



0022-3999(95)00523-L

COLON CANCER: PERSONALITY FACTORS PREDICTIVE OF ONSET AND STAGE OF PRESENTATION

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(Received 17 May 1994; accepted 22 June 1995)

Abstract—This study examined premorbid personality correlates of colon cancer and stage of presentation of colon cancer to health care providers. Sixty-one male veterans who completed the MMPI between 1947 and 1975 and were then diagnosed with colon cancer between 1977 and 1988 were matched with control patients. A 21-factor solution of the MMPI [1] was used to seek potential personality differences between colon cancer cases and their controls in terms of presence of colon cancer and stage of presentation for this disease. A stepwise conditional regression analysis found significant differences between the colon cancer and control groups on the Aggressive Hostility variable ($p < 0.018$). A multivariate analysis of variance conducted across the stages of colon cancer presentation found that patients who presented later on for colon cancer had higher Phobia scores ($p < 0.05$). Religious Fundamentalism was also related to presentation ($p < 0.05$), but in a nonlinear manner. Discussion is related to previous findings regarding the relationship between personality and development of cancer, as well as to implications for patient screening.

Keywords: Hostility; Colorectal cancer; Phobias; Religious fundamentalism; Prevention.

INTRODUCTION

Cancer of the large bowel is a major cause of death in the United States, ranking second only to lung cancer [2]. Over 150,000 new cases of colon cancer occur each year in this country, resulting in 61,300 deaths [2, 3]. Traditionally, genetic [4] and environmental (e.g., dietary) factors [4, 5] have been implicated in the etiology of colon cancer. However, psychological factors have also been examined recently as possible contributors to this cancer's onset [5].

Numerous studies have examined the relationship between psychological factors and various cancers [6–10]. Shekelle and colleagues [11] reported that psychological depression increases the risk of death from cancer, irrespective of site or type. Persky, Kempthorne-Rawson, and Shekelle [8] examined the relationship between personality, as assessed by the Minnesota Multiphasic Personality Inventory (MMPI) [12] and the 16 Personality Factor Questionnaire [13], and cancer in a 20-year follow-up of more than 2,000 males. Depression was associated with subsequent cancer incidence in men diagnosed during the first 10 years of follow-up. Depression was more predictive of cancer mortality than was type of cancer even after adjustment for confounding variables.

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In contrast, Zonderman and colleagues [10] failed to find a relationship between depressive symptoms as measured by the CES-D [14] and the subsequent development of cancer in both men and women. However, scales such as the CES-D have been criticized as measuring "chronic distress" as opposed to depression [15].

In addition to depression, suppression of emotions has also been linked to cancer development [16–19]. These works suggest that the excessive use of repressive and denying mechanisms or the general inhibition of emotional reactions may be related to the onset and development of malignant tumors. Grossarth-Maticek and colleagues [20–22] found that the Type I, or cancer prone, personality that is characterized by *both* lack of expression of emotions and hopelessness/helplessness and depression in response to stress predicted cancer onset. However, these works have since been criticized on methodologic [23–25] and related grounds [26]. Similarly, Solomon [19, 27] discussed the Type C personality pattern as a predictor of cancer. This "immunosuppression-prone" personality pattern is characterized by difficulty being aware of and communicating feelings [27].

Despite the prevalence of colorectal cancer, few studies have examined psychosocial factors related to this disease. The Melbourne Colorectal Cancer study [5] interviewed subjects with a newly confirmed diagnosis of colorectal cancer and found a relationship between colorectal cancer and a "personality profile" that includes repression, denial, nonexpression of anger, social desirability, conflict avoidance, and the suppression of reactions that may offend others. The denial of anger was a more pronounced risk factor for women than for men.

However, the Melbourne study highlights several methodological problems associated with retrospective studies. First, questionnaires used within these studies often lack adequate reliability and validity. Second, differences between cases and controls may be due to the psychological impact of the cancer diagnosis, the physiological process of cancer itself, or both. Third, these studies may be subject to recall bias; that is, the knowledge that one has cancer may alter the recall of past psychological states and life stress. As a result, retrospective studies have limited power to clarify the role of psychological factors in the development of cancer.

In addition to a possible causal role in cancer, psychological factors have also been shown to influence preventive health behaviors [28–30] such as participating in breast cancer screening [31]. Factors such as coping ability [32], fear [32–34], and denial [34] have all been associated with a tendency to postpone the seeking of treatment for cancer. The implications of delaying behavior are important, especially in neoplasias such as colon cancer in which stage of presentation impacts survival [35]. If psychological factors related to the postponement of presentation for colorectal examination could be identified, these could be used to assist in the recognition of those patients likely to postpone so that action could be taken to possibly improve survival.

This study sought to examine premorbid personality correlates of colon cancer, as assessed by a 21-factor solution of the MMPI [1], prior to the confounding effects of cancer diagnosis. In addition, this study examined the relationship between premorbid personality characteristics and delay of presentation to health care providers for this disease. It was hypothesized that depression (Factor 9) would be related positively to the subsequent development of colon cancer, whereas aggressive hostility (Factor 7) and assertiveness (Factor 12) would be related negatively to subsequent colon cancer. It was also hypothesized that phobias (Factor 15) and denial of somatic problems (Factor 4) would be related positively to later initial presentation for health care services.

METHOD

Colon cancer subjects

The Minneapolis U. S. Department of Veterans Affairs Medical Center (MVAMC) maintains a regional tumor registry. All newly diagnosed cases of colon cancer contained in the registry for the years 1977 through 1988 were cross-checked against a register of approximately 9,500 people who completed the MMPI at the MVAMC between 1947 and 1975. Definite matches (identical name and birth date in both sources of information) were found for 61 who completed the MMPI prior to their diagnosis of colon cancer. The MMPI-colon cancer diagnosis interval ranged from 5 to 37 years, with a mean of 20.5 years.

Control subjects

Sixty-one male veterans who completed the MMPI between 1947 and 1975, who continued to receive their medical care at the MVAMC between 1977 and 1988, and who had not developed a diagnosed colon cancer at the time of the present study, were selected as control subjects. A case-match approach was used in which the "nearest neighbor" cases in the MMPI register were selected as controls if, relative to the given colon cancer subject, they were ± 2 years in age, ± 1 year of education, and came from the same referral source. Subjects were referred for psychological assessment from the following sources: (a) psychiatry (41%), (b) medical and surgical (31%), (c) neurology (18%), and (d) chemical dependency (10%).

Measures

Because the standard MMPI clinical scales are heterogeneous in content, subjects can achieve identical scores despite endorsing nonoverlapping sets of items. Understanding the determinants of scale score differences is therefore difficult. Relatively homogeneous (and therefore more interpretable) groups of MMPI items have been developed by various researchers using factor analyses. A 21-factor solution developed and validated by Johnson et al. [1] was used in the present study to seek potential personality differences between colon cancer cases and their controls. The scales have high internal consistency and cover a broad range of personality characteristics. Factor scale titles are given in Table I. All MMPI profiles were valid by the F-K criterion [36]. Using this criterion, the most valid MMPI profile was selected for those who had completed more than one MMPI.

Table I.—Means and standard deviations for MMPI personality factors for cancer cases and controls*

Factor	Cancer		Control	
	<i>X</i>	SD	<i>X</i>	SD
1. Neuroticism-General Anxiety/Worry	10.5	20.6	7.7	25.8
2. Psychoticism-Peculiar Thinking	6.9	5.0	6.7	5.2
3. Cynicism-Normal Paranoia	2.2	6.9	1.9	6.4
4. Denial of Somatic Problems	-3.6	7.1	-3.4	8.2
5. Social Extroversion	2.6	4.9	3.6	5.3
6. Stereotypic Femininity	5.7	5.4	5.7	6.1
7. Aggressive Hostility	3.4	2.0	2.6	1.9
8. Psychotic Paranoia	7.1	4.0	6.7	4.5
9. Depression	4.4	3.3	4.7	3.0
10. Delinquency	2.1	3.4	1.0	3.5
11. Inner Directedness	-0.1	1.5	0.1	1.7
12. Assertiveness	-1.5	1.8	-1.6	1.8
13. Stereotypic Masculinity	-1.4	4.3	-1.9	3.8
14. Neurasthenic Somatization	4.6	4.4	4.0	5.2
15. Phobias	0.4	3.6	1.5	2.9
16. Family Attachment	-4.9	4.6	-5.7	4.4
17. Well-being—health	-0.2	4.0	-0.3	4.2
18. Intellectual Interests	-0.3	3.3	0.2	4.3
19. Religious Fundamentalism	-0.1	4.3	-0.0	4.5
20. Sexual Adjustment	-1.1	2.4	-1.6	2.0
21. Dreaming	-0.6	1.2	-0.6	1.2

* Overall $F = 49.97$, $df = 20$, $p < 0.001$.

Classification of cancers

Cancers of the colon were classified according to Dukes' classification of colorectal cancer, first discussed in 1932 [37]. This involves a 4-stage classification system: (Stage A) cancer limited to mucosa and submucosa, (Stage B) cancer extends into muscularis or serosa, (Stage C) cancer involves regional lymph nodes, and (Stage D) distant metastases are present. Of the 61 subjects identified, 57 had a reported stage of cancer development within their records. Because distinctions between Stage A and Stage B were not always made in the registry entry, these two stages were combined in this study. The pathologist in charge of the register assisted in resolving any uncertainties. Of the 57 classified, 19 were either Stage A or B, 25 were Stage C, and 13 were Stage D.

RESULTS

Colon cancer onset

Table I presents means and standard deviations for the 21 MMPI factor scores for the cancer and control groups. A stepwise conditional logistic regression analysis (BMDP LR) [38] used the 21 MMPI factor scores for the cancer and control groups. One variable significantly discriminated between the colon cancer and the control groups (Aggressive Hostility; $p \leq 0.018$). No other MMPI personality factors were related significantly to colon cancer.

Stage of presentation

A multivariate analysis of variance was conducted across the three stages of colon cancer presentation to determine the relationship between MMPI factors and stage of presentation for colon cancer. The overall F -statistic was significant (49.97, $df = 20$). Follow-up univariate F values were completed, and Factor 15 (phobias) and Factor 19 (religious fundamentalism) were both significant at the $p \leq 0.05$ level (see Table 2). Inspection of the means suggests that persons high on the phobia factor presented later on. Persons low on the religious fundamentalism factor presented earlier, and those with higher scores presented later.

DISCUSSION

Aggressive hostility, as measured by MMPI scores, was related to the subsequent development of colorectal cancer. Therefore, these results do not support the first hypothesis, nor do they add support to previous findings in which repression of emotions had been linked to immunosuppression and the development of cancer [20–22, 27]. However, we did not directly assess Type I or Type C personality type in this study. Those studies that have investigated this personality type have typically included subjects with breast cancer, lung cancer, or cancers irrespective of site. An exception is Kune and colleagues [5], who noted a relationship between repression, denial, and nonexpression of anger with colorectal cancer, a finding more pronounced for women. However, the Kune study was retrospective and admittedly used unreliable questionnaires to assess these personality factors.

The present study found aggressive hostility to be predictive of the development of colorectal cancer in male veterans. The reasons for this empirical relationship are open to speculation. At least two hypotheses are suggested by the existing literature: (a) the Hostility–Disease Model [39–41] and the related biopsychosocial model of cancer causation [42], and/or (b) the Health Behavior Model [43].

Table II.—Mean differences in MMPI personality factors scores by stage of colon cancer presentation*

Factor	Stage			<i>p</i>
	A-B	C	D	
1. Neuroticism-General Anxiety/Worry	13.5	12.6	3.0	.32
2. Psychoticism-Peculiar Thinking	7.3	6.8	6.6	.92
3. Cynicism-Normal Paranoia	2.5	2.5	2.5	.99
4. Denial of Somatic Problems	-4.9	-3.7	-1.8	.51
5. Social Extroversion	2.6	2.3	2.7	.97
6. Stereotypic Femininity	6.4	4.9	7.2	.44
7. Aggressive Hostility	3.9	3.1	3.5	.31
8. Psychotic Paranoia	7.3	6.9	7.4	.92
9. Depression	5.1	4.3	4.4	.68
10. Delinquency	1.7	2.6	1.5	.55
11. Inner Directedness	-0.1	-0.2	0.2	.68
12. Assertiveness	-1.5	-1.3	-1.6	.89
13. Stereotypic Masculinity	-1.7	-0.8	-2.4	.54
14. Neurasthenic Somatization	6.3	4.0	3.3	.11
15. Phobias	0.5	0.3	2.7	.03
16. Family Attachment	-5.4	4.0	-6.2	.37
17. Well-being—health	1.0	-0.7	0.2	.36
18. Intellectual Interests	-0.9	0.6	-1.2	.18
19. Religious Fundamentalism	-2.0	1.3	-0.5	.03
20. Sexual Adjustment	-1.0	-0.8	-1.6	.60
21. Dreaming	-0.6	-0.6	-0.2	.54

**n* = 57 (for Stage A-B, *n* = 19; Stage C, *n* = 25; Stage D, *n* = 13).

The Hostility-Disease Model proposes that hostility contributes to disease through increased physiological responses to possible stressors. According to this model, hostile persons experience more frequent and more extreme episodes of anger and are more often in a state of vigilant observation of their social environments. Anger and vigilance may alter immune system functioning and lead to elevated neuroendocrine responses and associated immunosuppression [44]. Impaired immunologic functioning may render the organism vulnerable to the action of latent oncogenic viruses, newly transformed cancer cells, or other incipient pathological process that are normally held in check by intact and properly functioning immune mechanisms [44, 45]. Thus, this model views stress as the final common pathway linking hostility to a lack of health—in this case colorectal cancer [46].

Greer and Watson [42], focusing on biopsychosocial models of cancer causation, hypothesize that cancer development is a multistage process that begins with the presence of a cell with unusual DNA—the oncogene. Homeostatic controls (in which psychological factors may play a role) can influence both the onset and development of cancer [42]. Sklar and Anisman [47] also report that psychological factors, such as stress, mediated by the central nervous system, may cause differential progress through the cancer stages of tumor induction, growth, and metastatic spread. They clarify this by suggesting that stress does not cause cancer, but instead, affects physiological functioning, and, thus, may “influence the course of neoplastic disease.”

In this context, responses to stress appear to involve three systems: endocrine, im-

mune, and autonomic. Because certain tumors demonstrate hormone responsiveness [48], one could speculate that a relationship between aggressive hostility and colorectal cancer could be due to excessive and deleterious endocrine, immune, or autonomic functioning, and that colorectal cells may be susceptible to such processes.

Andrianopoulos [49], however, claims that colon cancer is one of the cancers that is *not* increased in immunosuppressed populations. As such, an alternative explanation for our study's results is found in the Health-Behavior Model proposed by Leiker and Hailey [43], which argues that hostile persons may have a partly increased risk for the development of illness due to their daily habits. Persons with high levels of hostility report less physical activity, less self-care [50], and heavy smoking and alcohol consumption [51, 52]. Although these factors were not explicitly assessed or controlled for in the present study, the Health Behavior Model suggests that, as persons with higher levels of hostility, patients within our study may have engaged in less adequate health care (e.g., increased cigarette smoking and drinking of alcohol) than their controls, predisposing them to colorectal cancer. Cigarette smoking has been associated with increased rates of oral cavity, esophageal, kidney, bladder, pancreatic, and lung cancer [53], and the Melbourne Colorectal Cancer Study [54] found beer consumption to be a statistically significant risk factor for development of rectal cancer in males. If hostility proves to be an important risk factor, then interventions to reduce hostility could become an important addition to prevention efforts [46].

This study provided partial support for the second hypothesis. Phobias (Factor 15) was predictive of later presentation to health care providers, however, denial of somatic problems (Factor 4) was not. Numerous studies have indicated that fear is related to the postponement of medical care following the identification of illness-related symptoms [55, 56]. Whereas no known studies have examined the relationship between fear and delay as it relates to colon cancer, several authors have addressed this issue with breast cancer patients. The literature is unclear about the relationship between fear and delay for treatment for breast cancer. For example, several studies have shown that fear causes delay [32, 33, 56, 57]. Possible reasons for this include the relationship between fear, denial, and avoidance [57], fear of factors related to cancer such as assuming the sick role or fear of hospitalization [58], and the fact that high levels of fear can cause a person to become so preoccupied with reducing fear that health-care information and recommendations are ignored [59–61]. On the other hand, some studies demonstrate that fear can be a motivating factor [62–64] for seeking treatment.

An intriguing trend related to fear and delay that did not reach statistical significance, but which may help to clarify the relationship between these two factors was the observed values of Factor 1, neuroticism—general anxiety and worry. There was a trend for higher scores on this factor to be predictive of earlier stage of cancer presentation. It may be that nonspecific fear (i.e., general anxiety) leads to vigilance of internal and external threat cues, motivating a person to seek reassurance and treatment at an early stage. Fear (i.e., phobias), which is more specific, may lead to avoidance and delay.

As noted previously, religious fundamentalism was also related to delay in seeking treatment for colon cancer. However, these findings are difficult to interpret. Previous studies have not found such a relationship, but, as far as can be discerned, they have not assessed it. Cross-validation of this variable in other samples is required, because it is possibly due to chance. One can speculate that Religious Fundamentalism may be associated with delay because these persons may believe in divine healing [32] or

due to their tendency to be more optimistic [65]. Further research to clarify this relationship is necessary.

Awareness of personality factors associated with cancer onset and delay is important. Although genetic factors greatly affect the occurrence of colorectal cancer, these findings suggest that personality factors may influence onset and possibly influence when a patient presents with colorectal cancer. Since colon cancer prognosis is highly dependent on its staging, educational and clinical interventions could be directed toward those "at risk" patients who are likely to delay. Such educational efforts and clinical interventions would be aimed at increasing their health-care utilization and subsequent chances for survival [4]. Future study could contribute to the development of a short screening checklist, completed by the patient (or community member in the case of population screening) that could signal the need for closer screening/work-up among individuals with high scores on factors such as phobias, hostility, and so forth.

This study is exploratory, given its modest sample size, the rather homogeneous nature of the sample (male VA veterans being evaluated for known or suspected emotional problems), the small number of statistically significant findings, and the inability to assess and control for other risk factors such as family history, dietary intake, and other environmental factors. However, since our index and control cases came from the same referral sources, they may be considered to be matched roughly on factors such as health status, stress, and emotional problems. It should be noted that overall MMPI elevations were comparable between the two groups. While chance might account for some portion of the study findings, the use of logistic regression and MANOVA procedures minimize this possibility.

The current study also overcomes problems of previous studies in that personality was measured prior to the diagnosis of colorectal cancer. As such, patients within the index group were either cancer free or, at least, free from the stress typically associated with the diagnosis and/or treatment of cancer. In addition, the measurement of personality was obtained through the use of a replicated item level factor analysis of the MMPI, a reliable and valid measure of personality.

These results are the first to suggest a relationship between (a) aggressive hostility and the subsequent development of colon cancer and (b) phobias/religious fundamentalism and delay of presentation. Additional studies regarding these personality factors with other populations and with other cancer types could extend these findings. As well, further research could determine the efficacy of various procedures designed to screen and alter such personality and behavior.

Acknowledgements—We want to thank Dr. Stephen Ewing, Dr. Martin Oken, and Addie Willbrecht for their assistance in this project.

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