

Title: Drivers of Dietary Choice Following a Diagnosis of Colorectal Cancer: A Qualitative Study

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1 **Research Snapshot**

2 Research Question:

3 What drives dietary choice in patients being treated for colorectal cancer?

4

5 Key Findings:

6 A qualitative content analysis of semi-structured interviews with patients experiencing colorectal

7 cancer found four themes emerged inductively as primary drivers of dietary decisions: (1)

8 Medical Influences: eating to live; (2) Health Beliefs: connecting lived experiences with new

9 realities; (3) Static Diets: no changes post-diagnosis; and (4) Navigating External Influences:

10 confluence of personal agency and social constraints. Findings showed that dietary choices

11 varied based on perspectives, beliefs, and experiences dealing with the physical ramifications of

12 cancer and cancer treatment.

13 **Abstract**

14 Title: Drivers of Dietary Choice Following a Diagnosis of Colorectal Cancer: A Qualitative  
15 Study

16 Background: Dietary changes often accompany management of a cancer diagnosis but how and  
17 why patients with colorectal cancer (CRC) make dietary decisions requires further investigation.

18 Objective: To learn about patients' food-related beliefs and understand if and why dietary  
19 changes were made by patients starting chemotherapy following a CRC diagnosis.

20 Design: A qualitative semi-structured interview study was conducted as a secondary analysis  
21 among a subset of patients with stages II-IV CRC enrolled at baseline in a randomized controlled  
22 trial.

23 Participants/setting: Twenty-nine patients participated in the interview. Data was collected at the  
24 University of Alberta (Edmonton, Alberta, Canada) from 2016-2019 prior to any trial  
25 intervention.

26 Qualitative data analysis: Audio-recorded interviews were transcribed verbatim then coded  
27 inductively by two research team members. Qualitative content analysis was applied to capture  
28 emergent themes.

29 Results: Patients reported varied degrees of dietary change that stemmed from internal and  
30 external influences. Four main themes emerged to describe patients' dietary decisions after a  
31 CRC diagnosis: (1) Medical Influences: eating to live; (2) Health Beliefs: connecting lived  
32 experiences with new realities; (3) Static Diets: no changes post-diagnosis; and (4) Navigating  
33 External Influences: confluence of personal agency and social constraints.

34 Conclusion: The extent to which patients altered their dietary choices depended on perspectives  
35 and beliefs. These included the degree to which dietary decisions provided some agency (i.e.,

36 feeling of control) for dealing with physical ramifications of cancer treatment, individuals'  
37 personal understandings of healthy foods, and the role of diet in managing their new physical  
38 reality post–diagnosis. This information provides registered dietitian nutritionists and healthcare  
39 providers with insight into dietary intentions of select patients being treated for CRC. These  
40 findings can guide future research focused on effective strategies for streamlined nutritional  
41 support that aligns with patient needs.

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43

#### 44 **INTRODUCTION**

45 Cancer is the leading cause of premature death in the Western World<sup>1</sup>. In 2020, colorectal cancer  
46 (CRC) was the second cause of cancer-related deaths and the third most diagnosed cancer  
47 globally<sup>2</sup>. As a gastrointestinal cancer, linkages between diet and CRC (e.g., association between  
48 dietary intake and risk of disease<sup>3</sup>) are recognized. Lifestyle modifications including dietary  
49 changes are often initiated after a cancer diagnosis<sup>4</sup>.

50

51 People with cancer value the importance of optimal health and view nutrition as a key  
52 contributor<sup>5,6</sup>. An Italian study found that patients with cancer (n=1257) were attentive to  
53 nutrition throughout their treatment, and more than half made positive dietary changes<sup>6</sup>. Patients  
54 are motivated and seek nutrition information to guide food choices<sup>4,7</sup>. Common sources of  
55 nutrition information include physicians, family/friends, and mass media<sup>7,8</sup>. Notably, about one  
56 third of social media articles on cancer contain misinformation<sup>9</sup>. Patients thus receive conflicting  
57 information and have misconceptions regarding optimal nutrition<sup>10</sup>.

58

59 Self-guided dietary changes may not align with oncology nutrition guidelines<sup>11</sup>. For example,  
60 patients with cancer report decreasing or eliminating meat and/or dairy products. This change  
61 can result in decreased protein intake which is contrary to oncology nutrition guidelines that  
62 suggest increased protein intake during cancer treatment<sup>11</sup>. Decreasing or eliminating intake of  
63 animal products results in decreased protein quantity and quality as animal-based foods are  
64 sources of high-quality proteins and are important for people with cancer, especially for muscle

65 health<sup>11, 12</sup>. A systematic review of post-diagnosis dietary intake and cancer outcomes found that  
66 certain dietary patterns (i.e., Western diet) are associated with disease progression and recurrence  
67 but that specific food categories (i.e., meat, dairy products) were not associated with disease  
68 progression and should not be eliminated<sup>13</sup>.

69  
70 Dietary changes that occur after a cancer diagnosis are not well-characterized, especially among  
71 patients with CRC<sup>14</sup>. Most research on dietary change has been described quantitatively<sup>6, 14-17</sup>; to  
72 our knowledge, there is a paucity of qualitative analyses that describe the impact of cancer on  
73 food intake from the patients' perspective and further explore the phenomena affecting post-  
74 diagnosis dietary choices<sup>18-20</sup>. To date, most of the literature in this area has focused specifically  
75 on the impact of chemosensory alterations on food behaviour<sup>21</sup>. Thus, this study sought to learn  
76 about patients' food-related beliefs following a CRC diagnosis and ultimately understand if  
77 dietary changes were made by patients and their reasons for altering, or not, their diet.

78

## 79 **METHODS**

### 80 **Study Design and Ethics**

81 This qualitative study took place from 2016-2019 and was a secondary baseline analysis among a  
82 subset of patients participating in a randomized controlled trial at the University of Alberta  
83 (Edmonton, Alberta, Canada)<sup>22</sup>. The primary objective of the trial was to inform the feasibility  
84 of utilizing a high protein versus a normal protein diet to halt muscle mass loss in patients being  
85 treated for CRC<sup>23</sup>. The trial protocol is described elsewhere<sup>23</sup>. No incentive was provided for  
86 patients who completed the semi-structured interview. A trained member of the study team  
87 obtained written informed consent from patients. The study was approved by the Health



88 Research Ethics Board of Alberta-Cancer Committee (HREBA.CC-15-0193) and complied with  
89 standards on the use of human participants in research. Reporting was guided by Consolidated  
90 Criteria for Reporting Qualitative Research (COREQ): a 32-item checklist for interviews and  
91 focus groups<sup>24</sup>.

## 92 **Participants**

93 Inclusion/exclusion criteria are fully described in the trial protocol<sup>23</sup>. Briefly, patients were 18-85  
94 years of age, were diagnosed with stages II-IV CRC within the past seven months, did not have  
95 cancer cachexia, and had started or were scheduled to start adjuvant chemotherapy within 14  
96 days of completing the semi-structured interview. Some patients had surgery (typically 6-8  
97 weeks prior) to remove the tumor and/or place an ostomy.

## 98 **Demographic and Clinical Characteristics**

99 Patient age and sex were obtained from electronic health records. A questionnaire was used to  
100 collect data on self-reported race and ethnicity, annual household income, and highest level of  
101 education completed. Body weight and height were measured during trial participation and body  
102 mass index was calculated. Clinical characteristics including type and stage of disease and  
103 presence of an ostomy were obtained from electronic health records. Quantitative data are  
104 presented as mean  $\pm$  standard deviation.

## 105 **Qualitative Data Collection**

106 The first 36 patients to complete baseline assessments in the trial<sup>22, 23</sup> were invited to participate  
107 in a one-on-one semi-structured interview to gain a better understanding of their food-related  
108 beliefs and understand if and why dietary changes were made following a CRC diagnosis. At that  
109 point, 29 interviews had been completed and data saturation was reached, thus participants were  
110 no longer offered the opportunity to complete the interview, which was not required for

111 participation in the trial. The trial from which patients were invited purposefully included  
112 patients with a range of demographic and clinical characteristics (e.g., age, sex, disease location  
113 and stage, presence of an ostomy) that are commonly observed in patients undergoing adjuvant  
114 treatment. Interviews were completed at the baseline study visit, prior to randomization and  
115 receiving any intervention (i.e., nutrition counselling) in the trial. Five patients received nutrition  
116 counselling (mostly related to an ostomy) at the cancer center prior to the interview although  
117 codes that emerged from their data did not differ from the larger patient cohort; thus, their data  
118 was considered in the analysis.

119

120 Interviews followed a semi-structured guide (**Table 1**) and took place in a private room at the  
121 University of Alberta where only the patient and interviewer were present. The interview guide  
122 was developed by study team members whereby open-ended questions and optional probing  
123 questions were informed by a review of the literature and clinical experience pertaining to food  
124 choice and nutrition-impact symptoms in the oncologic setting. An expert in qualitative research  
125 and an expert in dietary intake in chronic disease reviewed the interview guide. The interview  
126 guide was then pilot tested with the first two patients, whose data were included in the analysis  
127 since no major changes were subsequently made to the interview guide.

128

129 The first two interviews were conducted by an experienced qualitative researcher (■■■■) who  
130 trained another female member of the team (■■■■; present for all interviews) to conduct the  
131 remaining interviews. Training included readings<sup>25</sup> and observing the experienced researcher  
132 during the first two interviews. Patient interaction was limited to recruitment, scheduling of

133 visits, and baseline study assessments that occurred during the same encounter as the interview.

134 Using the same team member for these tasks ensured consistency in data collection methods.

135

136 Patients were informed that the audio-recorded interview would take approximately 45 minutes,

137 and the interviewer would be taking notes. Interviews lasted until the patient had the opportunity

138 to respond to all questions and offer any relevant thoughts that had not yet been captured. Audio

139 files were transcribed verbatim by third-party services. Transcribed files were verified for

140 accuracy by a member of the research team and personal field notes added to the end of each

141 transcript. Patients were not offered the opportunity to review the transcripts nor to provide

142 feedback on data analysis.

143

#### 144 **Qualitative Data Analysis**

145 Qualitative content analysis is a systematic method for analyzing and interpreting data in a way

146 that enables one to describe the meaning of the data<sup>26</sup>. Qualitative content analysis was employed

147 concurrently to data collection. To enable an in-depth description of the semi-structured

148 interview data, a data-driven coding frame was built inductively<sup>26</sup>. Two members of the study

149 team independently conducted line-by-line manual open coding at the word- and sentence-level

150 to identify relevant concepts. Codes emerged inductively and formed a master coding frame

151 based on congruent findings. Selective coding was used to structure concepts and group open

152 codes into key categories<sup>26</sup>. From this process, themes emerged inductively from the data. This

153 approach has been described by Hsieh and Shannon (2005) as conventional content analysis; an

154 approach that enables researchers to describe a phenomenon<sup>27</sup>. To ensure rigor and reliability of

155 our coding frame, the first five transcripts were double coded to discover and discuss differences.

156 Minimal differences emerged thus the master coding frame was used for constant comparison  
157 with new data (coding additional transcripts), as they became available. Theoretical saturation  
158 occurred after approximately 72% of transcripts were analyzed although all coded transcripts  
159 were included to ensure that perspectives of all patients contributed to informing emergent  
160 themes. Once theoretical saturation was achieved, no additional participants from the trial were  
161 invited to participate. Data were managed using Excel (Microsoft Corp, Redmond, WA) and are  
162 presented as themes. The team member who conducted the interviews reviewed the analysis to  
163 ensure the themes matched their understanding of the interviews and field notes.

164

## 165 **RESULTS**

166 Twenty-nine patients completed an interview at baseline and are included. Mean patient age was  
167  $57 \pm 10$  years and mean weight was  $80.4 \pm 18.5$  kg. Most were White (65.5%) males (62.1%)  
168 with stage<sup>28</sup> III (58.6%) colon (82.8%) cancer. Patient characteristics are shown in **Table 2**.

169 Drivers of dietary choices post-diagnosis were informed by four main emergent themes (**Figure**  
170 **1**): (1) medical influences; (2) health beliefs; (3) static diets; and (4) navigating external  
171 influences.

172

### 173 **Medical Influences: Eating to Live**

174 Medical procedures, treatments, side effects, and interaction with health professionals emerged  
175 as a major influence of dietary decisions following a CRC diagnosis. Patients described their  
176 food intake as being influenced by medical procedures and treatments that forced dietary change  
177 (e.g., prescribed a low fiber diet post-operatively). In other words, the pleasure of food had  
178 become a less influential driver of dietary choice than prior to diagnosis for many patients and

179 dietary decisions pivoted to focus on meeting nutritional needs. Participants described changes to  
180 their gastrointestinal tract and ability to digest foods as limiting factors that forced them to alter  
181 their typical intake. For example, *“I used to eat a lot of fried foods. Now [since diagnosis] it’s*  
182 *like, I can’t eat fried foods. I do, but it gives me gas and indigestion”* (Patient 108).

183

184 Following ostomy surgery, patients received varying dietary advice; some surgeons  
185 recommended a low fiber diet for six weeks while other patients were told to resume their  
186 regular diet in moderation and as tolerated. Patient 123 described how they handled receiving  
187 conflicting dietary advice from their medical team: *“the nurse gave me a little bit of conflicting*  
188 *advice when I was first discharged from the hospital, she thought I should be on a low fiber diet*  
189 *initially. But the surgeon said just eat what you want in moderation and small quantity, so that’s*  
190 *what I did.”*

191

192 Patients described the post-surgery dietary changes as limiting: *“I can’t eat a lot of foods right*  
193 *now. No seeds. No nuts. No roughage. Can’t eat lettuce”* (Patient 108). Other challenges that  
194 emerged following ostomy surgery were the inability to digest certain foods. Patient 109  
195 described what they experienced when consuming cooked vegetables:

196 *“I notice that as it comes out [from the ostomy], it still looks the same...broccoli still*  
197 *looks like broccoli to me. Carrots, unless it’s really finely mashed, still looks like carrots*  
198 *to me. Obviously, corn is always going to look like corn, but a lot of those vegetables like*  
199 *spinach and even lettuce, when it comes out, it doesn’t look like it’s being digested at*  
200 *all.”*

201

202 Patients with an ostomy routinely described their output as containing undigested food: “*I have*  
203 *craved a little bit of fresh vegetables – raw vegetables – so I’m starting to introduce them a little*  
204 *bit, but I notice that a lot of them go through my body, my body doesn’t digest them*” (Patient  
205 124). The health impact of dietary changes resulting from an altered gastrointestinal tract and/or  
206 ostomy were concerning for patients. Patient 117 summarized their discontent with the dietary  
207 changes that they had to make, saying:

208         *“It sucks because I used to eat brown rice and wild rice and things like that, and I have to*  
209 *eat white rice... I never used to eat white pasta. I stayed away from bad carbs, but now I*  
210 *have to add them in. I never used to drink Gatorade, but because of my output, I have to*  
211 *now, so I don’t get dehydrated and everything and the salts. I never used to use salt. Now*  
212 *I have to use a little bit of it...I would never touch white bread before. Now I have to have*  
213 *it... raw vegetables used to be my snack, and now I can’t have them.”*

214

215 In addition to physical changes to the gastrointestinal tract that resulted in food intolerances,  
216 nutrition-impact symptoms commonly observed with anti-cancer therapies, such as sensitivity to  
217 cold, forced patients to make dietary changes: “*I have to drink lots of water and drinking warm*  
218 *water is – I struggle, I can’t*” (Patient 122). Patient 114 described the feeling of cold-sensitivity  
219 and corresponding impact on food intake as:

220         *“I’m addicted to milk, but that’s something I cut down on quite a bit now because of the*  
221 *side effects of the IV chemo...cold liquids make my throat strain up. And the first day, it*  
222 *was almost painful. So now you’re faced with warming up your milk because I can drink*  
223 *it only when it’s warm, and warm milk tastes disgusting... We switched to chocolate milk,*  
224 *because I don’t mind hot chocolate.”*

225

226 Diarrhea is a known side-effect of chemotherapy agents (e.g., capecitabine, 5-fluorouracil) used  
227 to treat CRC. Some patients felt forced to alter their diet to control diarrhea. Patient 110  
228 described their attempt at regulating diarrhea through food intake: “*I got really bad diarrhea then*  
229 *... I had to lower the fat content just to make my digestive system happier, so you do what you*  
230 *have to.*” Similarly, patients with an ostomy described modifying their diet based on the  
231 consistency of their output: “*...trying to manage ... how to thicken it up, so I’d have a lot of*  
232 *peanut butter and banana sandwiches, things like that*” (Patient 117). Dairy was commonly  
233 avoided due to digestion and absorption challenges and diarrhea. Patient 121 described the  
234 impact that avoiding dairy had on themselves and their family: “*I didn’t have milk for most of the*  
235 *summer. Milk, ice-cream. The family would all go for ice-cream cones, and I would get a water.*”

236

237 Another approach to managing diarrhea that included dietary change was varying the volume of  
238 fluid and food that a person consumed: “*...adjusting how much I drank, how much I ate, to limit*  
239 *the amount of diarrhea that I had...*” (Patient 125). Overall, patients attempted to remedy several  
240 symptoms through diet. For example, Patient 114 explained: “*I actually found out that my*  
241 *nausea would go away if I would start eating*”. In addition to altering meal timing and frequency  
242 to manage gastrointestinal symptoms, this strategy was employed to remedy the feeling of early  
243 satiety.

244

245 The concept of eating for strength also emerged through a lack of appetite and the need to  
246 actively cue oneself to eat: “*... after surgery, you have no appetite or don’t feel like eating, but I*  
247 *would force myself to eat just so I’d get stronger*” (Patient 104). Patient 116 described this

248 concept simply as: *“I don’t even feel hungry, but I eat”*. Patient 114 described the shift in their  
249 mindset as *“I’ve generally been kind of casual with my eating habits, but when you get to health*  
250 *issues, you focus a little bit more on that kind of stuff”*.

251  
252 Another medical reason that motivated dietary change was an altered immune system induced by  
253 anti-cancer treatment. For example, Patient 115 avoided some favorite foods during  
254 chemotherapy: *“...over the last few years, I actually got interested in eating sushi and sashimi. I*  
255 *like that quite a bit, although currently I can’t have it...I’m on the chemo and because of the*  
256 *possibility of a lowered immune system, can’t have anything raw”*. Foods commonly avoided due  
257 to food safety concerns included raw fish: *“Japanese foods, that’s the best. But only for cooking,*  
258 *not the raw sushi. That’s what I ate before, but no more. Everything has to cook”* (Patient 102).

259

## 260 **Health Beliefs: Connecting Lived Experiences with New Realities**

261 Personal health beliefs emerged as a driver of food choice and dietary change. This theme  
262 examined patients’ health beliefs and their interpretations of dietary guidelines based on lived  
263 experiences. Patients described reducing or eliminating red and/or processed meat post-diagnosis  
264 because of their perceived relationship between these foods and health: *“Totally contrary to 6*  
265 *months ago...before I started watching it [food choices] and knowing my diagnosis, it was a lot*  
266 *of stuff like pepperoni, sausage, smokies, hot dogs, just grabbed that stuff and munch on it. We*  
267 *don’t even buy it anymore”* (Patient 115). Patient 113 simply stated: *“I have eliminated a lot of*  
268 *red meat. I read that red meat could be a possibility of cancer.”* Reduced intake of red meat  
269 primarily affected the evening meal while elimination of processed meat changed food choices at  
270 breakfast and lunch. Red meat at supper was often replaced with chicken, turkey, pork, or fish



271 while processed meat at lunch was replaced with salads or leftover non-processed meat from the  
272 evening before. In addition to decreasing meat intake, patients also altered their food preparation  
273 methods in fear of health implications: “*we’ve not been doing much barbequing since my*  
274 *diagnosis. We’ve kind of stayed away from any super-heated red meat*” (Patient 115).

275

276 Patients iterated a link between red meat consumption and colon cancer and talked about the  
277 challenge of drastic dietary changes such as eliminating red meat from the diet: “*...somewhere I*  
278 *read that especially for colon cancer that red meat doesn’t really help. And I did [eliminate red*  
279 *meat] till I got hungry enough for a hamburger, and then I had the hamburger because that’s*  
280 *hard to do...*” (Patient 110). Patients struggled to balance their personal health beliefs with  
281 enjoyment of food. Patient 116 said: “*I know it wasn’t healthy to eat too much [meat], but I find*  
282 *out that I cannot resist. I still am eating [meat], but not as much as I used to, because every dish*  
283 *it has to have meat for me. I love meat*”.

284

285 Sugar consumption was a concern and efforts were made to reduce added and total sugar intake  
286 after diagnosis. Sugar-sweetened carbonated beverages were often eliminated. Ginger ale was an  
287 exception; most patients added ginger ale to their diet after surgery or at the start of anti-cancer  
288 treatment to help with digestive issues. The disconnect between the desire to eliminate added  
289 sugar but use ginger ale to aid with digestion was exemplified by Patient 121: “*In the last month*  
290 *I’ve had a couple of ginger ale for sure. It feels almost like not bad*”.

291

292 Quantity of food was often described as volume of intake or portion sizes. Patients expressed a  
293 desire to decrease the quantity of food consumed. When asked about any dietary changes made

294 post-diagnosis, Patient 127 said: *“I restrict a lot of what I’m eating now. Trying to decrease*  
295 *amounts...not necessarily specific foods, just amounts”*. Reasons for decreasing food intake were  
296 not consistent; some related it to their weight (i.e., many felt a need to lose weight, as a step  
297 towards optimizing health), others to a feeling of fullness, or to their ability to digest large  
298 quantities of food.

299

300 A pattern of replacing frozen or canned foods with fresh options emerged, especially in relation  
301 to meat, fish, and produce: *“just trying to stay away from processed foods. More vegetables,*  
302 *more fruit, right, eating lots more fruit”* (Patient 126). Some patients were also advised by a  
303 dietitian at the cancer center to increase protein intake and reported increasing their fish intake  
304 and focusing on protein when choosing foods. Patient 115 explained how they replaced highly  
305 processed meat with a meal-replacement cereal to make healthier food choices:

306 *“My favorite was Schneiders Pepperettes. Whenever they went on sale, I’d binge buy*  
307 *them. I’d buy 3 packages, and I’d eat unhealthy because it was convenient, because I had*  
308 *it, and I liked the taste of it, and it was my go-to munchie. Now I’d sooner take a bowl of*  
309 *Vector cereal with milk for the protein rather than having – I don’t miss that stuff*  
310 *anymore, knowing that I shouldn’t have it.”*

311

312 Overall, health improvement was the driving motivation for chosen diet change (i.e., changes to  
313 food choice that were not required due to a surgically altered gastrointestinal tract). Patient 115  
314 explained: *“Every once in a while, I do crave those salty, greasy snacks, but I just realize that*  
315 *it’s not good for me, so I guess I miss it a little bit, but not enough that I’m going to go out and*  
316 *buy any”*.

317

318 **Static Diets: No Changes Post-diagnosis**

319 Within this theme, drivers of dietary choice emerged as: (1) a perception that diet prior to cancer  
320 was healthy and that no further changes were needed to support healthy eating practices post-  
321 diagnosis; and (2) prior health challenges resulted in sustained dietary changes which remained  
322 appropriate post-diagnosis. Approximately one quarter of patients in this study described  
323 experiences that contributed to the formation of the static diet theme, one of whom intersected  
324 with the theme on medical influences related to the presence of an ostomy.

325

326 When asked if they had eliminated or changed any foods in their diet, answers included:

327 *“Nothing’s changed”* (Patient 105); *“Absolutely nothing”* (Patient 111); *“I’m eating everything*  
328 *that I’ve eaten before”* (Patient 120); and *“I find that the variety is all there, so I know that I’m*  
329 *getting a good mix of things. I don’t think I need to change too much in my diet”* (Patient 109).

330 For some patients, diet had not been a focus since their diagnosis: *“I never thought about that. I*  
331 *guess it’s possible, but not in any way that I’ve noticed”* (Patient 119).

332

333 Changes to food choices were based on lived experiences for some patients who talked about  
334 specific foods that were commonly associated with past health conditions (i.e., prior to this  
335 cancer diagnosis). Meat is a source of high-quality protein but was frequently avoided due to  
336 comorbidities. Patient 107 explained: *“... I don’t think I’ve had a hamburger probably once in*  
337 *the last 2 years. Not because I don’t like them, just primarily because after my stroke, I just quit*  
338 *doing that altogether”* and Patient 109 said: *“because of my previous condition with gout, I don’t*  
339 *like to actually eat too much beef. We cook it all the time, but I don’t usually eat it”*. Patient 103

340 described the impact that a different gastrointestinal condition had on their eating practices:  
341 *“Well with my Crohn’s, I found beef really bothered me, so that kept me away from it, and I*  
342 *guess that’s just kind of kept me away from it. But not that I wouldn’t enjoy a slice of roast beef,*  
343 *but it’s certainly nothing I would choose very often”*. Patient 112 said: *“We try not to eat pork*  
344 *because of my arthritis. It’s not good for arthritis.”*

345

### 346 **Navigating External Influences: Confluence of Personal Agency and Social Constraints**

347 Patients had varied capacities to control their environments and navigate their cancer journey.  
348 Nevertheless, patients actively interpreted knowledge and subsequently enacted dietary  
349 recommendations to varying degrees. This thematic category highlights patients’ agency (i.e.,  
350 feeling of control) in practicing dietary behaviors that they believe promote an optimal response  
351 to cancer.

352

353 Patients showed their agency as they interpreted the scientific literature and related findings to  
354 their personal situation. They relied on information from sought-out online sources (e.g.,  
355 websites, social media, etc.) or unsolicited advice from health care providers, colleagues, and  
356 friends and family: *“I’ve been told [about red meat] by my coworkers when we have lunch*  
357 *together, we talk sometimes, and then when I had before the surgery and I got colonoscopy,*  
358 *doctors advised me just to cut red meat. It’s not healthy. It was always, but I didn’t enforce that”*  
359 (Patient 116).

360

361 Patients’ interpretation of the literature was based on their own values and understandings.

362 Patient 114 commented:

363           *“Nuts...That is one thing I’ve added to my diet that I usually haven’t eaten a lot*  
364           *of...Specifically almonds. I saw a special on nutrition...British research determined that*  
365           *the almond is the most nutritious food in the world...I don’t know what factors they look*  
366           *at, but apparently, it’s the most nutritious. So I figured I might as well add it to my diet”.*

367 They expressed having to navigate the interweaving landscape of health care provider advice and  
368 their own personal learnings to effect health beliefs and ultimately health behavior change: *“after*  
369 *the stomach [surgery] one of the recommendations from the nurse, they say don’t eat that one*  
370 *[food] because it’s too much seeds. I say – but I want to go back to that, because that’s one of*  
371 *the big things for me, especially in the breakfast. Normally I prepare my smoothies”* (Patient  
372 128).

373

374 The importance of verifying advice, regardless of the reputability of the source, was also  
375 expressed by some patients. When asked where they heard about nutrition information pertaining  
376 to cooking practices for meat, Patient 115 explained:

377           *“From friends and from research on the Internet...Actually, first got the hint of it when I*  
378           *talked to [dietitian’s name redacted] for the first time at the cancer center and when I*  
379           *was first starting on my original chemo. I had a consultation with her, and we talked*  
380           *quite a bit about charring meat, barbequing, and that it’s – they know now that that’s not*  
381           *necessarily a good thing, so that was where I initially got the bug in my ear and then did*  
382           *more research on it on my own.”*

383

384 For others, physical activity was a major influencer of health and personal agency: *“before, I*  
385 *didn’t worry so much about nutrition because I know I was getting enough, but it was for a*

386 *different purpose. It was to maintain all that exercising I was doing”* (Patient 110). Regardless of  
387 the external influence, patients with prior experience managing their nutrition focused on dietary  
388 practices that dovetailed with their past ways of eating post-diagnosis.

389

## 390 **DISCUSSION**

391 This study adds to the paucity of global qualitative research on dietary decision making of  
392 patients with cancer near time of diagnosis and beyond. Data from semi-structured patient  
393 interviews suggested that medical influences, health beliefs, and navigating external influences  
394 were drivers of dietary choices. Additionally, static diets emerged for patients who felt their  
395 dietary behaviors already exhibited healthy eating patterns. Making sense of dietary advice was  
396 also of high importance to patients and was easier for those whose dietary health beliefs and  
397 practices merged with dietary recommendations.

398

399 The findings presented herein fit within the large body of literature that describes factors  
400 affecting eating behaviors<sup>29,30</sup> including individual determinants (e.g., medical influences, health  
401 beliefs, and prior dietary changes resulting in static diets post-diagnosis) and environmental  
402 influences (e.g., social and physical environments). Our findings align with the Information-  
403 Motivation-Behavioral Skills Model, a highly generalizable model used across health behavioral  
404 domains (including nutrition) that seeks, in-part, to understand health behaviors<sup>31</sup>. This model  
405 postulates that health-related information, personal/social motivation, and behavioral skills are  
406 core determinants of behavior engagement<sup>31</sup>.

407

408 The theme of *Medical Influences: eating to live* emerged from interviews with study patients.  
409 Many discussed symptoms/side effects of medical conditions or treatments and how these forced  
410 dietary change that shifted the notion of eating from pleasure to health. These findings were  
411 similar to those from a group in the United Kingdom (UK) who used principles of  
412 phenomenology to guide their qualitative thematic analysis of people's relationships with food  
413 and CRC<sup>20</sup>. They also found that symptoms from the medical attributes of cancer were major  
414 drivers of dietary change for participants<sup>20</sup>. Similar to the findings presented herein, other studies  
415 found that participants self-managed symptoms of nausea<sup>18</sup> and ostomy output through self-  
416 guided dietary modifications<sup>20</sup>.

417

418 Contrary to the current findings, the UK team discovered that participants with stages I-IV CRC  
419 used weight as measure of overall recovery post-operatively<sup>20</sup>. Weight was a topic of discussion  
420 in our cohort but not in the context of recovery from surgery or cancer. Instead, patients'  
421 discussion of weight contributed to the theme of *Health Beliefs: connecting lived experiences*  
422 *with new realities* but was not a focus at this point in their cancer journey. In line with the  
423 findings from the present study, a qualitative study of post-diagnosis dietary decision-making in  
424 Chinese cancer survivors found that personal belief guided dietary decisions<sup>18</sup>.

425

426 Given the unique nutritional impact of cancer, surgical and oncologic nutrition guidelines are  
427 used by practitioners to promote optimal nutrition during the perioperative and anti-cancer  
428 therapy periods, respectively<sup>11, 32</sup>. High-quality (i.e., animal-based) proteins are an important  
429 dietary component during cancer treatment<sup>11</sup> due to their superior anabolic properties and role in  
430 muscle mass maintenance<sup>12, 33</sup>. Dietary behaviors that decrease animal-protein (e.g., meat, dairy)

431 intake during cancer do not align with oncology nutrition guidelines<sup>11</sup>. Resulting protein intake  
432 may not be sufficient to preclude muscle depletion, one of the primary nutritional problems these  
433 patients experience<sup>12</sup>.

434

435 Patients herein equated dietary guidelines for cancer prevention with appropriate intake during  
436 cancer treatment which adds to the literature suggesting that nutritional recommendations  
437 throughout the cancer journey may be unclear to patients and families<sup>5,34</sup>. As discussed  
438 elsewhere<sup>12</sup>, nutrition goals and guidelines for optimal intake vary across the cancer continuum  
439 whereby nutrition recommendations for cancer prevention do not necessarily parallel  
440 recommendations during active cancer treatment. For example, red meat is likely associated with  
441 colon cancer incidence but inversely related to mortality from the disease<sup>35</sup>. Increased protein  
442 intake is a protective mechanism against mortality in older adults<sup>36</sup> who make up the majority of  
443 cancer cases. Given that patients have variable protein intake that is often below  
444 recommendations<sup>37-40</sup>, dietary patterns should likely shift following a CRC diagnosis to better  
445 align with oncology nutrition guidelines, especially if protein was not previously emphasized as  
446 a key nutrient in the diet<sup>11</sup>. A shift in dietary patterns was not observed in this study where a  
447 main theme emerged as '*Static Diets: no changes post-diagnosis*'.

448

449 The theme *Navigating External Influences: confluence of personal agency and social constraints*  
450 encompassed the idea that patients experienced confluence between personal agency and social  
451 constraints which led to dietary change. Similar to these findings, participants in the UK study  
452 expressed personal feelings and emotions as stronger influencers of dietary decisions than any  
453 objective dietary advice received<sup>20</sup>. Culture and family influence were external influencers of



454 dietary decisions in the Chinese cohort<sup>18</sup>. This contrasts with the findings from this study where  
455 culture and family were discussed but did not emerge as major drivers of dietary change. This  
456 difference may be due to time since diagnosis (i.e., patients in this study were much closer to  
457 diagnosis). Consequently, the medical aspect of their cancer was prioritized. Cultural or other  
458 personal factors influencing dietary choices may emerge once patients' comfort with managing  
459 medical side effects has stabilized. Overall, a loss of food enjoyment emerged in the themes  
460 which has been observed across various other cancer types and described as "eating without  
461 satisfaction"<sup>19</sup>, "impact on social functioning"<sup>41</sup>, and "trial and error to find tolerable foods"<sup>42</sup>.  
462 Beyond nutritional considerations, food is an important aspect of quality of life in patients with  
463 cancer<sup>43</sup>. Despite the importance of nutrition, it is often a lower priority for oncologists due to  
464 time constraints and lack of clear nutritional guidelines<sup>44</sup>.

465

## 466 **Strengths and Limitations**

467 This qualitative study complements previous quantitative research discussed. The format of the  
468 in-person one-on-one semi-structured interviews, including the presence of the same researcher  
469 for all interviews and their ability to note patients' facial expression and body language in field  
470 notes were strengths of this study. Notably, the sex-split observed is indicative of prevalence  
471 differences seen in CRC<sup>2</sup>. This study captured the perspectives of a group of nutrition-focused  
472 patients being treated for stages II-IV CRC. Nonetheless, patients' interest in nutrition captured  
473 herein do not necessarily represent all persons receiving adjuvant treatment for CRC.

474 Furthermore, a demographically diverse sample was enrolled which may have enhanced the  
475 generalizability of findings to a wider group of patients with CRC but is not generalizable to all  
476 given the inclusion/exclusion criteria of the larger trial. A limitation of this study is that patients

477 were not offered the opportunity to review transcripts of their interview or review the analysis to  
478 ensure their words were interpreted as they were intended.

479

## 480 **CONCLUSION**

481 A qualitative approach provides the opportunity to understand, from a patient perspective,  
482 dietary decisions following a CRC diagnosis and provides preliminary insight into the  
483 influencers and practical components of dietary change in select patients being treated for CRC.  
484 Patients' perspectives and beliefs determined the extent to which dietary choices were altered  
485 post-diagnosis. These included the degree to which dietary decisions provided some agency for  
486 dealing with physical ramifications of cancer treatment, individuals' personal understandings of  
487 healthy foods, and the role of diet in managing their new physical reality post–diagnosis. From a  
488 clinical perspective, this type of research can provide insight into relevant dietary trends,  
489 fallacies, and motivations for dietary change experienced by a group of patients with CRC  
490 receiving adjuvant therapy. Findings presented herein are hypothesis-generating and can be  
491 useful for tailoring future quantitative studies on effective strategies to optimize nutritional needs  
492 in patients with CRC.

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- 634

**Table 1:** Aggregated patient characteristics of n=29 adults receiving treatment for colorectal cancer participating in a semi-structured interview on their experiences with dietary decisions post-diagnosis.

<b>Patient characteristic</b>	
Age, years (mean $\pm$ standard deviation)	57 $\pm$ 10
Sex, n (%)	
Female	11 (37.9)
Male	18 (62.1)
Body Mass Index Category <sup>a</sup> , (n %)	
Underweight	1 (3.5)
Normal Range	9 (31.0)
Overweight	8 (27.6)
Obesity	11 (37.9)
Tumor Location, n (%)	
Colon	24 (82.8)
Rectum	5 (17.2)
Stage of Disease <sup>b</sup> , n (%)	
II	4 (13.8)
III	17 (58.6)
IV	8 (27.6)
Ostomy, n (%)	
Yes	8 (27.6)

No	21 (72.4)
Race and Ethnicity, n (%)	
Black	1 (3.4)
Filipino	2 (6.9)
Indigenous	4 (13.8)
Latin American	2 (6.9)
South Asian	1 (3.4)
White	19 (65.5)
Household Income <sup>c</sup> , n (%)	
< \$20,000	1 (3.5)
\$20,000–\$39,999	3 (10.4)
\$40,000–\$69,999	8 (27.6)
\$70,000–\$99,999	5 (17.2)
≥ \$100,000	9 (31.0)
Prefer not to answer	3 (10.3)
Highest Level of Education Completed, n (%)	
High school	8 (27.6)
College diploma	10 (34.5)
University undergraduate degree	8 (27.6)
University post-graduate degree	3 (10.3)

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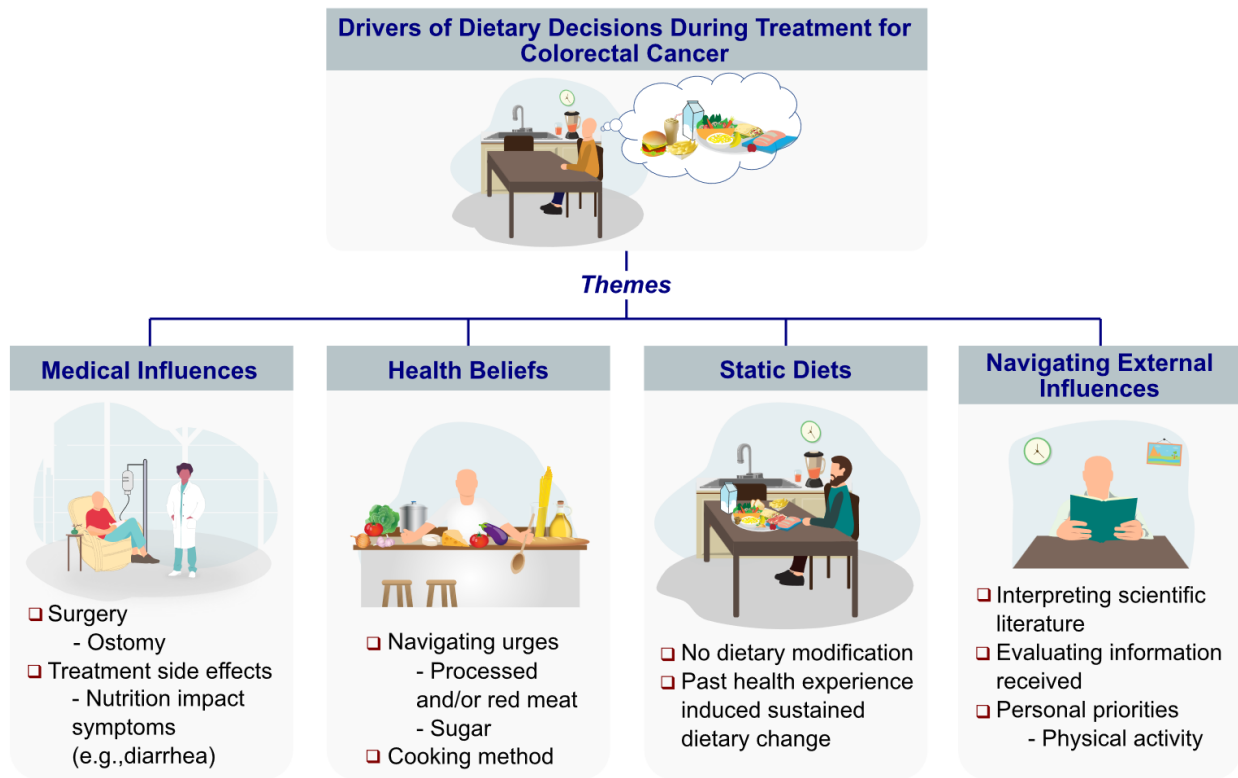
<sup>a</sup>Body Mass Index categories defined as per the Centers for Disease Control<sup>30</sup>; Underweight: <18.5 kg/m<sup>2</sup>; Normal range: 18.5-24.9 kg/m<sup>2</sup>; Overweight: 25.0-29.9 kg/m<sup>2</sup>; Obesity: >30.0 kg/m<sup>2</sup>.

<sup>b</sup>Stage of disease grouped as per tumor, node, metastasis (TNM) staging<sup>31</sup>. Stage II: disease is localized to primary tumor site; Stage III: disease involves the lymph node(s); Stage IV: disease has spread to distant organ(s).

<sup>c</sup>Annual household income before taxes and deductions in Canadian dollars.

1.	<p>Could you share with me some of your favorite foods?</p> <p>(How do you prepare your favorite foods?)</p> <p>(When do you eat your favorite foods?)</p>
2.	How has being diagnosed with cancer changed the way you eat?
2a.	<p>What foods have you added to your diet since your diagnosis?</p> <p>(Why did you add these foods?)</p>
2b.	<p>What foods have you eliminated from your diet?</p> <p>(Why did you eliminate these foods?)</p> <p>(What do you miss most about these foods?)</p>
2c.	What foods do you think are most important for people living with colorectal cancer to eat?
3.	What do you enjoy about your current diet?
3a.	How does this enjoyment compare to before you were diagnosed with cancer?
3b.	What aspects of eating do you enjoy more since your diagnosis?
4.	<p>What diet guidelines did you use before being diagnosed with cancer?</p> <p>(Why did you follow these?)</p>
4a.	<p>Do you follow any specific guidelines now?</p> <p>(How did you go about selecting guidelines to follow?)</p>

**Figure 1:** Semi-structured interview guide questions for adults receiving treatment for colorectal cancer. Probing questions were used as needed and are indicated in parentheses.



**Figure 2:** Categories and main themes emerging as drivers of dietary choices in adults receiving treatment for colorectal cancer.