Quality of Life and Sun-Protective Behavior in Patients With Skin Cancer

John S. Rhee, MD, MPH; B. Alex Matthews, PhD; Marcy Neuburg, MD; Timothy L. Smith, MD, MPH; Mary Burzynski, RN; Ann B. Nattinger, MD, MPH

Objectives: To determine whether change occurred in the general quality of life (QOL) of nonmelanoma skin cancer (NMSC) patients following surgery, to identify variables associated with patients’ change in QOL, and to assess the impact of the disease and treatment on sun-protective behaviors and cigarette smoking.

Design: Longitudinal prospective study of 121 consecutive patients referred to a dermatologic Mohs surgery clinic with NMSC of the head and neck.

Interventions: Quality-of-life, smoking habit, and sun-protective behavior assessments were performed before treatment (N=121) and after surgical treatment at 1 (n=105) and 4 (n=101) months. Quality-of-life measures included the Medical Outcomes Study 36-Item Short-Form Health Survey and the Functional Assessment of Cancer Therapy–General.

Results: Overall, general QOL measures demonstrated little change over time. Only the mental (Medical Outcomes Study 36-Item Short-Form Health Survey) and emotional (Functional Assessment of Cancer Therapy–General) domains of QOL showed statistically significant change over time. A 2-way interaction showing effects for age and time on emotional well-being was modified by a 3-way interaction that depended on employment status. Emotional well-being scores for younger employed NMSC patients increased over time compared with scores among younger unemployed patients. In addition, many patients adopted greater use of sun-protective behaviors at 4 months following surgery. No change in cigarette smoking status was evidenced.

Conclusions: Use of sun-protective behaviors increases after treatment. General QOL instruments demonstrate little change following treatment of NMSC. Although the associations are modest, improvements in emotional and mental health well-being following treatment of NMSC were demonstrated, especially for those younger than 65 years and employed. A disease-specific instrument may be necessary to further study this disease process.

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ALIGNANCES OF THE skin are the most common cancers of humans. Epidemiologic studies suggest that Americans have a 1 in 5 lifetime risk of having skin cancer. Recent estimates predict 1.3 million new cases of nonmelanoma skin cancer (NMSC) annually in the United States, with the incidence of NMSC expected to double in the next 30 years.1 Quality of life (QOL) has been identified as an important outcome in cancer research. In particular, cancer has been associated with various negative psychological sequelae, such as depression, anxiety, and vulnerability.2,3 Clinical experience, indicating that many cancer patients exhibit hopeful and goal-oriented thinking and positive attitudes rather than severe anxiety or depression, further suggests the need for comparative data. Although NMSC is usually non–life threatening, the disease may impact on self and body image because of the involvement of the largest body organ and the one most visually conspicuous to self and others.

Furthermore, whether sun-protective behaviors can be modified when coupled with the treatment of skin cancer is unclear. Past models of behavioral change have shown that an individual’s motivation for change or compliance is predicted by perceived susceptibility, severity of illness, and benefits vs costs.4 Patients about to undergo surgery for NMSC may experience levels of anxiety that may motivate change in behavior.

A previous cross-sectional study5 examined patients after the diagnosis of skin cancer but before any surgical treatment.

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Baseline QOL scores were high for the Functional Assessment of Cancer Therapy–General (FACT-G) and were close to normative values for the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). No clinical variables were predictive of QOL scores, although those who participated in sun-protective behaviors had a higher QOL. This study prospectively examines this cohort of patients during and after treatment. The objectives were to determine whether change occurred in the general QOL of skin cancer patients and to identify patient, clinical, and preventive behavior variables associated with patients’ change in QOL. In addition, we wanted to assess the impact of the disease and treatment on sun-protective behaviors and high-risk behaviors such as cigarette smoking.

**METHODS**

**STUDY DESIGN AND PROCEDURES**

The study period, consisting of enrollment, treatment, and follow-up, spanned 1 year (August 1, 2001-August 31, 2002). One hundred twenty-one patients referred to the Medical College of Wisconsin Dermatologic Surgery Clinic agreed to participate in the study, and all of these individuals completed the initial examination and survey. One hundred five participants (86.8%) and 101 participants (83.5%) completed the 1- and 4-month questionnaires and follow-up, respectively.

Eligible participants consisted of patients who presented to the Dermatologic Surgery Clinic with a biopsy-proved diagnosis of nonmelanoma cutaneous skin cancer. Our study cohort represented patients who were referred to a tertiary care Mohs surgery clinic for removal of a high-risk NMSC. Detailed eligibility requirements and inclusion criteria have been previously published. Briefly, participants with major psychiatric illnesses, other disabling chronic medical illnesses (rheumatoid arthritis, stroke, or renal failure), or cognitive impairment were excluded because these factors could potentially confound assessment.

All participants were examined at the initial visit before discussions of therapeutic interventions. A trained research assistant (M.B.) explained the research study to the participants and obtained an Institutional Review Board–approved informed consent form. All participants underwent Mohs surgical excision of their NMSC, followed by primary reconstruction. Questionnaires were administered at the 1- and 4-month follow-up appointments. These time points were chosen to correspond to the time when acute postoperative pain and wound care issues have been resolved (1 month) and when most of the postoperative healing process has finished (ie, able to evaluate the final postoperative result) (4 months). If the patient was not able to make the scheduled appointment, the questionnaire was sent with a self-addressed stamped envelope to the home address. Three attempts were made to contact the participant to complete the follow-up questionnaire for each follow-up time.

**MEASURES**

Data collected included demographic, clinical, and sun-protective behavioral information. Demographic variables included age, sex, marital status, educational level, and socioeconomic status (employment and income). Clinical variables included type of cancer, histologic subtype, location, H-zone involvement, functional area (eyelids, lips, or nasal alae) involvement, size, stage (if applicable), primary cancer vs recurrence, and concurrent comorbid conditions. A 10-cm visual analog scale (VAS), scored such that higher values indicated that patients were more bothered, was used to rate the patients’ perception of the skin cancer appearance preoperatively and the surgical scar postoperatively.

Sun-protective behaviors, such as the use of sunscreen, wearing protective clothing, and outdoor activity restriction during peak UV light exposure, were also measured before and after treatment. Cigarette smoking was assessed before and after treatment. Both of these measures were scored dichotomously at each time point.

The SF-36 is a generic health-related QOL measure that has been standardized, and norms for the general population have been previously validated. The tool consists of 8 separate domains: physical function, emotional role, bodily pain, general health perceptions, vitality, social function, physical role, and mental health. The FACT-G, version 4, is a well-accepted 27-item validated instrument that has been designed for cancer patients. The FACT-G consists of 4 subscales that measure physical, social/family, emotional, and functional well-being. Baseline reliability for the present study was consistently high, as reported in a preliminary study, and was in keeping with reliability coefficients reported by the authors of these scales. Higher scores on both instruments indicate a better QOL, such as more freedom from bodily pain (SF-36) or better emotional well-being (FACT-G).

**DATA ANALYSIS**

A mixed-factor design with several between-subjects factors and one within-subjects factor (time—3 levels: preoperatively, 1 month postoperatively, and 4 months postoperatively) was used for the primary analyses. Repeated measures procedures were used to investigate the effects of dichotomized demographic variables (age, employment status, sex, and marital status), risk (existence of comorbid conditions and smoking status), and protective behaviors (use of a hat or cap, use of sunscreen, avoiding the sun between 10 AM and 2 PM, and limiting sun-related activities) on each of the subscales for the QOL measures (SF-36 and FACT-G) across time. Each block of predictors (demographic variables, risk, and protective behaviors) was entered separately to test effects unique to that set. Contrasts were used to examine the effects of the predictors within each time period. t Tests were used to test simple effects for significant interactions.

After the deletion of patients with missing data, assumptions for mixed-model analyses regarding normality of sampling distributions, univariate homogeneity of variance-covariance matrices, and sphericity were met. The type III sum of squares method was used to analyze the data because the model was unbalanced and had no missing cells. To control for error, univariate effects were not investigated unless multivariate effects were significant. Cells with smaller sample sizes were examined to determine if these cells produced larger variances and covariances. Because this was not the case, the robustness of the significance tests was assured. Because of the exploratory nature of this initial study, no attempt was made to correct for the multiple pairwise comparisons; thus, α was set at .05 for all analyses.

For the behavioral portion of the study, descriptive statistics were used to calculate percentages of respondents, means, and SDs for each measure. χ² Procedures were used to test for changes in sun-protective behaviors across time. McNemar test coefficients indicated disagreement between pairs at pretest and posttest. Pairs showing change in behavior (no and yes or yes and no) were tested for association with other factors using the Fisher exact test. The cohort showing positive change in behavior was compared with the cohort showing no change. Lo...
Baseline (N = 121) descriptive statistics have been previously reported. Briefly, basal cell carcinomas were found in 85.1% of the sample (n = 103), and squamous cell carcinomas were detected in 13.2% (n = 16); 1.7% (n = 2) had other types of lesions. More lesions (N = 135) were located on the nose (37 patients [27.4%]), lips (27 patients [20.0%]), and forehead (29 patients [21.5%]) than other areas of the face, neck, or scalp. For most patients (87 [71.9%]), the lesion had not been previously treated. Demographic variables that were tested in the analysis are presented in Table 1: age (median, 63 years; mean, 62.17 years; and SD, 15.4 years) was also tested. Percentages of patients who reported using sun-protective behaviors across time indicated that patients increased their use of sun-protective behaviors after surgery compared with before surgery. Changes in positive and negative responses to each sun-protective behavior are shown in Table 2. Many patients adopted each of the sun-protective behaviors 4 months after surgery compared with before surgery. Cigarette smoking, a high-risk behavior, showed no significant decrease over time. Cross-tab procedures indicated agreement between health-protective behaviors (φ values ranged from 0.22 to 0.38), except for the use of sunscreen. Presurgery-postsurgery correlations between each behavior ranged from 0.23 to 46. Logistic regression analyses were conducted to determine the effects of demographic characteristics and risk behavior on each sun-protective behavior 4 months after surgery. Results indicated sex and age differences for avoiding the sun between 10 AM and 2 PM. Patients 65 years and older were more likely than younger patients to avoid the midday sun (P < .009). Women were about 1.5 times less likely (P < .002) than women to stay out of the sun during peak hours. Means and SDs for each of the QOL domains across time are shown in Table 3. Because the subscales contain unequal numbers of items, they cannot be compared with each other, but each should be compared across time points. In general, all subscale scores were fairly high and comparable to published norms for the general population. Results of repeated-measures analyses showed that there were no significant changes of the domains over time as a result of any of the sets of variables tested, with the exception of the SF-36 mental health subscale and the FACT-G emotional well-being subscale. Multivariate statistics indicated a significant effect for time (F = 3.79, P < .03) on the SF-36 mental health subscale. Univariate results showed a main effect for time (F = 4.80, P < .009). A priori contrast results across time indicated that the change was significant between presurgery and follow-up (F = 4.53, P < .04), but not between the 1- and 4-month postoperative visits (F = 2.14, P = .15). No demographic or clinical variable was associated with change in SF-36 mental health subscale scores. For the FACT-G, multivariate results of the 2 x 2 (age, < 65 vs ≥ 65 years; and job status, employed vs unemployed) mixed-model repeated-measures procedure indicated significant effects for time (F = 3.13, P < .05), a 2-way time × age interaction (F = 3.08, P < .05), and a significant time × employment × age 3-way interaction (F = 4.24, P < .02) for emotional well-being. Univariate, the main effect of time on emotional well-being was qualified by age (F = 3.87, P < .02), which was, in turn, qualified by employment status (F = 5.34, P < .006). Means and SDs for the interaction are shown in Table 4, and are graphically depicted in the figure. Emotional well-being scores for younger employed NMSC patients increased over time, compared with scores for younger unemployed patients. Emotional well-being scores for employed NMSC patients 65 years and older decreased compared with unemployed NMSC patients of a similar age cohort. Contrasts indicated that the changes were significantly different for younger compared with older adults depending on employment status only at presurgery to the follow-up time points for the 2-way interaction (F = 3.45, P < .02) and the 3-way interaction (F = 7.52, P < .007). Overall, partial η2 values squared showed that the variance accounted for by any of the predictors for emotional well-being ranged from 0.01 to 0.07. For the VAS scores, univariate results showed a main effect for time, with VAS scores decreasing (less bothered) between the presurgery and the 4-month postsurgery visits (P = .01). However, there was a trend for younger patients (< 65 years) to have less improvement in their VAS scores postoperatively compared with older patients (≥ 65 years) (P = .08). No other demographic or clinical variable was associated with change in VAS scores.
A previous cross-sectional study\(^5\) using the SF-36 and FACT-G had demonstrated minimal impact of NMSC on patients at initial diagnosis. Fewer comorbid conditions and increased use of sun-protective behaviors were associated with an enhanced QOL. These 2 variables, however, did not correlate with change in QOL scores in our longitudinal analysis. Our longitudinal data demonstrated final QOL scores that were quite high and in keeping with the norms for a healthy population. There was little variation in scores for any of the standard QOL measures, except for the SF-36 mental health and the FACT-G emotional well-being subscales, 2 measures that capture similar concepts. These findings suggest that patients’ emotional well-being improved after treatment of NMSC, although the strength of this statistically significant finding is weakened by the multiple pairwise comparisons and potentially limited clinical meaningfulness.

Interestingly, younger patients (<65 years), especially those who were employed, demonstrated greater improvement in their FACT-G emotional well-being subscale scores compared with their counterparts (Figure and Table 4). This group of patients may be particularly sensitive to the conspicuous nature of the disease as it relates to potential disfigurement and scarring. Emotional difficulties with QOL alterations have been demonstrated in patients with nonmalignant dermatologic disorders, such as acne and eczema.\(^{14,15}\) In addition, the diagnosis and treatment of cancer has been shown to have various negative psychological effects as well.\(^2,3\) Nonmelanoma skin cancer patients are unique in that the seriousness of the cancer is relatively less, yet the disease process often involves an area of the body that is visually conspicuous to self and others.

Another potential parallel model for NMSC QOL research is the work that has been performed on melanoma. A recent cross-sectional study\(^6\) of patients with non–stage IV melanoma revealed wide variability in the level of distress in patients presenting to a melanoma clinic before treatment. Patients were examined for general QOL, level of anxiety, and coping strategies. Scores from the SF-36 subscales were consistent with levels of physical function, bodily pain, vitality, and general health perceptions reported by patients with minor medical problems. Interestingly, approximately one third of the patients reported high levels of distress. This subgroup of distressed individuals reported a

### Table 2. Nonmelanoma Skin Cancer Patients Reporting Change in Sun-Protective Behaviors From Before Surgery to 4 Months After Surgery\(^*\)

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Response</th>
<th>% Increase</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunscreen use</td>
<td>No and No</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Wearing a hat or cap in the sun</td>
<td>No and Yes</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Avoiding the sun between 10 AM and 2 PM</td>
<td>32</td>
<td>34</td>
<td>8</td>
</tr>
<tr>
<td>Skipping sun-related activities</td>
<td>51</td>
<td>35</td>
<td>4</td>
</tr>
<tr>
<td>Smoking</td>
<td>83</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

\(\*\)N = 101. The first response was given before surgery, and the second, 4 months after surgery. Percentages (across rows) may not total 100 because of rounding.

### Table 3. Descriptive Data for Quality-of-Life Subscales Across Time Among Nonmelanoma Skin Cancer Patients\(^*\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Time</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Surgery ((N = 121))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF-36</td>
<td>General health perceptions</td>
<td>74.6 (16.9)</td>
<td>75.4 (17.3)</td>
<td>74.3 (17.9)</td>
</tr>
<tr>
<td></td>
<td>Mental health</td>
<td>76.1 (19.4)</td>
<td>78.5 (16.9)</td>
<td>79.6 (17.9)</td>
</tr>
<tr>
<td></td>
<td>Bodily pain</td>
<td>81.2 (21.2)</td>
<td>79.1 (19.6)</td>
<td>82.2 (21.7)</td>
</tr>
<tr>
<td></td>
<td>Physical function</td>
<td>84.9 (21.6)</td>
<td>83.6 (23.3)</td>
<td>84.3 (22.2)</td>
</tr>
<tr>
<td></td>
<td>Emotional role</td>
<td>84.3 (30.1)</td>
<td>83.3 (31.6)</td>
<td>79.9 (35.2)</td>
</tr>
<tr>
<td></td>
<td>Physical role</td>
<td>78.3 (36.1)</td>
<td>76.9 (36.5)</td>
<td>85.5 (30.3)</td>
</tr>
<tr>
<td></td>
<td>Social function</td>
<td>85.7 (21.1)</td>
<td>83.5 (21.9)</td>
<td>86.4 (20.4)</td>
</tr>
<tr>
<td></td>
<td>Vitality</td>
<td>64.6 (20.2)</td>
<td>65.6 (19.0)</td>
<td>66.8 (22.1)</td>
</tr>
<tr>
<td>FACT-G</td>
<td>Functional well-being</td>
<td>23.9 (5.0)</td>
<td>23.8 (4.6)</td>
<td>23.9 (5.5)</td>
</tr>
<tr>
<td></td>
<td>Physical well-being</td>
<td>26.2 (2.6)</td>
<td>26.4 (2.2)</td>
<td>26.5 (2.9)</td>
</tr>
<tr>
<td></td>
<td>Social/family well-being</td>
<td>24.8 (3.8)</td>
<td>24.7 (4.7)</td>
<td>24.8 (4.8)</td>
</tr>
<tr>
<td></td>
<td>Emotional well-being</td>
<td>20.3 (3.4)</td>
<td>21.1 (2.9)</td>
<td>21.0 (3.3)</td>
</tr>
</tbody>
</table>

\(\*\)Data are given as mean (SD) score on each subscale of each time point.

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**COMMENT**

Treatment of cervicofacial skin cancers may result in significant patient morbidity, owing to the functional and cosmetic importance of this region. Depending on various patient-related factors, the potential morbidity is widely variable. Other potential negative effects may be related to degree of disfigurement or scarring, which may have ramifications from a psychosocial, marital, sexual, or medical personnel interaction standpoint.\(^9,10\)

Unlike other malignancies, the subject of skin cancer has not been well investigated in terms of patient QOL assessment.\(^9,12,13\) In addition, there is no validated reliable QOL instrument specifically tailored for NMSC or skin cancer in general. Therefore, the selection of a more general global instrument seemed reasonable to begin examining this patient population. A specific advantage to the general instruments is that the scores can be compared with those of a wide range of other clinical conditions. The major disadvantage is the potential lack of sensitivity to the unique relevant issues of the disease process.
poorer QOL and used maladaptive coping strategies, such as escape-avoidance coping. 10

Cassileth et al10 found patients with melanoma to be approximately equal to the general public and strikingly similar to other dermatology patients in terms of emotional well-being, a finding similar to the one in a cross-sectional study7 on NMSC patients. In addition, their follow-up study11 found that the degree of surgical indention and how closely the actual size of the scar matched presurgery expectations were associated with emotional distress in patients undergoing surgical treatment of melanoma.

In our study, patients, by 4 months after surgery, generally found the resultant scar following treatment less disturbing than the actual cancerous lesion itself preoperatively; initially, at 1 month, younger patients (<65 years) were more bothered by the appearance of the scar at this early postoperative stage. The early appearance of the scar, with its accompanying erythema and edema, can often be quite pronounced, and is consistent with the natural course of scar maturation and healing. Again, this particular cohort of patients may be particularly sensitive to the conspicuous nature of this disease and its treatment. Interestingly, the location and size of the cancer demonstrated no association with VAS scores or general QOL measures.

Previous studies17,18 have shown that increased compliance with sun-protective behaviors can be achieved in those patients who have undergone treatment of NMSC. Models of behavioral change have shown that an individual’s motivation for change or compliance is predicted by perceived susceptibility, severity of illness, and benefits vs costs.4 Patients about to undergo surgery for NMSC may experience levels of anxiety that may motivate change in behavior. Our study demonstrated a 21.8% to 30.7% increase in the use of various sun-protective behaviors following treatment of NMSC. The adoption of sun-protective behaviors was not associated with any specific demographic or clinical variable. There were, however, some sex and age differences in the choice of the sun-protective behavior. Women and patients 65 years and older were more likely than their counterparts to avoid the midday sun.

Whether perceptions of other preventive health behaviors (eg, lifestyle alterations, risk-taking behavior, and participation in medical screening tests) are affected by treatment of NMSC remains unclear. Our findings indicate that smokers did not quit smoking, but they were not any less likely to adopt sun-protective behaviors. Adopting a novel behavior might be easier than relinquishing old habits, especially ones involving possible addiction.

Some limitations of this study should be noted. Our cohort consisted entirely of white persons; future studies need to be conducted comparing other ethnic groups. Although previous studies10 have shown that skin cancer is less common in the nonwhite population compared with the white population in the United States, racial and ethnic differences in sun-protective behaviors and skin-protection behaviors have been reported previously.19,20 In addition, these data reflect patients’ self-reported participation rather than actual participation; however, given the difficulties in tracking actual sun-

Table 4. Descriptive Data for Age and Employment Status on the FACT-G Emotional Well-being Subscale Across Time*  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before Surgery</th>
<th>1 mo After Surgery</th>
<th>4 mo After Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed and &lt;65 y</td>
<td>18.6 (3.5)</td>
<td>20.3 (2.4)</td>
<td>21.2 (3.2)</td>
</tr>
<tr>
<td>Unemployed and &lt;65 y</td>
<td>20.0 (3.6)</td>
<td>20.6 (4.7)</td>
<td>20.0 (5.2)</td>
</tr>
<tr>
<td>Employed and ≥65 y</td>
<td>23.4 (0.6)</td>
<td>23.6 (0.6)</td>
<td>20.8 (1.8)</td>
</tr>
<tr>
<td>Unemployed and ≥65 y</td>
<td>20.9 (2.7)</td>
<td>21.7 (2.5)</td>
<td>21.3 (2.7)</td>
</tr>
</tbody>
</table>
protective behaviors over time, it may not be possible to determine participants’ actual behavior. Information regarding skin type, skin sensitivity, and family history of skin cancer may also impact the likelihood of participation in sun-protective behaviors.

In summary, it is possible that the critical issue for most NMSC patients may not be the severity of the disease itself. Perhaps it is the perception of the illness that may predict not only the individual’s QOL but also the individual’s susceptibility to behavioral modification. The findings of our study do not rule out the possibility that there are domains of QOL that may be affected and not captured by standard general QOL instruments. In particular, the physical, functional, and pain subscale sections of the FACT-G and the SF-36 were not particularly applicable to our study population. The items of these particular subscales relate to issues (ambulation, eating, and visceral discomfort) that are likely more relevant for patients with other illnesses. However, the findings of our study suggest that the psychosocial and emotional domains warrant further investigation. This leads us to believe that there might be a need for a disease-specific QOL measure for NMSC.

We are planning future studies to develop a disease-specific QOL instrument and to investigate levels of distress, anxiety, and coping strategies in patients undergoing treatment for NMSC. In addition, studies are under way to investigate long-term sun-protective behavioral changes and possible alterations in other preventive health behaviors following treatment of NMSC.

In conclusion, general QOL instruments demonstrate little change following treatment of NMSC. Although the associations are modest, improvements in emotional and mental health well-being following treatment of NMSC were demonstrated, especially for those younger than 65 years and employed. Use of sun-protective behaviors increases after treatment. Further investigation of adoption of preventive health behavior and the psychosocial and emotional impact of NMSC is warranted.

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Corresponding author: John S. Rhee, MD, MPH, Department of Otolaryngology and Communication Sciences, Medical College of Wisconsin, 9200 W Wisconsin Ave, Milwaukee, WI 53226 (e-mail: jrhee@mcw.edu).

REFERENCES