Colon Cancer Reversed by Phyto-Nutritional Therapy: A Case Study

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Abstract: Colorectal cancer is the second most common cancer in Malaysia and up to 80% of its patients seek complementary therapies. Globally, up to 95% of cancer patient use adjunct therapies to reduce chemotherapy-induced side-effects. Morgan *et al*. (2004) had showed that conventional treatment for colon cancer produced minimal results. The vast majority of cancer survivors admitted to using dietary supplements and herbs after their cancer diagnosis. Current treatment seems to pay more attention to cancer as a disease rather than meeting the physiological needs of the patient. Nutritional therapy should be individually tailored since dietary deficiency is multifactorial and the tumor burden for each patient is different. Cancer is a metabolic disorder and colon cancer is strongly associated with advancing age, dietary and lifestyle habits. Up to 90% of all cancers might be prevented with proper nutrition since one-third of overall cancer deaths are linked to malnutrition. This case study shows how a late stage colon adenocarcinoma might be completely reversed by evidence-based phyto-nutritional therapy combined with some lifestyle modifications. The cancer apoptotic properties of this natural protocol warrant further investigation involving a higher number of patients with similar conditions.

Keywords: Colon cancer, metabolic disorder, complementary medicine, phyto-nutritional therapy, apoptosis.

CASE PRESENTATION

Alice W, age 44 and single, worked as an accounts executive in a printing company. With recommendation from a friend, she called at DSY Wellness Center to learn more about non-invasive therapy after she was diagnosed two weeks' earlier at a leading private hospital as suffering from stage III colon adenocarcinoma. She was against the idea of having her tumor surgically removed and then to undertake chemotherapy to address malignant cells which might metastasize during such an operation. In addition, she did not wish to face the possibility of having to maintain for life a "toilet bag" outside of her lower abdomen should subsequent surgery fail to reattach her severed colon.

Four years' earlier she rejected a private hospital's advice to undergo a colonoscopic polypectomy to remove some of her inflamed adenomatous polyps. Besides ulcerative colitis diagnosed two years' ago and a history of early diabetes, there were no major symptoms at time of consultation. Bleeding stools were infrequent but constipation was a problem. The hospital's colonoscopy and biopsy reports confirmed the malignancy.

The patient was fond of having preserved or canned food, toasted bread or cereals, fruit jam, packaged fruit juices for her breakfast. Lunch would usually consist of Asian fast food with soft drink or sugary beverage. In between meals, she would have titbits with canned beverage or caffeinated drink. She enjoyed grilled meat, fish, or sausages, and deep-fried foods which she prepared for herself for most evenings. She admitted to having little or no daily fresh vegetables, fruits, nuts, beans, or seeds.

Despite several years' of medications, her diabetes remained poorly controlled. Her body mass index (BMI) of 30.8 would place her in the obese category. Consequently, a comprehensive ketogenic (low-carbohydrate/sugar) dietary cum lifestyle modification program was recommended as follow:

(a) Temporarily replacing red and processed meat with non-farmed poultry, meat and fish which are high in quality protein useful for treating late stage malignancy [1]. Both red and processed meat intakes could raise colorectal cancer risk by 20% [2], although the association with red meat appears to be stronger for rectal cancer [3]. Mutagens are often found in deep-fried, grilled food, food preservatives or colourings, and pesticide residuals in food.

(b) Avoiding grilling or cooking any meat or fish over open flame to reduce formation of heterocyclic amines (mutagenic compounds that damage cell deoxyribonucleic acid or DNA), which are formed from added sugar and from several chemicals found in meat including its amino acids and creatine [4].

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(c) Increasing intake of fiber-rich fresh organic vegetables and fruits, as well as bran cereals and legumes since these foods are known to reduce colon cancer risk [5]. Just 30 gram dietary fiber daily could reduce risk of developing colorectal cancer. Cruciferous vegetables are rich in cancer-fighting nutrients such as sulforaphane, indole-3-carbinol and glucosinolates which have been shown to promote apoptosis (programmed cell death) and to induce the expression of the tumor-suppression p53 gene *via* estrogen-independent action. Tomato contains lycopene which could prevent colon cancer too [6, 7].

(d) Eating foods rich in omega-3 fatty acids such as those from anchovy, deep-sea fish, and raw nuts since they can reduce risk of developing colon cancer [8]. Brazil nuts, for instance, contain as much as 190 micrograms (mcg) of the antioxidant selenium per 10 grams [9]. Dietary selenium deficiency is associated with an increased risk of fatal cancer [10].

(e) Including non-GMO (genetically modified organism) soy products such as protein isolate and tempeh in her diet. Epidermal growth factor (EGF)-induced proliferation of colon cancer cells plays an important role in colon cancer progression and is mediated by loss of tumor suppressor FOXO3 activity. Genistein (a compound of soy isolate) can inhibit EGF-induced proliferation, while favoring dephosphorylation and nuclear retention of FOXO3 in colon cancer cells [11]. The benefits of consuming soy foods against colorectal cancer may extend to more advanced age for women [12].

(f) Having generous servings of anthocyanin-rich organic fruits and berries since these might inhibit growth of colon cancer cells by some 50% in just a few days [13]. Naringenin (flavonoid found in citrus fruits and tomato) is also known to have anti-carcinogenic properties by strongly inhibiting proliferation of colon cancer cells. Myricetin from berries is a potent inhibitor of matrix metalloproteinases enzyme responsible partly for colon cell metastasis [14]. A higher dietary intake of fresh organic vegetables [15] and vitamin C from berries and fresh fruits reduces the risk of colon cancer [16].

(g) Avoiding refined starch, sugar, or honey and consuming moderate quantity of organic non-GMO whole grains, which are associated with a lower risk of colon cancer although not of rectal cancer [17].

(h) Adding generous amount of spices to cooking. Flavonoids in turmeric and onions could reduce both the size and number of precancerous lesions in intestinal tract. The number of colon polyps might drop 60 percent, and their average size might drop by 50 percent [18]. Dietary curcumin such as from curry powders is known to suppress colon tumor volume by more than 50% compared to diet without this flavonoid [19]. Ginger contains highly active flavonoid gingerol-6, which could induce apoptosis and inhibit metastasis [20]. Diosgenin from fenugreek seeds may induce apoptosis *via* caspase-3 [21].

(i) Having regular yellow or green tea as beverage since its polyphenols could prevent the development of tumors by blocking angiogenesis (growth of new blood vessels) [22]. In addition, tea polyphenols are able to scavenge highly reactive hydroxyl radicals and are effective against peroxide-induced mitochondrial damage or radiation induced DNA damage implicated in various types of carcinogenesis (cancer creation) [23].

(j) Eating raw or lightly cooked garlic might decrease risk of colorectal cancer by 30% [15]. Studies suggest that adding garlic to diet could help prevent several types of cancer, particularly colon cancer [24, 25]. Even aged garlic could reduce risk of colon cancer [26].

The lifestyle modifications recommended included 30-minute physical exercise daily before evening meal such as walking, swimming, jogging, or similarly light aerobic workout since low physical activity is a risk factor for colon cancer [27].

The following herbal extracts and nutraceuticals were prescribed to be taken after meal:

(1) **Curcumin** (standardized to 90% with 5% black pepper oil): 2 grams (g) three times a day (TID). A daily dose of just 3.6g of curcumin (principal curcuminoid in curcuma loga) could achieve pharmacologically efficacious levels in the colorectum with negligible distribution of curcumin outside the gut [28]. There seems to be

no dose-limiting toxicity at doses up to 10 g/day [29]. Curcumin can inhibit cancer at its initiation, promotion and progression stages of development [30]. It is a COX2-inhibitor with both anti-inflammatory and antioxidant properties. It is able to positively affect gene transcription and to induce apoptosis [31]. Curcumin-induced apoptosis is mediated through activation of caspase-3 whereas its inhibition of carcinogenesis may be mediated through inhibition of angiogenesis [32].

(2) **Annona muricata:** 5g of powdered leaf and seed extracts TID. Compounds in this tropical fruit tree are selectively cytotoxic to colon adenocarcinoma cells [33]. Studies showed its annocherimolin had cytotoxic potencies much higher than those of adriamycin (chemotherapy drug) against colon (HT-29) cancer cell lines [33, 34], whereas its acetogenins could have significant cytotoxicities against colon adenocarcinoma cell lines [35].

(3) **Artemisinin**: 500mg TID, which was the dosage used in accordance with World Health Organisation recommendations based on the patient's body weight [36]. Studies showed this extract from Artemisia annua L. to be highly effective against colon cancer [37, 38] with its triterpene and sesquiterpene capable of destroying colon cancer cells [39]. The herb's effectiveness seems comparable to other standard chemotherapy drugs used to combat cancer, but it has the distinct advantage of very low toxicity [40, 41] and with several hundred years of continuous use in traditional Chinese medicine [42]. Artemisia is recognized in United States as a food item [43] and many Orientals add this herb to brew tea or to make a soup. Most cancer cells aggressively accumulate iron for their proliferation. Artemisinin reacts with iron within these malignant cells to destroy them, but normal cells unsaturated with iron remain virtually unharmed by this flavonoid [44-46]. It is this combination of iron (ferritin) and artemisinin that is known to be effective against malignant cells [47-49].

(4) **Resveratrol** (standardized to 40%**):** 500mg TID. This nutrient helps to suppress colon cancer cell proliferation and to enhance apoptosis even in the presence of the hormone IGF-1 *via* suppression of IGF-1R/Akt/Wnt signaling pathways and activation of p53 [50]. The combination of curcumin and resveratrol could inhibit growth of p53-positive and p53-negative colon cancer HCT-116 cells [51]. Being oil-soluble, resveratrol offers a protection against lipid peroxidation in cell membranes and DNA damage caused by reactive oxygen species (ROS) [52].

(5) **Selenium yeast:** 250 mg TID (equivalent to elemental selenomethionine 300mcg). This mineral may offer 50% reduction in cancer death [53] and it decreases incidence of colon cancer by some 50% [54]. Just 200 mcg of selenium is able to lower the risk of developing colorectal cancer [55].

(6) **Anchovy fish oil extract (EPA500/DHA200)**: 2g TID. These omega-3 fatty acids reverse inflammation and cachexia by inhibiting lipid mobilizing factor (LMF) produced by tumors, which then causes direct breakdown of adipose (fat) tissues [56]. Eicosapentaenoic acid (EPA) in fish oil is a LMF inhibitor. Anchovy oil seemed to have the lowest level of toxicity amongst all fish oils tested at the Center and there was no evidence of significant blood-thinning effect observed in this patent at this dosage.

As a preventive measure, the patient was also advised to take these nutrients after meal:

(a) ***Folate***: 1mg TID. Low blood levels of folate increases risk of colon and other cancers [57]. Studies suggest that folate deficiency predisposes individuals toward developing cancer of the colon [58, 59]. It may also reduce the risk of recurrent polyps [60].

(b) ***Calcium carbonate:*** 1g TID. Several studies found calcium supplementation reduced risk of colon cancer [61-65]. Its benefits may continue for some years after supplementation has stopped [66].

(c) ***Magnesium citrate***: 1g TID equivalent to 450mg of elemental magnesium. Low magnesium intake has been linked to increased risk for colorectal cancer [67]. This mineral is helpful in treating diabetes since it is a component of the hormone insulin.

(d) ***Mixed tocopherols***: 200mg TID. Although studies are mixed, but overall they suggest that

high intake of vitamin E is associated with reduced risk of colon cancer [68-71].

(e) ***Vitamin D3***: 4000iu TID. Several epidemiological studies reported higher risk of colon cancer in individuals having low intake of vitamin D [72-75]. However, one study found no association when carried out on patients living in sunny climates [76] where they already had adequate vitamin D synthesis through sunlight exposure.

The patient was advised to continue with her 80mg aspirin prescribed by her regular physician for blood thinning since this non-steroid anti-inflammatory drug (NSAID) could also work to block enzyme cyclooxygenase2 (COX-2), which promotes inflammation and cell division. Tumors make an abundance of COX-2 and low-dose NSAID has a moderate chemo-preventive effect on adenomas in the colon [77] and could reduce the risk of fatal colon cancer [78]. However, prolong aspirin use is associated with a dose-related increase in incidence of gastrointestinal complications [79] and hemorrhagic stroke [80].

CAUSES AND PATHOLOGICAL ISSUES

Colorectal (bowel) cancer - the third most common cause of cancer death around the globe – originates from epithelial cells carrying mutated APC (adenomatous polyposis coli) gene lining the colon or rectum of gastrointestinal tract [81]. It is the second most frequent cancers for both sexes in Malaysia [82]. Between 75 and 95% of colon cancer occurs in people with little or no genetic risk [27, 83] and none of this patient's siblings had ever been diagnosed with this condition.

Although research studies show a significant link between the gene TGFBR1 (transforming growth factor beta receptor type 1 gene polymorphisms) and colon cancer [84, 85], this genetic test was unavailable.

Besides constipation with occasional blood in her stools and unexplained fatigue, the patient experienced no major symptoms. While rectal bleeding or anemia are high-risk features [86], the classic warning signs include worsening constipation, bloody stool, weight loss, loss of appetite and even nausea or vomiting in some cases.

Most colorectal cancer occurs due to lifestyle and advancing age. Indeed, it is being known for decades that up to 90% of most cancers could be prevented with proper nutrition [87]. However, most nutritionist and dietician are not trained to offer advice on or to administer nutritional therapy to cancer patients. At least one-third of overall cancer deaths are linked to malnutrition [88] and infection both of which are preventable by properly targeted nutritional therapy.

People with inflammatory bowel disease such as ulcerative colitis or Crohn's disease are at increased risk of colon cancer [89]. Studies also found diabetes to be associated with an increased risk of colorectal cancer [90].

The patient's anaerobic gut bacterium Enterococcus faecalis was not tested for although this might play a role in the pathology of colon cancer [91] since its toxins can effect DNA mutations.

Adequate vitamin D in the diet can help prevent colon cancer [92]. Consequently, a person's blood level for calcidiol [25(OH)D] is a useful marker to test. If levels are between 33 and 41 ng/mL, patient may be five times less likely to develop colon cancer [93]. Not surprisingly, death from colon cancer is less likely in those who lived in sunny regions of the world [94]. The patient in question had been avoiding the sun for years for fear of developing accelerated skin aging. Individuals with circulating serum 25(OH)D levels below 30 ng/mL may double the risk of colon cancer compared to those with higher levels [93, 95-97] and much higher cancer incidence for those with levels lower than 20 ng/mL [98]. The 25(OH)D levels are associated with risk of colon cancer during both its early and late stages [93, 99] suggesting that vitamin D metabolites may have effects at all stages of carcinogenesis [100, 101].

While cancer stage may be a major determinant of the patient's quality of life, the impact of nutritional deterioration combined with deficiencies in nutritional intake may be more important than the stage of the disease process [102].

Conventional cancer treatment may not extend much the average survival of patients and there seems to be no significant improvement in treatment outcomes or reduction in absolute – rather than relative- risks since 1980s [103].

DIAGNOSIS

The patient's localized bowel cancer was diagnosed through colonoscopy - which is commonly used for screening and surveillance of colorectal neoplasia [104]

Table 1: Extracts from Patient's Blood Test Results for the First Four Month of 2012

	March	April	May	June	July
25(OH)D (>30 ng/mL)	18	27	46	56	61
CA 19-9 (<35U/ml)	393	311	224	98	54
CEA (<5ng/ml)	20.6	11.2	7.6	3.1	2.9
HbA1c (<5.1%)	9.3	8.7	8.3	7.8	7.2
Fasting insulin (2-25uIU/ml)	84.5	66.3	55.8	48.3	40.8
Fasting glucose (<115mg/dl)	215	168	145	102	93
Triglycerides (<200mg/dl)	404	358	272	208	187
Hs-CRP (<1.0mg/L)	16.9	14.4	10.8	5.4	3.5
Physical statistics:					
Skeletal muscle (%)	21.4	22.7	23.6	25.3	25.8
Total body water (>55%)	42.7	44.2	46.6	47.4	49.1
Total body fat (<25%)	38.1	36.4	32.5	30.3	26.7
BMI (21-24)	30.8	28.4	27.3	26.2	25.7

– and a tissue biospy. Additionally, blood markers strongly suggested existence of malignancy. However, virtual colonoscopy (CT colonography) was not done since this procedure seemed less effective in detecting small lesions than traditional colonoscopy besides carrying a radiation risk. Radiation exposure causes approximately 3% of all cancers since this method creates the very reactive hydroxyl radical (ROS) widely implicated in cellular mutations. The less invasive sigmoidoscopy, pill camera, and the annual fecal immunochemical blood test might not offer the same levels of accuracy as colonoscopy. Although removing adenomatous polyps of the colon and rectum through colonoscopic polypectomy could result in a lower incidence of colorectal cancer [105], this invasive procedure was rejected by the patient some years' ago.

CONCLUSION

Although the test for Colon Cancer Specific Antigen-2 was unavailable, biopsy report in July from a leading local hospital confirmed the disappearance of the patient's malignancy with a substantial regression for her colon tumor size. Table **1** test results strongly suggested that a well-targeted phyto-nutritional therapy was effective against colon cancer especially in its less advanced stage and the overall outcome achieved warrant further investigation involving higher number of patients with similar conditions.

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