

# The Effects of a 24-h Psychological Training Program on Attitudes, Communication Skills and Occupational Stress in Oncology: a Randomised Study

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The usefulness of psychological training programs (P.T.P.) in health care settings devoted to cancer care is beginning to be recognised but their content, form and effectiveness need further investigation. Seventy-two oncology nurses were randomly assigned to a 24-h P.T.P. or to a waiting list period. Attitudes were assessed by a semantic differential questionnaire, occupational stress was assessed by the Nursing Stress Scale and communication skills were assessed by standardised videotaped role-playing exercises. These were used to compare trained (T.S.) and control subjects (C.S.). The results show a significant training effect on attitudes ( $P = 0.05$ ), especially on those related to self concept ( $P = 0.004$ ), and on the level of occupational stress related to inadequate preparation ( $P = 0.02$ ). Limited changes were found regarding post-training communication skills. T.S. were significantly more in control of the interview than C.S. ( $P = 0.02$ ). The results indicate that 24-h P.T.P. assessed here are effective. The data also demonstrate the need to consolidate the skills acquired by regular post-training sessions.

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## INTRODUCTION

THE MEDICAL and nursing staff can, through their listening attitude and interventions, contribute to the psychosocial adjustment of cancer patients as well as to the maintenance of their quality of life. However, general professional training remains essentially centered upon technical aspects, not investigating the problems raised by the psychosocial issues of cancer care. Moreover, cancer care in general and nursing in particular has been frequently described as stressful [1, 2].

The importance of psychological training programs (P.T.P.) is often recognised and these programs are being implemented more and more frequently in general hospitals and other health care settings. Elaboration of their content and form varies, however, with the experience and personal options of the trainer. Interventions can be educational, behavioural and/or psychodynamic [3–11]. There have been several reports regarding their effectiveness using cognitive, emotional, behavioural or attitudinal measures of change [12–23]. Small groups have been mostly used to provide conceptual knowledge and practical skills for health care professionals [24].

In a study on brief training effectiveness [26, 27], 12-h multidisciplinary P.T.P.—using a pedagogical model—have been shown to produce significant attitude changes. However,

while attitudes moved significantly to the positive pole immediately after the training, 1 year later the reverse phenomenon was noticed.

It is often argued that communication skills and attitudes interfere with occupational stress and consequently with quality of care. Post-training communication skills and attitude changes could be linked to a better quality of care and to more effective coping with occupational stressors met with in oncology, without, however, enough empirical evidence of these relationships [28].

A randomised study was, therefore, designed in order to assess the effectiveness of a 24-h P.T.P., using attitudes, communication skills and occupational stress as end points. An experienced nursing population was chosen in this study because of the availability of validated and specific assessment tools and for a feasibility reason.

## SUBJECTS AND METHODS

### *Study design*

A randomised group design was used in which nurse candidates for a P.T.P. were allocated to a P.T.P. group or to a 4-month waiting list group. For all the subjects allocated to the waiting list period, a P.T.P. was scheduled after 4 months. The randomised interventions were indicated by opening a sealed envelope once subjects satisfied the inclusion criteria of the study. Subjects were randomised separately in the different institutions in order to allocate 6 subjects to the training program and 6 subjects to the waiting list in each consecutive group of 12 eligible subjects in an institution.

### *Psychological training program*

P.T.P. consisted of 8 weekly sessions of 3 h. Training groups were made up of six participants. P.T.P. was conducted in

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accord with a detailed unpublished manual (available by writing to the authors) that specified aims, contents and techniques. The aim of the program was to develop understanding on psychosocial issues in cancer care and to improve communication skills of participants. The content of each session of the program included theoretical information, case presentations, role-playing exercises and time for exchanges about experiences. The content of each session is detailed in the manual and can be summarised as follows.

The first session was devoted to introducing participants to each other (about 65 min), to present the objectives of the P.T.P. and to discuss the way it was to be organised (about 80 min). All the participants also received several review papers related to the topics discussed during the program. Sessions two and three, four and five, and six and seven were, respectively, devoted to discussing the issues related to patient care, health care professionals' problems and family care. Each of these sessions began with a case presentation (75 min) and was followed by a role-playing exercise with videotaped feedback (75 min) along with theoretical input given by the trainer. The role-playing exercises had the following themes: information during the diagnostic phase, pain control, support during chemotherapy, euthanasia request, health care professional-family collusion and family problems. Each participant thus had the possibility of getting feedback on one role-playing interview. The last session included a presentation of theoretical information (60 min) and an assessment of the P.T.P. by the participants (85 min). The 24-h P.T.P. assessed here had similar content compared to the 12-h P.T.P. assessed previously [26–27].

Prior to the study, this 24-h P.T.P. was tested prospectively in a sample of 55 health care professionals in order to standardise its content and to assure its feasibility in health care settings.

The trainers were two experienced psychologists who had received further clinical training in a comprehensive cancer centre (Institut Jules Bordet, Brussels). Standardisation of competence of the two psychologists was acquired by leading together P.T.P. during four complete training programs using the manual and being supervised.

### *Subjects*

Several institutions interested in organising P.T.P. were asked to participate in a research program assessing their effectiveness. The complete research protocol was, therefore, explained to the general hospital authorities. After approval of the protocol, a local organiser invited eligible nurses to participate in a preliminary meeting where aim, content and organisation issues of the P.T.P. were discussed. One hundred and seventy nurses participated in these meetings. After being informed of all organisational and research issues the first 170 nurses who firmly registered for participation in P.T.P. were included in the study.

The subjects were active nurses having professional experience in caring for cancer patients during at least 6 months, and wishing to participate in a psychological training group. All the subjects received detailed information about study objectives and methods. They were all willing to enter the study in which they understood that they would be offered a P.T.P. which could follow a 4-month waiting period, and that they would be invited to participate in an assessment procedure.

### *Assessments*

All the subjects were invited to a three points assessment procedure. Each subject had the same assessor throughout the study. The two assessors had been trained together in order to

achieve the best interrater reliability. Trainers had never been involved in the assessment procedure.

Subjects allocated to the P.T.P. were assessed 1 week before training, 1 week after the end of training and 2 months later. For the subjects allocated to the waiting list, assessments were scheduled at the same time intervals (2 and 4 months after baseline assessment). Each assessment included a structured semi-directive interview assessing attitudes, motivation to participate in the study and needs regarding the content of the training. Questionnaires assessing attitudes and nursing stress were also completed at each assessment session.

The present study incorporates a Semantic Differential Questionnaire (S.D.Q.) on the psychosocial aspects of cancer and applied in the context of supportive groups designed for oncology nurses [25]. The contrasting adjectives of the S.D.Q. remained constant for each concept scored and were chosen from the evaluative adjective scales [29]. The questionnaire was translated into French.

The questionnaire consists of a list of 20 attitudes, each of which must be located on 13 semantic differential scales. For each group (training and control) of subjects, a set of 20 indices was obtained, corresponding to attitude changes for the 20 questions. The 20 indices were grouped in five categories, reflecting attitudes about oneself (attitudes 2, 5, 6, 10), toward terminal illness and death (attitudes 9, 11, 18), personal growth (attitudes 3, 17, 20), professional relationships (attitudes 4, 8, 13, 15) and occupational attitudes (attitudes 1, 7, 12, 14, 19). For each of the five categories or concepts, an average index was obtained by averaging the indices of attitude changes for that category's constituent attitudes.

The semantic differential scales are scored from 1 to 7 from the positive to the negative pole. By adding up the scores obtained from each question on the 13 scales, and then dividing them by 13, a score is obtained for each question. Score 4, 'neutral', is allotted whenever an answer is missing. For each subject, the scores attributed to the 20 attitudes are calculated to obtain a mean before training and a mean after training.

The Nursing Stress Scale (N.S.S.) was originally a four-point 33-item scale describing situations that have been identified as causing stress for nurses in the performance of their duties [30]. It provides a total stress score as well as scores on each of the seven subscales that measure the frequency of stress experienced by nurses in the hospital environment. A translated version of this questionnaire has been validated for its internal consistency in a sample of 178 nurses. The revised French version of the N.S.S. used in this study includes 20 items and six subscales measuring stress related to lack of support, inadequate preparation, professional conflicts, death and dying, caring and work load. The revised lack of support factor includes items 7, 11, 16 of the original N.S.S.; inadequate preparation factor includes items 15, 18, 23; professional conflicts factor includes items 2, 5, 9, 24; death and dying factor includes items 6, 8, 12, 13; caring factor includes items 3, 4, 21; workload factor includes items 27, 30, 34.

Standardised role-playing sessions were proposed in all the subjects 2 months after training or at the third assessment for the waiting group. Each subject received the task of interviewing a simulator in a given scenario in order to understand his/her needs and problems. Six scenarios were available for the role-playing exercises. A 5-min videotaped assessment interview was scheduled, using a different scenario for each subject of a given group. This was organised in order to avoid bias due to the fact that subjects assessed on the same day may be influenced by

information related to the same scenario. Patient roles were performed by 35 volunteers (simulators). Each simulator played the same scenario once in the training arm and once in the waiting arm of the study. These simulators were selected from professional and private acquaintances of the investigators. All were paid for their participation in the study.

Videotapes of the assessment interviews were retranscribed by the research staff secretary. These retranscribed interviews were then assessed by an independent rater (a psychologist) according to the Cancer Research Campaign Workshop Evaluation Manual (C.R.C.W.E.M.) which was translated in French. The rater was blind for the trained or non-trained status of the subject assessed. In order to avoid inter-rater reliability problems, only one rater was in charge of the assessment of the videotaped interviews. The C.R.C.W.E.M. provides a rating of form, function and content, of each utterance of an interview. The rating manual is also designed to assess who is in control of the interview and to demonstrate the ability of the interviewer to use cues provided by simulators. Blocking behaviours are also rated. Because the assessment interviews were focused on the first 5 min of the interview, it was decided to avoid scoring the following functions: reassurance, inappropriate advising and understanding hypothesis. Response to understanding hypothesis was, therefore, not scored in the content categories analysis.

#### Statistical analysis

The statistical analysis was performed by using the SPSS PC+ v 4.0 software. Univariate analysis includes  $\chi^2$  tests to compare the distribution of categorical variables and Student's *t*-tests (paired or independent) to compare the means of continuous variables. For multivariate results, we used analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA) sometimes with a repeated measures design; the hypothesis tests were based on Fisher-Snedecor statistics. All significance probabilities are two-tailed.

The amount of attitude change immediately after training and 2 months later was measured by the following formula [25]:  $d_{ij} = i - j$  [*i* and *j* representing scores before (1), immediately after (2), and two months after (3) training]. A negative  $d_{ij}$  ( $i < j$ ) means a negative change, as the highest values on the differential semantic scale of the questionnaire represent a negative attitude. Each attitude and concept in each group of subjects, as well as the total score, was studied in order to evaluate the level of significance of the difference observed when comparing the mean scores before and just after the training, and 2 months later.

For the N.S.S., a statistical analysis was also performed for each item, each concept and total score.

Percentage for each category of utterances forms, functions, contents, type of control and blocking of behaviour, was calculated for each role-playing exercise along with proportions of cue-based utterances and the levels of psychological depth of each of them. These percentages among the two groups were treated as continuous variables and compared with an analysis of variance (Fisher-Snedecor statistics).

## RESULTS

Four general hospitals agreed to participate to the study. Thirty-six nurses from the Centre Hospitalier Universitaire de Liège (Belgium), 12 from the Hôpital de la Citadelle de Liège (Belgium), 12 from Hôpital Civil de Verviers (Belgium) and 12 from Hôpital St Joseph de Paris (France) were included in the study.

A total sample of 72 nurses was thus included in the study. As shown in Table 1, the baseline characteristics for the randomised groups were similar (age, sex, marital status, education, professional status and professional experience with cancer patients during the last 2 years).

After initial contact one subject was unable to continue participation in the training. Two subjects belonging to the waiting list group and one to the trained group refused to participate in the role-playing exercise. These subjects were excluded from the data analysis.

Changes of attitude were estimated statistically in repeated measures analysis of variance. A significant training effect was found on the total attitudes score ( $F = 3.05$ ;  $P = 0.05$ ) and on the self-concept attitudes scores ( $F = 3.27$ ;  $P = 0.04$ ). As shown in Table 2 most attitudes moved to the positive pole just after the training while no change was found in the control group. Moreover, global attitudes about self, attitudes toward illness and death, and occupational attitudes moved significantly (two-tailed Student's *t*-test;  $P < 0.01$ ) to the positive pole just after the training. Two months after the training the reverse phenomenon is noticed.

Using a repeated measure analysis of variance, a training effect on one nursing stress subscale is found: stress related to inadequate preparation ( $F = 4.15$ ;  $P = 0.02$ ). The nursing stress subscale includes the following items: feeling inadequately prepared to help with the emotional needs of a patient, being asked a question by a patient for which I do not have a satisfactory answer, and feeling inadequately prepared to help with the emotional needs of a patient. These results are reported in Table 2.

The comparison of ratings related to form, function, content, structure, control, use of cues and blocking behaviours of the transcribed assessment interviews shows only that trained subjects were more in control of the interview than control subjects ( $F = 5.87$ ;  $P = 0.02$ ).

Table 1. Baseline characteristics for randomised groups

|  | Training group<br>( <i>n</i> = 36) | Control group<br>( <i>n</i> = 36) |
|--|------------------------------------|-----------------------------------|
| Age  |                                    |                                   |
| Mean   | 32.5                               | 30.5                              |
| S.D.   | 9.0                                | 7.7                               |
| Range  | 21–53                              | 21–49                             |
| Sex  |                                    |                                   |
| Female   | 35                                 | 32                                |
| Male   | 1                                  | 4                                 |
| Marital status   |                                    |                                   |
| Single   | 11                                 | 21                                |
| Married  | 17                                 | 13                                |
| Other  | 8                                  | 2                                 |
| Education  |                                    |                                   |
| College  | 0                                  | 1                                 |
| High school  | 35                                 | 34                                |
| University   | 1                                  | 1                                 |
| Professional status  |                                    |                                   |
| Nurses   | 33                                 | 33                                |
| Head nurses  | 3                                  | 3                                 |
| Experience with cancer patients<br>during the last 2 years |                                    |                                   |
| 1–10 patients  | 8                                  | 5                                 |
| > 10 patients  | 28                                 | 31                                |

S.D., standard deviation

Table 2. Post-training changes: attitude and stress

|  | Training group<br>(n = 35) |         | Control group<br>(n = 36) |        | P§   |
|--|----------------------------|---------|---------------------------|--------|------|
|  | d12                        | d23     | d12                       | d23    |      |
| Semantic differential questionnaire (S.D.Q.) |                            |         |                           |        |      |
| Attitudes toward oneself                     | 0.316†                     | -0.260* | -0.024                    | 0.030  | 0.04 |
| Attitudes toward illness and death           | 0.338†                     | -0.147  | 0.037                     | 0.001  | 0.11 |
| Personal growth                              | 0.121                      | -0.167  | -0.153                    | 0.017  | 0.20 |
| Professional relationship                    | 0.151                      | -0.142  | -0.111                    | 0.043  | 0.07 |
| Occupational attitudes                       | 0.389†                     | -0.222† | 0.109                     | -0.042 | 0.17 |
| S.D.Q. total score                           | 0.278†                     | -0.193* | -0.012                    | 0.005  | 0.05 |
| Nursing stress scale (N.S.S.)                |                            |         |                           |        |      |
| Lack of support                              | 0.324                      | -0.048  | 0.204                     | -0.389 | 0.92 |
| Inadequate preparation                       | 1.038‡                     | -0.057  | 0.315*                    | 0.093  | 0.02 |
| Professional conflict                        | 0.114                      | -0.214  | 0.097                     | -0.063 | 0.81 |
| Death and dying                              | 0.171                      | -0.064  | 0.035                     | 0.035  | 0.71 |
| Caring                                       | 0.371                      | -0.162  | 0.157                     | -0.167 | 0.61 |
| Work load                                    | 0.114                      | 0.419*  | 0.324                     | 0.093  | 0.56 |
| N.S.S. total score                           | 0.334†                     | -0.033  | 0.176                     | -0.010 | 0.57 |

d12 One week before training–1 week after training differences for the training group/baseline–2 months postbaseline differences for the control group.

d23 One week after training–2 months after training differences/2 months and 4 months postbaseline differences for the control group.

\* $P < 0.05$  (two-tailed) Student's paired  $t$ -test. † $P < 0.01$  (two-tailed) Student's paired  $t$ -test. ‡ $P < 0.001$  (two-tailed) Student's paired  $t$ -test. § $P$  value of Fisher–Snedecor statistic (MANOVA testing a group effect).

Although no other differences were found it is worthwhile describing some of the findings. The first 5-min test interview included the following frequencies of utterance forms: 64% statements, 22–26% directive, leading and multiple questions and 3–4% open, open directive and screening questions. Among the utterances functions used by participants, reassuring, negotiating, advising and confronting (about 40%) and acknowledging (about 20%) are highly represented. The psychological depth of the interview remains mostly neutral (about 66%). Each utterance is very frequently interview cue-based (about 90%). Blocking behaviours are noticeable in about 18% of utterances. These results are summarised in Table 3.

## DISCUSSION AND CONCLUSION

This randomised study assessing the effectiveness of P.T.P. for health care professionals and more especially for nurses dealing with cancer patients challenges beliefs about their supposed—often over- or underestimated—usefulness.

The results suggest that a 24-h P.T.P. induces attitude changes especially for attitudes related to the self concept of trained subjects. These changes of attitudes are associated with a reduced level of occupational stress related to an inadequate preparation. Moreover, training offers communication skills to participants allowing health care professionals to be more in control of an interview.

After 2 months, the changes due to the training are limited. Such limited training effects could be explained by the short duration of the training assessed here. Results show that the significant attitude changes observed just after the end of the program were no longer evident after a 2-months period. The fact that attitudes move to the negative pole after the end of the training is difficult to interpret at this point.

Hypotheses that could be raised are numerous. First, the training program could be too short to teach participants the needed psychological skills related to their everyday work. Even

though statistically significant, the skills learned during P.T.P. should be considered as too limited to be clinically relevant. The training program probably gives the participants an awareness of the problems met with in cancer care, and/or facilitates their relationship with patients. It can be hypothesised that if the communication skills were assessed just after training, more learned skills could be noticed. Presumably, there is recognition that there is much to learn with a simultaneous sense of not knowing how to practically apply any new knowledge. Data reported in this study about the communication skills performed (low rate of open questions and clarifications, and high rate of premature advising and blocking behaviours, for example) during a 5-min role-playing exercise, confirm the need for training which offers participants psychological skills useful enough for daily practice.

Second, the absence of consolidation of effectiveness noticed 2 months after the end of the training could be explained by the loss of the 'peer support group effect' generated by the training program, although no reduced stress level related to lack of support is found.

Third, it can be hypothesised that the trained participants did not find support and/or time in their institutions to give them the opportunity to allow a practice development of their skills. Moreover, one should not consider too quickly that psychological skills performed during exercise are performed in the same way as in a regular clinical practice.

Therefore, the question of whether or not the training program should be longer and/or consolidated by several follow-up sessions should be investigated. Different questions should still be raised concerning the optimal techniques, number of sessions, duration and content of the training. Other possible predictors (multidisciplinary vs. monodisciplinary; medical vs. nursing staff; experienced vs. not experienced participants. . .) of effectiveness are also important issues to be considered.

A better differentiation of training and/or support programs

Table 3. Communication skills comparison of trained and control subjects

|  | Training group  |      | Control group   |      | P*   |
|--|-----------------|------|-----------------|------|------|
|  | % ( $\bar{X}$ ) | S.D. | % ( $\bar{X}$ ) | S.D. |      |
| Form of utterances   |                 |      |                 |      |      |
| Statement and response   | 63.2            | 14.1 | 64.8            | 15.1 |      |
| Questions (open, open directive and screening)                         | 3.7             | 3.0  | 2.7             | 4.1  |      |
| Questions (directive, leading and multiple)                            | 25.6            | 13.7 | 22.1            | 15.7 |      |
| Unclassifiable   | 7.5             | 5.7  | 10.4            | 7.5  | 0.19 |
| Function of utterances   |                 |      |                 |      |      |
| Eliciting information (psychological and general)                      |                 |      |                 |      |      |
| Clarification (psychological and general) and checking                 | 19.8            | 10.1 | 13.7            | 9.6  |      |
| Acknowledging, empathy and summarising                                 | 22.3            | 12.0 | 20.2            | 12.9 |      |
| Reassuring, negotiating, advising, alerting to reality and confronting | 39.4            | 19.3 | 42.6            | 19.4 |      |
| Introducing  | 2.7             | 1.8  | 3.6             | 5.9  |      |
| Unclassifiable   | 7.5             | 6.2  | 10.3            | 11.8 | 0.29 |
| Cue-based utterances   |                 |      |                 |      |      |
| Immediate and immediate partial  | 84.5            | 7.3  | 82.2            | 8.2  |      |
| Delayed and delayed partially  | 4.2             | 5.6  | 4.3             | 5.2  |      |
| Not cue-based  | 3.8             | 3.0  | 3.2             | 3.1  |      |
| Unclassifiable   | 7.5             | 5.7  | 10.4            | 7.5  | 0.13 |
| Psychological depth of the interview                                   |                 |      |                 |      |      |
| Level 1 (neutral)  | 66.8            | 21.9 | 65.7            | 21.3 |      |
| Levels 2, 3, 4   | 25.9            | 21.4 | 25.2            | 23.1 |      |
| Unclassifiable   | 7.3             | 5.7  | 9.0             | 6.7  | 0.52 |
| Blocking behaviours  |                 |      |                 |      |      |
| No blocking  | 75.6            | 10.5 | 71.1            | 15.6 |      |
| Blocking, repetition and repetition as blocking                        | 17.0            | 9.7  | 19.9            | 14.1 |      |
| Unclassifiable   | 7.4             | 5.8  | 9.0             | 67.0 | 0.33 |
| Control  |                 |      |                 |      |      |
| Participant  | 75.5            | 13.8 | 64.7            | 21.9 |      |
| Simulator  | 18.0            | 12.8 | 26.8            | 20.3 |      |
| Unclassifiable   | 6.4             | 4.6  | 8.5             | 4.2  | 0.02 |

\*P values of Fisher-Snedecor statistic (MANOVA testing a group effect). S.D., standard deviation.

designed for health care professionals should be included in future research. Such training and/or support programs should also be distinguished from interventions designed for health care professionals showing significant adjustment problems specific to cancer care.

Actually, only a small number of validated instruments measuring the effectiveness of training for health care professionals dealing with cancer patients are available. The S.D.Q., the N.S.S. and the C.R.C.W.E.M. are examples of these few instruments. Moreover, the C.R.C.W.E.M. could also be useful for rating communication skills performed during clinical interviews.

In this study it has been hypothesised that the learning of new skills is often associated with a change of attitudes and a reduction of professional stress level. The results reported here are supporting this hypothesis emphasising, however, the need to design P.T.P. focusing more extensively on communication skills by implementing, for example, regular consolidation sessions of training.

Considering the major involvement of health care professionals and especially nurses in cancer care and their direct responsibilities for the quality of care achieved, it is important to generalise the implementation of an optimal psychological education program in all health care settings. A second generation of studies should aim at assessing effectiveness of training

programs by measuring the quality of life reported by patients and families, along with an assessment of learned skills.

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# The Prognostic Value of Nuclear Roundness and Neopterin in Ovarian Cancer

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The prognostic value of clinical factors, morphometric features and neopterin, a marker for macrophage activation, was investigated retrospectively in 68 ovarian carcinoma patients. Nuclear roundness was a good predictor of patient survival. About 50% of our patients showed neopterin concentrations above the cut-off level of 275  $\mu\text{mol/mol}$  creatinine. Interestingly, those patients with elevated urinary neopterin concentration, and thus displaying a sign of activation of cell-mediated immunity, had a shorter survival than those with a normal concentration. Applying a multivariate Cox regression analysis, the only independent parameters predicting patient survival were FIGO stage, residual disease, nuclear roundness and neopterin.

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## INTRODUCTION

THE PROGNOSIS for a cancer patient depends in general on three groups of factors. The first includes those variables which characterise the tumour itself. These are tumour stage, grade and histological type [1-3]. More sophisticated methods like the determination of S-fraction, ploidy, oncogenes, tumour-suppressor genes, growth factors or proteolytic enzymes may improve the characterisation of tumours and are more objective [4-10]. The second group of parameters concerns the patient's treatment. Residual disease is a leading prognostic factor in ovarian cancer and is correlated with surgeon's skill [11]. The selected chemotherapeutic regimen, particularly platinum-con-

taining cytostatic drugs, also markedly affects survival of ovarian cancer patients [12]. The last group of prognostic indicators deals with the host. Tumour growth and, therefore, patient survival may also be affected by interactions of the tumour with the immune system, whereby cell-mediated immunity is assumed to influence cancer growth. Macrophages, cytotoxic T-cells and natural killer cells are the effector cells with the potency to reject the growing cancer, like an allogeneic transplant [13, 14].

The subdivision of prognostic factors into these three classes seems reasonable, as each class is mostly independent of the others, e.g. parameters describing the tumour, although often