Salivary cortisol response after a medical interview: The impact of physician communication behaviour, depressed affect and alexithymia

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Abstract

Objective: To explore if – and possibly how – a medical interview may affect adrenocortical activity in musculo-skeletal pain patients with and without alexithymia.

Methods: Female patients (N = 54) recruited from a patient organization for fibromyalgia completed the Toronto Alexithymia Scale (TAS-20) and subgroups with, respectively, low and high scores were selected for participation. Seven physicians conducted consultations attempting to vary their communication in accordance with given guidelines. All consultations were videotaped and analysed by The Roter Interaction Analysis System (RIAS) to evaluate the actual content of the consultations.

Results: An increase in depressed affect from pre- to post-interview was associated with relatively high cortisol levels 24 h after the consultation, but only in patients with alexithymia. Psychosocial questions from the physician were associated with increased depressed affect immediately following the interview, but not with cortisol responses at any time.

Conclusion: In patients with deficient affect regulation, increase in depressed affect after a medical interview may be associated with delayed effects in adrenocortical activity, possibly mediated by rumination.

Practice implications: Providers should be sensitive to potential deficits of affect regulation in their patients.

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1. Introduction

1.1. The medical interview and interpersonal events

The medical interview is an interpersonal event of great significance in health care and for the sick individual. There is evidence that some interpersonal events may be important sources of psychological stress, as well as buffers against stress, most extensively studied in the area of cardiovascular and other autonomic activation [1]. In a number of laboratory experiments [2] as well as observational studies [3], the effect of medical interviews on autonomic activity has been demonstrated. The most well known example of how situational factors associated with the medical interview may influence cardiovascular functioning is perhaps the white coat effect phenomenon, defined as an increase in blood pressure when measured in the doctor’s office, but not at home [4].

Interpersonal challenges have also been applied in studies of adrenocortical activity, in terms of cortisol response. Cortisol is a product of the hypothalamic–pituitary–adrenal (HPA)-axis, and is reliably associated with increased psychological stress [5]. Whereas cortisol reactivity to acute stress is a normal and protective bodily response to stress, sustained cortisol activation is associated with adverse health effects [6]. The interpersonal stressor applied in experimental studies of adrenocortical activity is often a public speaking task, or a speaking task in combination with cognitive tasks. A recent meta-analysis of laboratory research on the effect of acute stressors on cortisol responses...
reported a mean effect size of 0.39 in 37 studies with public speaking or other verbal interaction procedures as the only stressor task [7], indicating a fairly consistent, but most often small to moderate effect on the HPA-axis of interpersonal stressors. Buffer effects of interpersonal support on cortisol responses [8] have also been described.

To the best of our knowledge, only one published study on the effect of social interaction on adrenocortical activity has applied a clinical interview as stressor. Griffiths et al. investigated the influence on neuroendocrine parameters of a 7 min semi-structured clinical interview concerning potentially stressful life experiences [9]. They found that the interview did not influence cortisol responses, but found that it provoked a significant elevation of circulating natural killer (NK) cells.

From the literature on cortisol responses to interpersonal stressors, one should not expect a medical interview to be a strong stressor. In order to induce a cortisol response, the interview would probably have to contain elements that would be experienced by the patient as clearly provocative. Moreover, one would expect that the threshold for provocative content would be lower for patients with problems in affect regulation. In the present study, we therefore wanted to explore what features of the medical interview could be responsible for a potential effect of the interview on cortisol responses, to the extent that cortisol activation would be seen at all, in patients with and without difficulties of affect regulation (alexithymia). Two features related to the interview are investigated, the potential effect of physician communication style and of depressed affect at the time of the interview or initiated by the interview.

1.2. Physician communication style

In an earlier experiment, which included a pilot study of the effect of an interview on cortisol responses, our group investigated the effect of patient-centred versus physician-centred communication style, characterised by high versus low physician emphasis on psychosocial communication, on patient satisfaction and on emotional and physiological responses in high and low trait anxiety students [10–12]. We found that high anxiety students in the patient-centred condition actually tended to increase their cortisol response from pre- to post-consultation, as compared to high anxiety students in the physician-centred condition and to low anxiety students in both conditions, who most often displayed reduced cortisol levels from pre- to post-consultation [10]. The finding is in keeping with results from psychotherapy research, indicating that highly anxious patients react with increased anxiety to an emotionally provocative therapist style [13]. We would, therefore, expect that patients who had a high level of anxiety – or perhaps even more so if they displayed deficient affect regulation – would be vulnerable to an increased cortisol response to a physician communication style that emphasized sensitive topics and provoked emotions.

1.3. Depressed affect

It has been shown that fluctuations in depressed affect (state) may influence cortisol responses [14]. No data exist on the relationship between depressed affect and cortisol response in medical interviews, but it would be reasonable to expect that patients who displayed a depressed affect at the time of the consultation, or who reacted to the interview with increase in their negative affect, would show a larger cortisol response during or subsequent to the interview than patients with less depressed affect.

1.4. Pain and alexithymia

Musculo-skeletal pain patients with and without alexithymia were chosen as subjects in the present study, as we expected that patients with alexithymia would be more vulnerable to potential stress effects of emotionally relevant physician behaviours. Alexithymia is a term first coined by Sifneos, to denote patients who have difficulties in identifying and naming their emotions [15,16]. Alexithymia has been described as a common deficit in emotional functioning, for instance, among patients with somatic complaints in a psychiatric setting [17], chronic pain syndromes [18] and certain anxiety disorders [19].

People with alexithymia seem unable to differentiate and regulate their emotional experiences. Their affects are described as diffuse; they often tend to experience an undifferentiated negative subjective state [20,21]. Although there have been inconsistent findings on the psychophysiological characteristics of people with alexithymia, there is evidence from a number of studies that alexithymia tend to be associated with tonic physiological hyperarousal, that is a stable level of mild hyperarousal [22]. The findings concerning reactivity to psychological stressors (phasic arousal) are less consistent. There are few reports on cortisol response in patients with alexithymia, but an association between alexithymia and low baseline cortisol levels has been reported [23,24]. The stress reactivity of patients with low cortisol levels is found to vary; low cortisol baseline does not preclude high reactivity [25].

In interpersonal interaction, alexithymic persons have been found to be interpersonally avoidant [26] and display behaviour patterns suggestive of tension and anxiety, though not explicitly and verbally expressed [27]. We expected alexithymic individuals to be more vulnerable to increased cortisol activation in medical interviews because of their reduced ability to handle emotionally charged input and their alleged tension and anxiety in interpersonal situations.

Patients with musculo-skeletal pain problems, recruited through their membership in a fibromyalgia association, were chosen as our target patient group for the present study, to serve as an example of patients believed to be vulnerable to alexithymia and who also might have a potentially stressful relationship to physicians [28].
1.5. Cortisol activation and recovery

In studies of cortisol response to stressors, two different measures are relevant, activation and recovery. Activation is a measure of the increase in cortisol values from a baseline level to the maximum level subsequent to stress exposure. Since subjects often display a somewhat elevated cortisol already on arrival to the laboratory, an activation associated with expectations and perhaps anxiety of taking part in an experiment (anticipatory activation), the baseline assessment may be conducted at a day different from the experiment, as was done in our study.

Recovery is a measure of the decrease in cortisol values over time from the peak response back to a level corresponding to the baseline level. Whereas, the lag from stress exposure to cortisol activation response is 15–20 min, recovery may take place over a somewhat longer time frame. A recent review of laboratory studies conclude that cortisol levels most often return to pre-stressor levels by 40–60 min after the end of the stressor, but there are individual differences in patterns of recovery [7]. There is a growing interest in the phenomenon of stress recovery in psychobiological research, and failure to adapt after stress termination is associated with dysregulation of protective mechanisms [6,29].

1.6. Aim of the study and hypotheses

The aim of the present study is to explore if – and possibly how – a medical interview may affect adrenocortical activity, and thus, serve as a source of psychophysiological stress in patients with alexithymia. The hypotheses of the study are summarized in Fig. 1.

As indicated above, the medical interview as such should not be expected to be a strong stressor in relation to cortisol activation. We therefore expected the anticipatory activation to represent the most significant cortisol increase in relation to baseline for most patients (arrow 1 in Fig. 1). We also expected most patients to display an adequate recovery from a pre-consultation high to the last assessment on the day of testing (arrow 2) and all patients to return to baseline on the assessment 24 h after the interview (arrow 3).

However, we hypothesized that one subset of subjects, namely patients with alexithymia who were interviewed according to an emotionally provocative communication style, would react with negative emotions during the consultation and respond with either increased cortisol activation during the interview (seen at T4) or delayed recovery (T5), or both, indicative of a stress reaction (arrow 4). Patients without alexithymia would not be expected to display an increased cortisol response subsequent to the interview.

Moreover, we expected that alexithymic patients would be more vulnerable to display more depressed affect following psycho-emotional communication style than patients without alexithymia (arrow 5). We also expected that patients with high depressed affect immediately after the interview, or who reported an increase in depressed affect post-interview, would display higher cortisol levels than patient with less depressed affect (arrow 6), but we had no specific hypothesis as to whether or not patients with alexithymia would be particularly vulnerable to a cortisol increase associated with depressed affect.

2. Methods

2.1. Participants

Patients with chronic musculo-skeletal pain problems were recruited through their local chapter of the Norwegian
Fibromyalgia Association. Only female patients were included in the study. Of the 550 women originally invited, 162 patients (29%) volunteered to participate. Out of 133 patients completing the 20-item Toronto Alexithymia Scale [30], the 40 with the lowest scores and the 40 with the highest scores were selected as potential participants for the consultations. From this pool of 80 subjects, 13 subjects, including pregnant subjects and subjects undergoing hormone replacement therapy, were excluded. Eventually 67 subjects took part in the consultations. Twelve subjects with missing data on baseline cortisol or one of the three post-consultation measurements and one patient with extreme cortisol values were excluded post hoc. Data from 54 subjects are thus reported here, 26 patients with high alexithymia scores (mean 66.3, range 59–80) and 28 with low alexithymia scores (mean 33.1, range 26–39). Cut off scores have earlier been set as follows: non-alexithymic, \( \leq 51 \), intermediate, 52–60; alexithymic, \( \geq 61 \) [30]. As only two of the patients with high alexithymia scores scored slightly below the limit, the two subgroups henceforward are designated as patients with and without alexithymia.

Physicians (three females and four males, age range 30–60) were recruited to participate in the experiment: two psychiatrists, one specialist in internal medicine, one specialist in occupational medicine and three physicians in junior research positions. Neither patients nor physicians were paid for their participation.

2.2. Procedures

2.2.1. Patient information

The patients were invited to sign up as potential participants in a study dealing with physician–patient communication. In the invitation letter, it was emphasized that the consultation given in the experiment would be an opportunity for the patients to discuss their subjective musculo-skeletal problems with a physician. Patients were informed that the intention of the study was to examine different aspects of physician–patient interaction and that the physicians in this matter had been instructed to follow specific guidelines. The patients were told that the physician would ask them questions about the most stressful aspects of their illness. They were informed that the consultation would be videotaped and that the experiment would also involve psychophysiological measurements and responding to questionnaires.

2.2.2. Experimental procedure

The experiment took place in the communication laboratory at the Department of Behavioural Sciences in Medicine at the University of Oslo. The communication laboratory is equipped with video and sound recording devices as well as some of the furniture and instruments belonging to a general practitioner’s consultation room. Subjects, who had been randomised to the experimental condition, reported to the laboratory between 1:00 and 3:00 pm. Upon arrival, informed consent was obtained. Consultations were videotaped. After the consultations patients completed a questionnaire measuring satisfaction (reported in [31]) and they were given a debriefing consultation with a physician or a psychologist.

2.2.3. Physicians’ instructions

The physicians were asked to interview the fibromyalgia patients about their disease, collecting enough information to assess the severity of each patient’s disease. They were instructed to limit the consultation duration to 18 min. No somatic examination was to be undertaken. The physicians each conducted from 8 to 10 consultations. Instructions on communication style is described below.

2.3. Physician communication behaviour

Physician communication behaviour was measured in two different ways in the present study, in terms of (a) experimental conditions and (b) based on interaction analysis.

2.3.1. Experimental conditions

Physicians were instructed to perform the interview according to common conventions for good communication. In one respect, they were instructed to differentiate their communication style. In condition A, here labelled Disease Centred \( (N = 28) \), physicians were instructed to restrict focus to biomedical aspects, to restrict empathic and emotional commitment and display a high degree of physician dominance by asking closed medical questions. By contrast, in condition B, here labelled Psycho-emotionally Centred \( (N = 28) \), the physicians were instructed to introduce psychosocial content into the consultation, to aim at empathy and active handling of patient emotions during the interview and to facilitate the patient’s active involvement in the consultation.

All physicians were assigned to both strategies, conducting half of the consultations in the “disease centred” manner and the other half according to the “psycho-emotionally centred” strategy. The order of the communication style applied by the physician was counter-balanced so that the style of communication changed after the completion of every two interviews.

2.3.2. Interaction analysis

The videotaped consultations were analysed in accordance with Roter’s Interaction Analysis System (RIAS) [32,33], with minor modifications described in detail elsewhere [34]. The RIAS consists of a detailed classification system where each communication unit from both physician and patient is assigned to 1 of 39 categories, grouped into two main classes of utterances, labelled task-focused and psycho-emotional. Communication units are defined as “utterances”, the smallest discriminable speech segment to which a classification may be assigned. The unit
may vary in length from a single word to a lengthy sentence. The duration of each utterance was entered. The consultations were coded directly from videotapes and not from transcripts. The coder assessed the tonal qualities of the interaction in addition to the content when assigning a communication unit to a specific category. An experienced coder (KH), who was blind to the patients’ alexithymia status and to the physicians’ communication style, performed coding.

In the analyses, The Observer software program for the collection and analysis of observational data was applied [35,36]. The program was specially configured so that RIAS could be used in the analysis.

For the purpose of the analyses in the present paper, the RIAS codings were applied only to coding categories considered to represent emotionally provocative communication. Only two RIAS categories (Open and Closed Psychosocial Questions) were considered to fall into these categories. These two categories were pooled to a category here labelled psychosocial questions. The amount of psychosocial questioning is described in terms of total time spent in the pooled category by the physician. In the statistical analyses, the percentage of total consultation time spent in the psychosocial questions pooled category and a median-split dichotomised variable based on the percentage score were applied.

Twenty consultations were randomly selected and coded by the second author (PKG) to test inter-rater reliability. Spearman’s rank correlation coefficients between the coders for the pooled category of psychosocial questions from the physician was .76. This coefficient equates to those reported by others [37,38] and is considered satisfactory.

2.4. Salivary cortisol

Salivary cortisol was chosen as the dependent variable in the present study as an indicator of the psychophysiological responses during and after the consultation. Salivary cortisol levels correlate highly with serum cortisol concentration and reflect the unbound fraction of circulation cortisol [39].

Salivary cortisol samples were collected at 8 points in time before, during and after the medical interview (Salivette, Sarstedt, Rommelsdorf, Germany). Salivettes were sent by mail to the subjects who took the first samples 48 h (T0) and 24 h (T1, home baseline) before the medical interview. Further samples were obtained upon arrival at the laboratory (T2, laboratory baseline), immediately before the interview approximately 15–20 min after T2 (T3), immediately following the interview (T4), at departure from the laboratory after all questionnaires had been filled in approximately 20 min after T4 (T5) and again in the subjects’ homes 24 h (T6) and 48 h (T7) after the interview (data from T7 are not reported).

All cortisol samples were taken between 1:00 and 3:00 pm subsequent to the rapid morning decline in cortisol values and because afternoon values are more strongly influenced by external stimulation.

The saliva samples, collected in plastic vials after saliva production, were stored at −20 °C until shipment to Haukeland University Hospital Laboratory, Bergen, Norway, where analyses were conducted. Free cortisol in saliva was measured using a time-resolved immunoassay (DSL-10-67100; Diagnostic Systems Laboratories, Webster, TX, USA). Intra- and inter-assay precision data were computed. The coefficients of variance (CV) were 1.4 and 0.8% within assays and 11 and 6% between assays, respectively.

The first and second cortisol samples were obtained by the subjects themselves in their homes without any practice. The sampling of T0 may, therefore, be particularly influenced by nervousness or feeling of insecurity by the subject and was considered a trial sampling that was disregarded in statistical analysis. T1 is, therefore, referred to as the home baseline.

In description of the raw scores (Section 3.3) and in Fig. 1 cortisol values are given in nmol/l. In the statistical logarithms of the original values are applied.

2.5. Questionnaires

Alexithymia was measured with a Norwegian translation of the 20-item Toronto Alexithymia Scale (TAS-20; [30]). In this self-report questionnaire, the patient is presented with 20 statements and is asked to indicate to what extent she agrees with each. Scores range from 1 (completely disagree) to 5 (completely agree). Five of the items are negatively keyed. Maximum score is 100 (high degree of alexithymia), minimum score 20 (low degree of alexithymia). Cronbach’s alpha coefficient of internal consistency was .92.

Depressed affect (state) was measured immediately before and after the interview by administering a Norwegian translation of the Profile of Mood States (POMS). The POMS questionnaire is composed of a list of 65 adjectives. The subjects are asked to indicate how they feel “right now” on a 5-point scale ranging from 1 (not at all) to 5 (extremely). The instrument contains six subscales originally derived from factor analytic studies. Only the subscale depression/dejection was applied in the present study, and referred to in the text as depressed affect. The test–retest reliability of the depression/dejection subscale has been reported to .74. Cronbach’s alpha coefficient of internal consistency was .92 on the pre-interview and .95 on the post-interview assessments.

2.6. Data analysis and statistics

Partial product–moment correlation analyses were performed to test possible associations between cortisol assessments at different points in time and between cortisol and age. Partial correlations were conducted to test the cortisol–depressed affect relationship, controlling for age.

t-Tests were applied to test the significance of changes in depressed affect and cortisol values over time.

The relationship between alexithymia status and cortisol was investigated applying one-way ANCOVAs with cortisol
value at baseline as dependent variable, with age as covariate and with cortisol values at T2 through T6, respectively, as dependent variables, with age and baseline cortisol as covariates. Analyses of variance were also applied to test relationships between background variables.

Linear regression analyses were applied to investigate the relationship between independent variables (age, communication, depressed affect) and cortisol at T4, T5 and T6, respectively, and to investigate the influence of communication on post-interview levels of depressed affect.

The .05 probability level was adopted as a criterion of statistical significance. Some borderline significant associations (\( p < .10 \)) are reported.

Statistical analyses were performed by applying the Statistical Package for the Social Sciences (SPSS) software, Version 11.0.

3. Results

3.1. Subjects

Mean age of the patients was 53.8 years (S.D.: 10.7). Patients with alexithymia (M: 57.0; S.D.: 10.2) were significantly older than patients without alexithymia (M: 50.2; S.D.: 10.3). There were no statistically significant differences between TAS scores or age between ‘disease centred’ and ‘socio-emotionally centred’ communication styles.

3.2. Physician communication behaviour

Mean total duration of the consultations was 19 min 3 s (S.D.: 6 min 2 s). Mean duration of the physician net verbal communication time was 4 min 5 s (S.D.: 1 min 50 s). Psychosocial questions represented a mean of 15.4 s (S.D.: 17.1 s; range 0–1 min 5 s), representing 6.2% of the net physician verbal communication time. Psychosocial questions were significantly more common in the psycho-emotionally centred (M = 22.5 s, S.D. = 18.4) as opposed to the disease centred (M = 8.3 s, S.D. = 12.3) condition (F = 11.2; \( p < .01 \)).

3.3. Depressed affect

Pre-consultation depressed affect score (mean per item) was 1.88 (S.D.: 2.00); whereas, post-consultation depressed affect score (mean per item) was 1.71 (S.D.: 1.98), indicating a mean reduction in depressed affect of .17 (S.D.: .66; M: −10). The reduction in depressed affect was borderline significant (\( t = 1.89; p < .07 \)). There were no significant differences in levels of depressed affect between patients with and without alexithymia.

The reduction in depressed affect was dichotomised based on median-split in two groups: patients with reduction in depressed affect (mean: −.67; S.D.: .40) and patients with no change or increase in depressed affect (mean: .20; S.D.: .56).

3.4. Cortisol response

Cortisol responses, measured in nmol/l at T1–T6 are displayed in Fig. 2. Mean baseline cortisol value was 9.1 nmol/l, with a S.D. of 7.7. The highest mean cortisol level was seen at T2, upon arrival to the laboratory (mean: 9.8 nmol/l; S.D.: 7.1). The average patient thus displayed a borderline significant increase in measured cortisol from baseline to T2, but with large individual differences (mean: 1.6; S.D.: 8.9; \( t = 1.74; p < .10 \)).

A subject is generally classified as a responder when there is an increase in cortisol of at least 15% from a previous value [24]. Half of our sample (N = 24; 48.0%) qualified as cortisol responders in that they had a 15% increase from baseline to levels measured at T2 or T3. From T2 on, a gradual recovery took place. The lowest cortisol level in the sample as a whole was measured at T6 (mean: 8.9; S.D.: 7.2).

Computations of correlations between the six cortisol values are presented in Table 1. There are significant correlations between the two samples taken in the home (T1 and T6) and between the four samples taken at the day of the

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<td>T2</td>
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<td>T3</td>
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<td>.87***</td>
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<td>T4</td>
<td>.11</td>
<td>.78***</td>
<td>.84***</td>
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<td>T5</td>
<td>.13</td>
<td>.69***</td>
<td>.76***</td>
<td>.87***</td>
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<tr>
<td>T6</td>
<td>.39**</td>
<td>.18</td>
<td>.25</td>
<td>.21</td>
<td>.35*</td>
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</table>

\( * \ P < .05. \\
** \ P < .01. \\
*** \ P < .001. 

Fig. 2. Mean cortisol values in nmol/l in the sample as a whole (T1–T6).
interview. In the sample as a whole, there is a significant increase in cortisol from T3 to T5 \((t = 3.67; p < .01)\), and from T3 to T6 \((t = 3.89; p < .001)\). There were no significant differences from T2 to T5 or T2 to T6.

Age was borderline significantly negatively related to cortisol level at T1 \((r = -.26; p < .07)\).

There were no significant differences between cortisol values of patients with and without alexithymia at any point of assessment. Moreover, in a series of partial correlation computations, controlling for age, cortisol values were not at any time significantly related to depressed affect pre- or post-consultation, nor to change in depressed affect from pre- to post-interview.

### 3.5. Effect of communication on depressed affect

To test whether communication variables were associated with the change in depressed affect from pre- to post-consultation (arrow 6 in Fig. 1), we performed a linear regression analysis with change in depressed affect as dependent variable and age, alexithymia score, pre-consultation depressed affect, percentage of psychosocial questions and alexithymia × psychosocial questions as independent variables. Pre-consultation depressed affect \((\text{Stand } \beta = .31; p < .05)\) and psychosocial questions from the physician \((\text{Stand } \beta = .33; p < .05)\) contributed significantly to the variance, indicating that pre-consultation depressed affect was associated with more reduction in depressed affect and psychosocial questions from the physician were associated with less reduction in depressed affect following the interview.

### 3.6. Effect of communication on cortisol on day of interview

To test the hypotheses that patients with alexithymia who received emotionally provocative interviews would display higher cortisol levels at T4 and/or T5 compared to the other patients, we performed 4 two-way ANCOVAs, with cortisol at T4 and T5, respectively, as dependent variables, with socio-emotional versus disease centred communication style as factor variable in addition to alexithymia status, and with age and baseline cortisol as covariates. There were no significant main or interaction effects, neither of communication variables nor alexithymia status.

We then conducted linear regression analyses with cortisol levels at T4 an T5, respectively, as dependent variable, and with age, alexithymia score (TAS-20), cortisol at T2, percentage of psychosocial questions, and alexithymia × psychosocial questions as independent variables. Only cortisol at T2 contributed significantly to the variance.

### 3.7. Effects of communication and depressed affect on cortisol after 24 h

We finally tested whether the differences in cortisol values at T6 between patients with and without alexithymia were related to physician communication behaviour and depressed affect. We performed a two-way ANCOVA, with cortisol at T6 as dependent variable, with socio-emotional versus disease centred communication style and alexithymia status as factor variables, and with age and cortisol at baseline (T1) as covariates. There was a significant effect of

### Table 2

| Cortisol values 24 h after the interview (T6) in nmol/l across alexithymia, reduction in depressed affect and psychosocial questions from physician |
|-----------------|----------------|--|-----------------|------------------|------------------|------------------|
|                 | Low alexithymia | High alexithymia |
|                 | M               | S.D.    | N   | M               | S.D.   | N   |
| Reduction in depressed affect | 8.3 | 8.2 | 10  | 5.1 | 4.6 | 13  |
| No change or increase in depressed affect | 5.0 | 6.5 | 18  | 10.2 | 9.0 | 13  |
| Few psychosocial questions | 7.4 | 6.5 | 14  | 6.5 | 5.9 | 12  |
| Many psychosocial questions  | 4.9 | 4.1 | 14  | 8.6 | 8.5 | 14  |
| Sum                | 6.2 | 5.5 | 28  | 7.6 | 7.3 | 26  |

**ANCOVA**

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<thead>
<tr>
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<th>Sig.</th>
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<td><strong>Covariates</strong></td>
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<tr>
<td>Cortisol T1</td>
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<td>Alexithymia</td>
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<td>N.s.</td>
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<tr>
<td>Change in depressed affect</td>
<td>.49</td>
<td>N.s.</td>
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<td>Many vs. few psychosocial questions</td>
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<td><strong>Two-ways interactions</strong></td>
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<tr>
<td>Alexithymia × depressed affect</td>
<td>9.49</td>
<td>&lt;.01</td>
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<tr>
<td>Alexithymia × psychosocial questions</td>
<td>1.50</td>
<td>N.s.</td>
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<td>Depressed affect × psychosocial questions</td>
<td>1.69</td>
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cortisol at T1 ($F = 9.5; p < .01$), but physician communica-
tion style did not contribute to the variance.

When many versus few psychosocial questions were
applied as factor variable instead of socio-emotional versus
disease centred communication style, the significant effect
of cortisol at T1 ($F = 12.5; p < .001$) was upheld. There was
also a borderline significant psychosocial questions $\times$
alexithymia status interaction effect ($F = 3.7; p < .07$),
with a trend in the direction of higher cortisol in patients
with alexithymia who had received many psychosocial
questions.

However, when the dichotomised depressed affect
change score was added as a factor variable and depressed
affect at baseline was entered as a covariate, we found a
significant alexithymia status $\times$ change in depressed affect
interaction effect ($F = 9.5; p < .01$; Table 2). Alexithymic
patients who failed to reduce their level of depressed affect
from pre- to post-consultation displayed higher cortisol 24 h
after the consultation than the other subsets. The significant
effects of baseline cortisol and alexithymia status were
upheld, but not the borderline significant effect of
psychosocial questions.

This relationship was also tested in a linear regression
analysis with cortisol levels at T6 as dependent variable, and
with age, alexithymia score (TAS-20), home baseline
cortisol (T1), depressed affect baseline, percentage of
psychosocial questions and change in depressed affect from
pre- to post-interview as independent variables. Only
baseline cortisol contributed significant to the variance.
However, when change-in-depressed affect $\times$ alexithymia
was entered in the equation a significant interaction effect emerged (Stand $\beta = .31; p < .05$).

4. Discussion and conclusion

4.1. Discussion

In this study of an arranged medical interview with
musculo-skeletal pain patients, we found that an increased
depressed affect from pre- to post-interview was associated
with relatively high cortisol levels 24 h after the consultation
in patients with alexithymia. Psychosocial questions from
the physician were associated with increased depressed
affect immediately following the interview, but not with
cortisol responses at any time.

The hypotheses of the study are illustrated in Fig. 1. As
expected, a significant cortisol activation effect was
observed in the sample as a whole from baseline 24 h
before the consultation to the first two cortisol measure-
ments on the day of the interview (arrow 1 on Fig. 1). About
one-half of the sample consisted of cortisol responders with
at least 15% increase from baseline to levels measured at the
day of the testing before the interview. Their response should
be characterised as anticipatory activation, as it occurred
before the interview itself. Also, as expected, cortisol values
measured at T5 were back to home baseline levels for most
patients (arrow 2).

Contrary to our expectation, we did not find an increased
cortisol response immediately after the consultation in any
subset of the sample, including alexithymic patients who
were interviewed with a psycho-emotional communication
style or given many psychosocial questions, nor significant
differences in recovery between alexithymic and non-
alexithymic patients, regardless of communication pattern
(arrow 3).

These findings indicate that the consultation did not
represent a stimulus stressful enough to produce changes in
cortisol response. In further studies of immediate psycho-
physiological stress effects of medical interviews, it would
probably be better to study more emotionally salient types of
consultations or concentrate on other markers of stress than
cortisol.

Contrary to our expectations, depressed affect was not
related to cortisol levels at any time on the day of the
interview (arrow 4). Although there is evidence that
fluctuations in depressed mood may influence cortisol
responses [14], there is no automatic association between
level of depressed mood and level of cortisol level. For
instance, in a recent well-controlled study of the association
between affect and cortisol on each of 7 days over a 3 weeks
period, state negative affect was not associated with same
day cortisol measures [40].

While neither depressed affect nor physician commu-
nication behaviour was related to cortisol values, the former
two variables were related to one another. As expected,
many psychosocial questions from the physician were
associated with an increase in depressed affect immediately
post-interview, indicating that psychosocial questions in this
particular context brought up emotionally relevant topics,
associated with an immediate increase in sadness and other
signs of depressed affect (arrow 5).

At 24 h after the consultation, the mean cortisol level
was, as expected, back to home baseline for the sample as a
whole, and there was a significant correlation between
cortisol at T6 and T1 (arrow 6). However, we also found a
significant difference between patients with and without
alexithymia at T6. We examined to which extent the two
independent variables in our study could explain this latter
unexpected finding. There was a trend that alexithymic
patients who had received many psychosocial questions had
higher cortisol at T6. However, when we looked at the
potential effects of depressed affect before and after the
interview, we found that an increased depressed affect from
pre- to post-interview was associated with relatively high
cortisol levels 24 h after the consultation in patients with
alexithymia.

We interpret this finding as indication that the
alexithymic patients who reacted with increased depressed
affect failed to elaborate or come to grips with their
emotional responses to the consultations. There is evidence
that when individuals with alexithymia are exposed to
emotionally charged information, they may experience an emotional arousal even if they may have a deficit in spontaneous labelling of the emotions [41]. For instance, Berthoz et al. found in their fMRI study that alexithymic and non-alexithymic individuals did not display differences in limbic arousal after emotional stimulation [42]. Moreover, there is also evidence that this activation is not entirely limited to somatic sensations. Individuals may experience a diffuse distress, causing them for instance to report more depressive affect on questionnaires, even if they are unable to or have difficulties to elaborate on their emotions in a less structured setting [16].

Without the ability to label the emotional response, they would be more vulnerable to rumination and less likely to share their responses with others, thereby less likely to reduce their distress. There are few studies of rumination in alexithymic patients, but some indications that individuals with alexithymia may be reluctant to share their emotions with others [43]. We suggest that this proposed lack of work-through will make them more vulnerable to sustained or even increased stress hormone activation in the 24 h following the consultation.

Based on our findings, we thus hypothesize that when patients with deficits in affect regulation become distressed, they will be vulnerable to rumination and reinforcement of depressive affect and to sustained stress responses, which again may lead to sustainment or reinforcement of subjective somatic symptoms. This hypothesis, the stress rumination hypothesis, should be explored in further studies.

The present study has a number of limitations. The consultations were arranged, in the sense that patients were invited to a special consultation, with another physician than their own, and on the initiative of the researchers. We do not know to which extent the phenomena that we have seen in these consultations also will be characteristic of consultations with physicians in regular consultations. It is also a weakness that seven different physicians took part, with potentially different ways to practice a psycho-emotional and disease centred communication style.

The data set is complicated, with assessment of cortisol responses before, during and after the consultation. The interaction analysis system contains 40 categories of communication behaviour for both physician and patient. In this study, we have limited the investigation to study the effect of three selected clusters of physician communication categories to cortisol recovery.

4.2. Conclusion

In patients with deficient affect regulation, an increase in depressed affect after a medical interview may be associated with delayed effects in adrenocortical activity, possibly mediated by rumination. Although the findings should be replicated before firmer conclusion may be drawn, the present study indicates that some patients’ experience of stress may be augmented or weakened by the physician’s communication style with subsequent manifestations in their patterns of cortisol recovery.

4.3. Practice implications

The findings imply that providers should be sensitive to potential deficits of affect regulation in their patients. In patients with deficits in affect regulation, such as alexithymia, providers should take into consideration that an emotion provoking communication style may release affect responses, which some patients may not be able to handle well. We may ask whether repeated stressful medical encounters may serve to sustain high level of stress with potential harmful effects on certain aspects of health for some vulnerable individuals. Therefore, in treating patients with alexithymia, providers should avoid affect provocations and employ an empathic and supportive communication style [31].

References
