Although the possibility that personality (innate or learned) can influence the initiation and progression of cancer seems counter-intuitive to many people still under the spell of Cartesian dualism; there is now sufficient evidence to demonstrate and speculate the existence of causal link between personality (psycho-social, biochemical individuality, etc) on the one hand, and cancer on the other, through the possible intermediary of the stress-strain immune-cytokine network systems. The general theory linking these two and these intermediary systems has been discussed in some detail by Eysenck3,8,23,24,55, Baillie6,55, Solomon55, Scherg114,115, and Temoshok18 together with reviews of the evidence. In this article, these theory and evidence are examined and discussed extensively, in a cross-cultural perspective; contrasted, interrelated and summarized in terms of: specific cancer-prone personality or Type C, stress inoculation (host resistance), suppression of dysphoric emotion or emotion suppressive personality, fighting spirit and stoic acceptance, hopelessness/helplessness and depression, psychological intervention (prophylactic behavior therapy of Type C) in cancer patients, personality or response to drug therapy and HLA antigen status, and the quality of life.

1. Cancer-prone (Type C) personality

Introduction

Contrary to Japanese modal personality of homogeneity or lifestyle of collectivism, it has long been suspected, in Western society of individualism, that personal characteristics, biochemical individuality1 or diathesis2,23,24,55, exert some kind of causal role as far as the genesis of cancer is concerned23,8,55, but the evidence has often been unsatisfactory3,5,9,17. For a possible role of personality as one of the risk factors in the causation of cancer, good summaries exist in the works of Eysenck23,24,55, Greer20, Rosch20, Pettingale et al26,30 and many others. Based on research of this kind, there had been a good deal of interest in possibility of preventing and treating cancer by suitable intervention through psychological therapy31,32, often called cognitive behavior therapy of personality23,24,25,26,30. Ideas concerning the importance of personal characteristics and behavior patterns have in recent years been incorporated in a number of theories, leading to highly focused investigations relating to psychosocial variables, physiological conditions and cancer survival3,18,35,44.

Mechanisms

Evidence from these investigations includes the theory that there exists a cancer-prone (Type C, as opposed to Type A) personality which succumbs more readily to cancer (although fairly resistant to infarct/stroke), and dies more quickly after contracting cancer, than other types of personality (Types A, B, etc)3,5,55. Such a cancer-prone personality is characterized, primarily, by a tendency to suppress (not express) dysphoric (or negative) emotions such as anxiety, anger, hostility, etc, and present a bland surface, and to find it difficult to cope with (interpersonal) stress (or tense arousal), to develop feelings of hopelessness and helplessness, and finally depression6,8,18,38. Recent evidence from European and American studies supports this theory quite strongly, both by controlled psychometric comparisons between cancer and other types of patients, and by prospective or retrospective studies (Table 3) in which healthy cancer-prone subjects are followed-up (or followed-down) for up to 10~15 years and compared with subjects, who are not cancer-prone, for mortality from and incidence of cancer7,18,44. A number of psychological intervention studies showed that some kind of personality modification
by means of cognitive behavior therapy can prevent cancer from arising, and prolong survival in terminal cancer patients. Theories have been elaborated to identify the way in which personality factors can influence cancer initiation and progression through the workings of the CNS, hormones, and other substances regulated or elaborated by the CNS and the immune systems, including neuropeptides, cortisol, ACTH, endogenous opiates, cytokine network systems, etc. Hence these theories can be summarized to suggest a causal pathway in terms of a link connecting personality (ineffectual response to interpersonal stressful encounters: final consequence of which is strain), stressors, cortisol, immunosuppression, cancer growth, cytokines, cachexia, and death.

History
In early 1980s, the belief in (cancer-related) Type C personality took its place besides the Rosenman-Friedman Type A (infarct/stroke-prone) and Type B (healthy) personality. Early American and European studies noted that cancer was more common in sensitive and frustrated persons, liable to suppress their emotions, euphoric as well as dysphoric ones, marked emotional stress was observed before the onset of chronic myelocytic leukemia, the appearance (diagnosis) of cancer was frequently preceded by personal loss (such as bereavement), and depression was a frequent precursor of cancer. After this period, research on specific personality correlates of cancer emerged. Various personality factors (traits) found in these studies are shown in Table 1.

Components of cancer personality
These personality factors can be summarized into four major categories (components), as shown in Table 2. Since negative emotions, and failure of coping with a subset of such emotions (i.e., stress), responsible for immunosuppression are modulated primarily by these personality factors, a certain objective (external) events (stressors) may produce quite different emotions or stress, hence different types (or stages) of cancer, depending on these personality factors. In other words, immunosuppression (cancer progression) is the combined effect of stressors (external events) and personality (internal events), consistent with the diathesis-stress theory. These personality factors can be understood in terms of traits (primary factors), types (higher order factors), attitudes, coping mechanisms and other non-cognitive aspects of behavior and its underlying genetic, biological and environmental causes.

These diathesis components, hence personality, include negative emotionality (neuroticism, anxiety, arousability, sensitivity, etc), which interacts with stressors to produce the final physical disease, immunosuppression or cancer. Personality factors (such as interpersonal sensitivity, in terms of introversion, emotionality) may act indirectly through social support resources available (e.g., supportive attitudes of doctors/nurses, etc.), which may alleviate stress (or immunosuppression). Effectiveness of these resources is partly a function of such personality traits as extraversion, neuroticism, social desirability, internal locus of control, etc., depending on ethnocultural lifestyle differences. In this context, an integrated model of personality is suggested linking diathesis, stressors, coping, emotion and cancer in a sociocultural perspective.

Neuroticism and cancer
In empirical work began early 1960s, a number of patients attending chest clinic in London were tested with the personality scale, designed as a measure of neuroticism. It was hypothesized that low scores indicate suppression of
emotion, and that those diagnosed later as suffering from lung cancer have lower scores than those in whom cancer in any organ is excluded. The result was that the control patients had much higher neuroticism scores than the cancer patients, regardless of smoking habits, suggesting that even a single personality factor is strongly related to the incidence of lung cancer\(^{101-110}\). In addition, evidence for a synergistic relationship was found between personality and smoking, in that the poorer the outlet for emotional discharge the less the exposure to smoking required to cause cancer\(^{104}\). These studies were replicated and extended to other types of cancer\(^{11,112}\), demonstrating the hypothesis that cancer is correlated substantially with suppression of emotion, a potential personality factor\(^2\).

It is argued however that a low neuroticism score can be produced in two ways\(^7\). 1. The low scorers are very stable and truly experience little anxiety, anger or depression, 2. the low scorers suppress their experiences and feelings of strong emotions and deny them. The procedure used in these studies\(^{101}\) combined these two different types of patients. The result supported the hypothesis that cancer is linked with suppression of emotion (the first trait), suggesting further that if cancer incidence is linked with a pure measure of suppression, the differences observed between cancer patients and non-cancer patients would be much greater.

The second trait of the cancer-prone personality suggested was a tendency to fail to cope with interpersonal stress, give up, and develop feelings of hopelessness and helplessness\(^{13}\). In a series of studies, patients undergone a diagnostic cone biopsy due to repeated evidence of abnormal cervical cells. Personality tests held six months prior to diagnosis accurately predicted to have cancer in 74% of patients, significant at P<0.001. Other studies replicated this procedure have borne out this finding with other types of cancer\(^{114-120}\). In later quasi-prospective studies (Table 3) personality questionnaires were filled in prior to diagnosis by 1,596 women complaining of breast lumpiness or tenderness\(^{121-124}\). It was found that women with breast cancer had more (self-rated, not overtly expressed) interpersonal problems than those with benign tumor or non-cancer patients, indicating that the ability to express (not suppress) anger, hostility or anxiety for coping with stress (or strain) reduces the risk of cancer, although denial coping increases such a risk\(^{122}\).

### 2. Personality and stress inoculation

A number of animal studies have shown inhibitory effects of chronic stress on tumor cell proliferation and adaptation to the effects of the stressor with repeated exposure\(^{125-127}\). It was argued that adaptation to chronic stress has an inoculation effect on the organism\(^{45}\). Although acute stress depletes catecholamines, increases ACh, and enhances synthesis and secretions of hormones, resulting in immunosuppression; chronic stress results in adaptation to these mechanisms, leading to immunoenhancement\(^{4,7,125}\). Such an inoculation (or adaptation) effect was found in that more frequent (chronic) interpersonal stress continued to be related to a non-malignant diagnosis, contrary to sudden (acute) experience of major loss-related event (such as bereavement) which resulted in increased risk of being diagnosed as having a malignancy\(^{122}\).

Chronic stress may result in tolerance of endogenous opiates, reduced plasma cortisol and enhanced ACTH leading to immunoenhancement, whereas acute stress produces an increase in cortisol, learned helplessness and depression leading to immunosuppression\(^{45,128}\). Hence acute stress reinforces cancer-proneness and induces tumor development; but chronic stress, to which people with a certain personality type (high neuroticism (N) and psychoticism (P), low extraversion (E)) are more exposed because of innate reaction potential and arousability (the genetic factor), seems to protect the people with such a personality type against cancer\(^{4,5,128,129}\) (cf. Chapter 6: such a genetic factor may predict HLA antigen status). These and other later studies indicated that prophylactic intervention is possible, by the use of cognitive behavior therapy (termed creative novation therapy), to produce such a personality type, which can protect patients against immunosuppression hence cancer progression\(^{4,5,23,24}\), through enhanced adaptation (inoculation) to stress.

### 3. Suppression of emotion

**Retrospective studies**

Retrospective case comparison studies of cancer patients (Table 3) revealed a significant role of emotions in cancer incidence. These studies can be summarized in terms of a personality in which there is a tendency to suppress or deny emotions\(^{75,22}\), and to have reduced expression of emotions, especially, dysphoric ones\(^{108,120,130,131}\). Emotionally repressed, hence cooperative and uncomplaining, personality characteristics were typical of many cancer patients. These clinical case studies of a repressed expression of emotions in

### Table 3 Research design for assessing personality and cancer\(^{132}\)

<table>
<thead>
<tr>
<th>Design</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrospective</td>
<td>Assessment of personality after cancer diagnosis</td>
</tr>
<tr>
<td>Quasi-prospective</td>
<td>Assessment of personality after seeking medical consultation but prior to cancer diagnosis</td>
</tr>
<tr>
<td>Retrospective</td>
<td>Examination of cancer incidence and mortality among a cohort whose personality was assessed at earlier time for some other reason</td>
</tr>
<tr>
<td>Prospective</td>
<td>Baseline personality assessment of a cohort who are followed for cancer morbidity and mortality</td>
</tr>
</tbody>
</table>
cancer patients (less likely reporting poor QOL) contributed to the construct of a Type C personality\(^{132}\), which is comparable to the concept of Types A and B in cardiovascular disease-prone and healthy people. Later studies\(^{133}\) directly supported the idea of this personality, when it was found that patients with malignant melanoma, in comparison with patients with cardiovascular disease, showed greater psychophysiological arousal to emotional stimulation but reported less emotional perturbation in response to the potentially upsetting stimuli.

**Experimental study**

Three groups tested were Type C cancer patients, Type A cardiovascular disease patients, and Type B healthy subjects (control)\(^{133}\). They were shown slides designed to distract them emotionally, to provoke anger, anxiety, sadness, threats to self-esteem or to interpersonal needs or harmony. Autonomic arousal measures were taken and they were asked how bothered by the slides. Patients were scored as repressive if they denied being bothered but showed strong arousal. Cancer patients showed the highest score, cardiovascular disease patients the lowest, and healthy subjects the middle score, on this repression index. Hence Type C cancer patients maintain emotional suppression (nonexpression) and may show rational/antiemotional interpersonal relations, despite (unexposed) distress or strain\(^{96}\), contrary to Type A cardiovascular disease patients who are characterized by expression (not suppression) of anger, hostility, aggression, cynical distrust, etc. These (personality) traits, as opposed to (temporary) states, should be less affected by retrospective account, hence these findings can be considered in that light. It is noted that these personality constructs hold, despite the major limitations in research design posed by the absence of control for site, stage, the mode of treatment of cancer, as well as demographic variables, which are important in identifying appropriate controls for comparison.

**Retro- or quasi-prospective studies**

Retroprospective studies (Table 3) have found more repression and less self-reported depression or denial among patients who developed cancer of multiple sites ten years later\(^{144}\). In these studies patients were examined for other known risk factors as well as personality; findings were adjusted for age, sex, occupation, marital status, family history of cancer, smoking, alcohol, body mass, serum cholesterol, etc. The question of a possible role of these personality factors, as initiators or promoters of cancer, based on these and other later unbiased retroprospective or quasi-prospective data, requires further investigation. In prospective studies, baseline personality data were obtained first, and healthy subjects were followed for many years for subsequent development of cancer and mortality. These prospective\(^{49,50,35,136}\) and some quasi-prospective\(^{137}\) studies typically found that those who later developed cancer were initially low neuroticism scorers and tended to suppress their emotions.

**Differentiation of suppressors**

Although cancer-prone personality characterized by suppression of emotions was measured by the use of low scores on the neuroticism (N) scale of the personality questionnaire\(^{101}\), patients low on N would also have such low scores, without suppression of emotion. In this context, it was hypothesized that repressors (typical cancer patients) combine low scores on N/anxiety scales with high scores on lie (L)/social desirability scales\(^{138,140,141}\). This hypothesis was demonstrated by comparing verbal (suppressed, dissimulated) responses and psychophysiological (true, nondissimulated) responses to emotionally loaded questions\(^{139}\), so that low N scorers could be sorted out into true non-anxious and dissimulated non-anxious (defensive suppressors of anxiety), in terms of low and high L scores respectively.

Although many European and American studies have shown negative correlations between cancer-proneness and personality traits of neuroticism\(^{84,101,120,144\ldots154}\), correlation was found to be positive in recent German\(^{142}\) and Japanese\(^{94,95,145,147,167}\) studies, when patients or healthy subjects dropped their defenses and admitted to their true emotions without the need to suppress them. This type of situation could be created quite easily among Japanese and Germans but not other Europeans or Americans, in terms of some specific interpersonal relationships\(^{84,97,155}\). In addition, cancer-proneness, in terms of rationality (R), one of the active components of Type C personality\(^{156\ldots158}\), was positively correlated with L scale scores in Japanese\(^{96}\) but not in Germans\(^{142}\), indicating that these Japanese are defensive high anxious (high N/high L), hence there is a difference (cultural/learned or racial/genetic) between Japanese and Germans also.

In this way, the suppression of emotion can be measured with psychometric accuracy by using the Eysenck Personality Questionnaire (EPQ)\(^{139,160}\) L scale as well as N scale scores. This gives four types\(^7\): 1. high N/low L are the truly anxious persons. 2. low N/low L are the truly non-anxious persons. 3. low N/high L are the repressors (cancer-prone persons). 4. high N/ high L are defensive high anxious persons.

**Component analyses**

In a series of Japanese studies\(^{144,156,158}\), three cancer-prone personality subscales, nationality (R), emotional-defensiveness (ED) and harmony-seeking (HS)\(^{26,138,146,151,156\ldots158}\), were used to analyze active components of the cancer-prone Type C. Results generally supported the European and
American theories and evidence. These subscales were so constructed that wording of each item maintains intercultural functional equivalence of everyday living context, between Europe (Germany), America and Japan. The subscales used in three countries (in three languages) are shown in Tables 4 and 5 (German, English and Japanese versions are theoretically similar, and psychometrically equivalent, to each other).

In the Japanese studies, each Type C component as well as global measure of Type C correlated positively with one of the components of anger expression (on the STAXI), directed inward (Ax/in), that is suppressing angry feelings, indicating that cancer-prone personality is characterized by the suppression (nonexpression) of dysphoric emotion, consistent with European and American results. Properties of such an emotion suppressive personality are more pronounced by the association of R, ED or RED with this anger component than HS, which is consistent with similarly found negative correlation of RED with a tendency to experience angry feelings more frequently, or trait-anger. These results indicated that one of the components of the cancer-prone personality is associated with low emotionality among the Japanese, consistent with Western theories and evidence. On the contrary, HS was found to be positively correlated with the trait-anger, indicating that another component of Type C is characterized by high emotionality, not inconsistent with previous German findings, with global (undifferentiated) Type C measures, in that these measures were positively correlated with the EPQ N scale scores. At the same time, the results of these Japanese studies, the negative association of RED and trait-anger, and also R and the EPQ N scale scores, agree well with the findings of early British studies in that low scores on the N scale (as an indication of suppression of emotion) are associated with lung cancer.

Further Japanese findings may well support the British and American theories of emotion suppressive nature of the cancer-prone personality, in that the EPQ N scale scores correlated negatively, but L scale scores correlated positively, with R, implying that R is characterized by low N/high L, hence Japanese high R scorers (cancer-prone Type Cs) are repressors of emotions. These and other Japanese studies may also be consistent with a notion of

<table>
<thead>
<tr>
<th>Instruction: A number of statements are listed below which people have used to describe their interactions with others. Read each statement and then circle the appropriate number to indicate how often you generally react. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally react.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I try to do what is sensible and logical .............................</td>
</tr>
<tr>
<td>2. I try to understand people and their behavior ..........................</td>
</tr>
<tr>
<td>3. I try to behave reasonably in my relations with others ..................</td>
</tr>
<tr>
<td>4. I use intelligence and reason to overcome conflicts or disagreements with other people ...........................................</td>
</tr>
<tr>
<td>5. When I am in a situation in which I strongly disagree with other people, I try hard not to show my emotions ..........................</td>
</tr>
<tr>
<td>6. If someone deeply hurts my feelings, I still try to treat them reasonably and to understand their behavior ...............................</td>
</tr>
<tr>
<td>7. I try to understand other people even if I do not like them .................</td>
</tr>
<tr>
<td>8. I succeed in avoiding arguments with others by using reason and logic, contrary to my feelings .............................................</td>
</tr>
<tr>
<td>9. If someone acts against my needs and desires, I still try to understand him/her .........................................................</td>
</tr>
<tr>
<td>10. My behavior in most life situations is logical and reasonable, and not influenced by my emotions ........................................</td>
</tr>
<tr>
<td>*11. If someone deeply hurts my feelings, I may attack them or respond purely emotionally .................................................</td>
</tr>
<tr>
<td>12. My use of reason and logic prevents me from attacking others, even if there are good reasons for doing so ..........................</td>
</tr>
</tbody>
</table>

*Item reversed
Table 5  Cancer-prone Type C personality subscale: HS (Harmony Seeking)\textsuperscript{26,136,146,156–158}

<table>
<thead>
<tr>
<th>Instruction: A number of statements are listed below which people have used to describe their interactions with others. Read each statement and then circle the appropriate number to indicate how often you generally react in the manner described. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally react.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I will accept difficulties and ignore my own needs in order to have harmonious relationships with others</td>
</tr>
<tr>
<td>2. My aim in life is to live for my dearest friends and family members, without demanding anything for myself</td>
</tr>
<tr>
<td>3. I am available to help someone I care about with even the smallest problem</td>
</tr>
<tr>
<td>4. I want to have only harmonious relations with my best friend</td>
</tr>
<tr>
<td>5. When I care about someone I go out of my way, to make that person happy</td>
</tr>
<tr>
<td>6. I am willing to make personal sacrifices to maintain smooth relationships with people I care about</td>
</tr>
<tr>
<td>7. It is important for me to do everything possible, to have harmonious relationships with people I care about</td>
</tr>
<tr>
<td>8. When I cannot be with my closest friends, I enjoy talking with them on the telephone</td>
</tr>
<tr>
<td>9. It is very important to me to make my dear ones happy</td>
</tr>
<tr>
<td>10. When there is a conflict between my own needs and taking care of someone important to me, I will sacrifice my own needs to help the other person</td>
</tr>
<tr>
<td>11. I feel responsible for making my relationships with others go as smoothly as possible</td>
</tr>
<tr>
<td>12. It is very important to me to get along perfectly with people who are dear to me</td>
</tr>
</tbody>
</table>

anxiety, characterizing Type C personality\textsuperscript{7,47}, in that N scale scores correlated positively, whereas L scale scores correlated negatively, with HS, implying that HS is characterized by high N/low L, so that Japanese high HS scorers (cancer-prone persons) are truly anxious persons.

In addition, the ED scale scores\textsuperscript{156} as well as global measures\textsuperscript{143,145} of cancer-prone personality were associated positively with the EPQ E scale scores, implying that the Japanese (undifferentiated) Type C cancer-proneness is associated with hysterical disposition (high N/high E), although such a cancer-proneness of Germans\textsuperscript{142} was associated with dysthymic personality (high N/low E). These Japanese and German findings equally agree with the relationship of this personality (cancer-proneness) and the disease (cancer) postulated by the Western theories\textsuperscript{3–5,7,170}, in terms of the concept of arousal, in that the CNS depression or low arousal/arousability facilitate the development of cancer, which relates hormones and peptides in the neuroendocrine and immune systems, ACTH, cortisol, cytokines, etc., with stress or strain. These Japanese results are also consistent with the Swedish and British studies\textsuperscript{135,171,172} associating extraversion (E) with cancer.

Japanese high R scorers (repressors of emotions) were associated positively with Rogerian (nondirective), but not Skinnerian (directive), interpersonal reaction type scores\textsuperscript{156}. On the contrary, high HS scorers (truly anxious Japanese) were associated positively with both of these interpersonal reaction types: they were also associated positively with Rogerian, but not Skinnerian, interpersonal action type scores\textsuperscript{145–147,156,163–166}. These Japanese results suggest that repressors (but not truly anxious persons) communicate or express less their emotions, feelings or intentions, when they are communicated by others (doctors, nurses, etc.); whereas truly anxious persons communicate/express less their feelings/emotions or intentions, when they communicate to others. Since their interpersonal actions/reactions generally depend on nondirective (passive) ways, the high R scorers (repressors) and also high HS scorers (truly anxious persons) may have greater difficulty in communicating with others (families, medical staffs, etc.) actively as well as passively,
leading to greater relative risk of developing cancer-proneness, distress or strain, and related changes in hormones and peptides in the neuroendocrine and immune systems\(^5\). This possibility is consistent with the findings by American (Alameda County) study\(^{173,174}\) , that lower level of satisfaction with social life (interpersonal relations) and feeling socially isolated enhance risk of cancer.

### 4. Fighting spirit and stoic acceptance

Survival from breast cancer was found to be related to the personality trait characterized by fighting-spirit (confidence, motivation), in that women with this trait had a better prognosis than those showing stoic-acceptance (desperation), hopelessness, helplessness or denial\(^{27-30}\). Hence patients with emotion suppressive (cancer-prone Type C) personality survived less well than those showing the opposite type of (emotion expressive Type A or B) personality (Fig.1). These British findings are equivalent to American studies showing that breast cancer patients who survived more than one year had higher ratings on measures of hostility and anger (i.e. fighting spirit) than those who died within the first year\(^{179}\). These personality differences were shown in patients matched for age, sex, intelligence, and stage of cancer\(^{178}\). American long term survivors were typically found angrier (expressing deteriorated QOL: cf. Chapter 7, for poor QOL associated with cancer-proneness in Japanese), but without loss of control (as in Type B), showing underlying strong emotions or emotionality, hostility, aggressiveness, etc., (as in Type A personality)\(^{177}\).

When patients were classified into two types, 81% of fighting spirit type patients were still alive, but only 20% or less of the stoic acceptance (hopeless, helpless) type patients, after 10 or 15 years from the outset of the study\(^{27,178,179}\). This series of British studies was successfully replicated by an American study\(^{180}\), using patients suffering from malignant melanoma.

These British and American results are in good agreement with each other and with predictions from the theories of personality\(^3\-\(^9\), and also recent Japanese result\(^{147,156,158,167,168}\). All these studies showed that the person with cancer-prone personality is not only more likely to develop cancer, but also less likely to survive at a certain stage\(^7\). However, such personality factors as worrisome, carefulness, self-regulation, etc. (as in high N/low E, low N/high E) may influence when the patient seeks medical help in the development of cancer\(^{111}\), hence contribute to longer survival. A series of Japanese studies\(^{146,147,156,158,167,168}\) are generally consistent with these European and American findings, in that cancer-prone Type C personality and related variables were negatively related to the measures of fighting spirit or self-regulation (which may include Type A behavior patterns, outward anger expression (Ax/out, etc.) and positively related to those of stoic acceptance or desperation. In these studies, the Type C personality was assessed using the RED and HS scales\(^{156,158}\) as well as global measures\(^{49,50,145}\). Fighting spirit and stoic acceptance were assessed by the response scores on the Doctor-Patient Communication Questionnaire, with a 4-point Likert-type rating, in terms of the way in which the subject (as an imaginary cancer patient) will communicate with doctors before or after the diagnosis is made. The fighting spirit (or self-regulation) referred to "I want complete and accurate information about the diagnosis and prognosis of my cancer", "I will fight against my cancer"; and the stoic acceptance (or desperation) referred to "I will accept as destiny whatever the diagnosis of my cancer may be, and live peacefully rest of my life"\(^{156}\).

### 5. Prospective studies

Table 6 shows the self-regulation scores (away from cancer-prone personality) of five groups of patients suffering from different types of cancer, related to years of survival\(^7\). Patients surviving 1-2 years had low scores, while those surviving 18 years or more had higher scores. There is a linear relation between these scores and years of survival in all five groups. Although many of the personality traits suggested to favor survival may be correlated with known physical risk factors (smoking, alcohol, diet, etc.); Table 7 shows that drinking and smoking went up with greater self-regulation (i.e., lesser cancer-proneness) in patients who survived, and went down with greater self-regulation in those who died. Hence these results suggested that survival time of cancer patients depends on personality (not physical risk) factors\(^7\).

Contrary to these German studies, American studies\(^{182,183}\) have shown that more depressed patients had twice as high a risk of death from cancer as less depressed patients. This
Table 6 Survival time of cancer patients as a function of self-regulation (healthy Type B personality), as opposed to cancer-prone personality

<table>
<thead>
<tr>
<th>N</th>
<th>Survival time (Years)</th>
<th>Mean</th>
<th>Type of cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Breast</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>156</td>
<td>1-2</td>
<td>1.4</td>
<td>10</td>
</tr>
<tr>
<td>156</td>
<td>3-5</td>
<td>4.3</td>
<td>15</td>
</tr>
<tr>
<td>117</td>
<td>6-9</td>
<td>7.8</td>
<td>20</td>
</tr>
<tr>
<td>103</td>
<td>10-17</td>
<td>14.7</td>
<td>19</td>
</tr>
<tr>
<td>89</td>
<td>18-27</td>
<td>23.9</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>74</td>
</tr>
</tbody>
</table>

SR = Scores on the self-regulation inventory

Table 7 Physical risk factors (smoking and drinking) in cancer patients as a function of self-regulation (healthy Type B personality), as opposed to cancer-prone personality

<table>
<thead>
<tr>
<th>Self-regulation score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Cigarettes per diem (number)</th>
<th>Alcohol per diem (gram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survived</td>
<td>15.3</td>
<td>15.6</td>
<td>14.7</td>
<td>24.6</td>
<td>21.7</td>
<td>22.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>26.9</td>
<td>25.6</td>
<td>24.3</td>
<td>23.9</td>
<td>21.3</td>
<td>21.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survived</td>
<td>21.6</td>
<td>23.6</td>
<td>39.8</td>
<td>48.7</td>
<td>42.6</td>
<td>44.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>75.8</td>
<td>79.4</td>
<td>69.6</td>
<td>28.3</td>
<td>24.2</td>
<td>25.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

seems to contradict the earlier British study(101) showing a negative relation between neuroticism and cancer, but it was pointed out that the correlation was with death from cancer, not with onset. Hence neuroticism is related negatively to the lack of fighting spirit (as discussed earlier) to prolong survival of cancer patients. In addition, in an American study(134), cancer patients were far less depressed and significantly more repressed than healthy subjects, consistent with the early British study(101) and the present theory(7). One of the longest-continued studies (continued over 40 years) reported that those who were loners and suppressed their emotions had the highest risk of cancer, i.e., 6 times more likely to develop cancer than those who gave vent to their emotions(185,186). These studies can be interpreted as a compelling evidence that Type C personality is a cancer-risk factor(7). The fact that these European and American studies agree well with each other, differentiating cancer patients from non-cancer individuals in terms of personality, suggests strongly that it is not cancer that causes personality changes, but the personality that causes cancer(7).

In more voluminous prospective studies, carried out in Yugoslavia(17) and Germany(49,136), healthy individuals were selected on a randomized basis, medically tested, interviewers applied questionnaires and information collected on physical risk factors, lifestyle habits, etc. Cancer mortality and incidence were assessed after a 10-year follow-up. Data were collected to assess cancer-prone personality by means of a set of trait inventories theoretically based to predict cancer and other diseases. Questionnaires used included: (1) Number of traumatic life-events evoking chronic helplessness/hopelessness. (2) Rational-antiemotional behavior (suppression of emotion). These personality factors (Type C components) were found to be more important in the prediction of cancer than physical factors(4,5,136,187).

Figs. 2, 3 and 4 show results from the original Yugoslav and the two German studies. The Yugoslav sample was 60 years old on average, and two German samples 10 years younger. Subjects were either randomly selected or composed of persons judged to be stressed by relatives and friends. Mortality was clearly greater in the older sample than in the younger random sample, and greater in the stressed than in the non-stressed sample. In all samples, cancer mortality was highest in Type C probands. The German studies were continued for another four and half years. The results are shown in Fig. 5. They show a continued significant effect along the same lines.

Results of a number of independent replication studies, of these original Yugoslav and German studies, continue to be supportive of theory. Nothing is more convincing than successful independent replication. Among the more interesting of these studies are those carried out in various
parts of Germany, Netherlands, Australia, America, Japan, and elsewhere. These replication studies either found high predictability for cancer, identified relevant variable involved, clarified the meaning of original factors in terms of more familiar concepts, suggested cultural differences, or improved psychometric procedures, in divergent international contexts.

6. Personality intervention, response to drug therapy, and HLA antigen status

More convincing research strategy involves psychological intervention, along therapeutic lines, which would lead to measurable changes in Type C personality, and a reduction in the cancer mortality, to prolong life expectancy of patients with inoperable cancers. The original German study reports on 24 pairs of terminally-ill cancer patients matched for type of cancer, and then allocated randomly to psychological treatment (prophylactic cognitive behavior therapy of Type C) or control. Mean survival time was 3.09 years for the control group, 5.07 years for the therapy group. British studies reported that terminal breast cancer patients receiving psychological treatment survived about twice as long as those not receiving the treatment. Women with terminal cancer of the breast were also subjects of later German studies, in which half had agreed to drug therapy, half had refused; half of each group received behavior therapy, half did not. Both drug therapy and behavior therapy did significantly better than no therapy in prolonging life, both together did specifically better than the sum of their individual effects; i.e., these was a synergistic effect. These studies suggest that personality intervention has a significant effect on survival, and that specific effects of a certain drugs may change as a function of personality. These results indicated that the personality was a significant prognostic factor.

There may be some prognostic differences in gastric cancer patients between Japanese and Europeans. The survival
Table 8 Variables related to cancer-prone Type C personality\(^5,96,147\)
(A summary of results from Japanese and Western studies)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type C personality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Japanese</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>−</td>
</tr>
<tr>
<td>Age (older)</td>
<td>−</td>
</tr>
<tr>
<td>Marital status (married)</td>
<td>−</td>
</tr>
<tr>
<td>Work condition (stressed)</td>
<td>+</td>
</tr>
<tr>
<td>Problem-focused coping</td>
<td>0</td>
</tr>
<tr>
<td>Emotion-focused coping</td>
<td>+</td>
</tr>
<tr>
<td>Coping by denial</td>
<td>+</td>
</tr>
<tr>
<td>Anger suppression</td>
<td>+</td>
</tr>
<tr>
<td>Anger expression</td>
<td>−</td>
</tr>
<tr>
<td>Type A behavior pattern</td>
<td>− 0</td>
</tr>
<tr>
<td>Health practice</td>
<td>−</td>
</tr>
<tr>
<td>Body mass</td>
<td>−</td>
</tr>
<tr>
<td>QOL, psychological</td>
<td>−</td>
</tr>
<tr>
<td>QOL, somatic</td>
<td>0</td>
</tr>
<tr>
<td>Parents’ Type C</td>
<td>+</td>
</tr>
<tr>
<td>Social support, resources</td>
<td>−</td>
</tr>
<tr>
<td>Communication style, directive</td>
<td>−</td>
</tr>
<tr>
<td>No siblings</td>
<td>+</td>
</tr>
<tr>
<td>Fighting spirit</td>
<td>−</td>
</tr>
<tr>
<td>Stoic acceptance</td>
<td>+</td>
</tr>
<tr>
<td>Extraversion (E)</td>
<td>+</td>
</tr>
<tr>
<td>Neuroticism (N)</td>
<td>+</td>
</tr>
<tr>
<td>Psychoticism (P)</td>
<td>− 0</td>
</tr>
<tr>
<td>Social desirability (L)</td>
<td>+</td>
</tr>
</tbody>
</table>

rate (%) of British patients in pTNM stages I, II and IV was 39, 18 and 5\(^5,96\), whereas that of Japanese patients was 69, 42 and 7\(^5,96\). HLA antigen status was found to predict the Japanese patients’ response to therapy\(^91\). Hence, genetic factors and the response to drug therapy may differ between Japanese and British gastric cancer patients. In this context, a certain personality factor is expected to predict the HLA antigen status, since personality traits (E, N, P) or their factors (genotypes) are strongly determined by the genetic factors\(^5,96,192\) (cf. Chapter 2: stress inoculation effect, a personality factor, is linked with innate reaction potential and arousability, a genetic factor.). The EPQ\(^5,96,160\) (a culture-fair standardized personality questionnaire, in English, German, Japanese\(^5,96,158\) and many other languages) seems useful in identifying personality correlates of HLA antigen status, to predict gastric cancer patients’ response to adjuvant therapy. This may lead to individualized therapy for cancer patients by means of personality assessment, as well as HLA antigen evaluation\(^91\), by classifying them into four personality groups in terms of the scores on N and L scales\(^7,156\), for easy clinical application.

7. Quality of life (QOL) and personality

American studies reported evidence that psychological interventions can increase cancer patients’ optimism, reduce feelings of hopelessness, and improve the quality of life (QOL), leading to an increase in the number of NK cells\(^35,202\). Similarly, it was found that malignant melanoma patients who received group psychological therapy improved the QOL and had higher amounts of NK cells\(^52,53\). Melanoma patients were divided into two groups; the experimental group receiving a 6-week structured behavior therapy, while the control group received only the routine medical care also received by the experimental groups. A measure of distress (expression of emotion) taken at baseline was found to be a positive factor for survival: this is in good agreement with the fighting spirit hypothesis, and the relation between suppression of emotion and cancer. An important finding here is that the psychological distress or dysphoric emotion (which may signify poor QOL) becomes a positive factor for survival in American patients with fighting spirit. On the contrary recent Japanese studies\(^146,156\) have shown that the QOL scores (a measure of non-distress, no somatic complaints) were negatively correlated with one of the subscales of cancer-prone personality, R (but not ED or HS), hence distress may be a negative factor for fighting against cancer in Japanese. Such a correlation was more pronounced with psychological, than somatic, items of the questionnaire, the QOL-20\(^181\). These results suggest: (1) high R scorers (Type Cs) are less likely to report or express (viz, suppress) their positive emotions (or satisfaction); (2) they are more likely to report or express (not suppress) their negative emotions (distress or frustration); leading to deteriorated QOL scores in Japanese. The former is a suppressor (low N/high L), and the latter is a truly anxious/angrier person (high N/low L); both may differ from Americans\(^2,53\). In this context, it is interesting to note that the score of toughmindedness (on the EPQ psychoticism scale) was positively correlated with the psychological items of the QOL-20 in Japanese\(^96,156\). Hence, the QOL measure needs to be used along with the EPQ, so that such a possible cultural difference could further be elucidated.

8. Concluding remarks

Although at present personality as a risk factor for developing cancer, in terms of a cancer-prone personality, leaves many problems, the concept of a Type C personality (as opposed to Type A, and away from Type B), with reduced expression or suppression of emotions (primarily dysphoric ones), could be explored as a most likely candidate for contributing to cancer incidence and progression, in relation to such variables as shown in Table 8\(^9,96,147\). The increasing focus, in many divergent studies...
carried out in Europe, America and Japan, on a potential contribution of personality to cancer and its control makes this an area of great research interest; particularly in light of the emerging evidence of perturbation of the immune system by psychological states (as a function of personality, genetic or postnatally developed), and the modulation of function and reactivity of the immune system through cytokines as well as hormonal and CNS-mediated neuropeptides, which are linked with such psychological states, viz., personality. Cytokines such as IL-1, produced by cells of the immune system, have direct effects on the CNS through a functionally important feedback loop that enables the CNS to regulate (as a function of Type C personality) the strength of the immune system’s response to cancer cells. Results of these studies strongly suggest that: specific (emotion-suppressive) personality traits (neuroticism, social desirability) play a part in predisposing certain people to cancer (via inefficient stress inoculation); such personality traits (stoic acceptance, lack of fighting spirit) serve to shorten the life-span of people already suffering from cancer; hence psychological intervention in these personality traits (prophylactic behavior therapy) can cause cancer-prone people to avoid developing cancer, increase cancer patients’ desirability) play a part in predisposing certain people to cancer; hence psychological intervention in these personality traits (prophylactic behavior therapy) can cause cancer-prone people to avoid developing cancer, increase cancer patients’ QOL, and help terminal cancer patients to live longer, through synergistic interaction with primary therapeutic interventions.

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