer cell ability to avoid death, and blood vessel formation of tumors. Overstimulation of insulin and insulin -like growth factor biomarkers and their signaling pathways have been associated with increased risk of malignancies. It is well established that excess body fat, particularly abdominal fat, is positively correlated with insulin resistance. When there are consistently high levels of blood glucose, excess insulin is secreted from the pancreas and commonly results in hyperinsulinemia increasing promotion of tumor growth[4].

An estimated 30–40% of cancers can be prevented through changes in lifestyle and environmental risk factors associated with cancer incidence. These risk factors can be changed, and because of the considerable potential to reduce the global burden of cancer through interventions targeting these risk factors associated with a sedentary lifestyle, patients need to be made aware of what they can do. Despite this knowledge that has been made available, there remains limited awareness that these associations exist. They are rarely reviewed by oncology treatment teams with patients.

Oxygen and cancer. Sedentary lifestyles lead to decreased oxygenation in the body. Studies have found oxygen starvation enhances cancer's metastatic capability. Research is showing regular and moderate to vigorous aerobic physical activity is related to a reduced risk for various forms of cancer. Exercise is associated with changes in fitness, body composition, and physical functioning as well as patient-reported outcomes such as levels of fatigue, and quality of sleep. Emerging evidence indicates that exercise may also be directly linked to the control of cancer tumors[5]. Exercise has an impact on all the major cancer hallmarks looking at breast cancer in a 2023 review. An active and healthy lifestyle including physical exercise following diagnosis and during therapy contributes to decrease cancer severity and reduced expression of tumor markers[6]. In 2019, researcher was conducted at Johns Hopkins Kimmel Cancer Center, it was found that tumor cells exposed to low oxygen levels are more likely to invade and survive in the bloodstream. These cells are also four times more likely to become viable circulating tumor cells, which can metastasize[7]. Cancer patients need to keep in mind, many types of cancer cells tend to become more aggressive as they adapt to low oxygen levels.

Giving patients the tools they can use to modify these risk factors is key to healing cancers and chronic disease.

Knowing the strong risks associated for cancer with these modifiable factors, in Hyperion Functional Medicine functional oncology program, these three cancer drivers are addressed for all cancer patients.

1. **Inflammation** which arises from many sources, when developing from a sedentary lifestyle, drives cancer cell production and growth. Fatty or adipose tissue is a metabolic organ that secretes an array of signaling molecules that increase inflammation and stimulate cancer cells.
2. **Hyperinsulinemia and Insulin resistance**, because of sedentary lifestyle and in many cases the resulting obesity, drive cancer cell production and growth. ***Hyperion Functional Medicine orders detailed lab testing for all cancer patients to identify and treat insulin resistance, hyperinsulinemia, resulting metabolic syndrome, and inflammation.***
3. **Exercise and oxygenation**. Engaging in endurance and resistance exercises, as well as maintaining an active lifestyle, can improve the functioning of mitochondria and has been shown to the risk of cancer[8]. Metabolic dysfunction plays a role in many types of cancers. Disruption of glucose metabolism is associated with higher cancer recurrence rates and reduced survival. Health benefits from exercise during and after cancer treatment improve survival .

In cancer, the term "mitochondrial dysfunction" refers to mitochondrial impairment leading to abnormal metabolic reprogramming of cellular energy functions characterized by accelerated glucose uptake and lactate production. It was discovered by the Nobel Laureate Otto Warburg one hundred years ago .

© 2024 Hyperion Functional Medicine, LLC. All Rights Reserved.



Physical activity can help improve mitochondrial function and lower the risk of cancer growth and proliferation. Tumor cells in cancer are assisted by mitochondria that have been damaged leading to reprogramming of their functions. This reprogramming increases energy needed for cancer cells survival by switching to a specialized form of metabolism known as the "Warburg Effect" for growing the tumor. These results of reprogramming favor tumor progression, blood vessel growth for the tumor, and suppression of the immune system.

What is important for patients to think about, if you have these risk factors, and you are under treatment for your cancer with radiation, chemotherapy, immunotherapy, or other targeted treatments, how well will any treatment plan for your type of cancer work to decrease cancer growth or cure your cancer if you don't address underlying cancer roots?

A patient centered exercise and nutrition plan targeting weight loss, if needed, is a part of all Hyperion Functional Medicine cancer treatment protocols.

Sedentary lifestyle and the associated cancer risks identified for specific cancers can be reviewed under this tab for the following cancer types: Breast cancer, colon cancer, ovarian cancer, bladder cancer, and endometrial cancer.

CANCER ROOTS
Collaborating for a Cure

In partnership with healingstrong

1 Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, Chastin SFM, Altenburg TM, Chinapaw MJM; SBRN Terminology Consensus Project Participants. Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome. Int J Behav Nutr Phys Act. 2017 Jun 10;14(1):75. doi: 10.1186/s12966-017-0525-8. PMID: 28599680; PMCID: PMC5466781.
2 Friedenreich CM, Ryder-Burbidge C, McNeil J. Physical activity, obesity and sedentary behavior in cancer etiology: epidemiologic evidence and biologic mechanisms. Mol Oncol. 2021 Mar;15(3):790-800. doi: 10.1002/1878-0261.12772. Epub 2020 Aug 18. PMID: 32741068; PMCID: PMC7931121.
3 Alibegovic AC, Sonne MP, Højbjerre L, Bork-Jensen J, Jacobsen S, Nilsson E, Faerch K, Hiscock N, Mortensen B, Friedrichsen M, Stallknecht B, Dela F, Vaag A. Insulin resistance induced by physical inactivity is associated with multiple transcriptional changes in skeletal muscle in young men. Am J Physiol Endocrinol Metab. 2010 Nov;299(5):E752-63. doi: 10.1152/ajpendo.00590.2009. Epub 2010 Aug 24. PMID: 20739510.
4 Friedenreich CM, Ryder-Burbidge C, McNeil J. Physical activity, obesity and sedentary behavior in cancer etiology: epidemiologic evidence and biologic mechanisms. Mol Oncol. 2021 Mar;15(3):790-800. doi: 10.1002/1878-0261.12772. Epub 2020 Aug 18. PMID: 32741068; PMCID: PMC7931121.
5 Hofmann P. Cancer and Exercise: Warburg Hypothesis, Tumour Metabolism and High-Intensity Anaerobic Exercise. Sports (Basel). 2018 Jan 31;6(1):10. doi: 10.3390/sports6010010. PMID: 29910314; PMCID: PMC5969185.
6 García-Chico C, López-Ortiz S, Peñín-Grandes S, Pinto-Fraga J, Valenzuela PL, Emanuele E, Ceci C, Graziani G, Fiuza-Luces C, Lista S, Lucia A, Santos-Lozano A. Physical Exercise and the Hallmarks of Breast Cancer: A Narrative Review. Cancers (Basel). 2023 Jan 3;15(1):324. doi: 10.3390/cancers15010324. PMID: 36612320; PMCID: PMC9818971.
7 DiGiacomo JW, Gilkes DM. Tumor Hypoxia As an Enhancer of Inflammation-Mediated Metastasis: Emerging Therapeutic Strategies. Target Oncol. 2018 Apr;13(2):157-173. doi: 10.1007/s11523-018-0555-4. PMID: 29423593.
8 Clemente-Suárez VJ, Martín-Rodríguez A, Redondo-Flórez L, Ruisoto P, Navarro-Jiménez E, Ramos-Campo DJ, Tornero-Aguilera JF. Metabolic Health, Mitochondrial Fitness, Physical Activity, and Cancer. Cancers (Basel). 2023 Jan 28;15(3):814. doi: 10.3390/cancers15030814. PMID: 36765772; PMCID: PMC9913323\.
9 Raun SH, Buch-Larsen K, Schwarz P, Sylow L. Exercise-A Panacea of Metabolic Dysregulation in Cancer: Physiological and Molecular Insights. Int J Mol Sci. 2021 Mar 27;22(7):3469. doi: 10.3390/ijms22073469. PMID: 33801684; PMCID: PMC8037630.
10 Warburg, O., Minami, S. Versuche an Überlebendem Carcinom-gewebe. Klin Wochenschr 2, 776–777 (1923). https://doi.org/10.1007/BF01712130