Practical Issues in nutrition intervention in cancer patients

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Do we need to assess nutritional status in oncology patients? 

- Malnutrition related to disease or treatment?
- Difficulty swallowing?
- Symptoms related to cancer treatment?

So, what do we do now?
Cancer and malnutrition

There is enough evidence that up to 40% of hospitalized patients with cancer are malnourished, this is associated with an increase in hospital length stay and morbidity
Prevalence of malnutrition

Prevalence of malnutrition by specialties (n = 818). ¹Malnutrition was determined with Subjective Global Assessment within 48 h of hospital admission.
Metabolic changes in oncology patients

Role of tumor-induced systemic inflammation with metabolic pathways in organs affected by cancer cachexia.

IL: Interleukin; TNF: Tumor necrosis factor; IFN: Interferon; STAT3: Signal transducers and activators of transcription 3.
Impact of cancer cells in patients nutritional status

Malignant Tumor Cells

↑ Proinflammatory Cytokine Production (IL-1, IL-6, TNF-a)

↓ Appetite

↓ Food Intake

↑ Acute Phase Protein Response Initiated (↑ CRP)

↑ Resting Energy Expenditure

Metabolism of Macronutrients Affected

↑ Proteolysis-Inducing Factor (PIF)

↓ Lean Body Mass

Weight Loss
Cancer and malnutrition

- Up to 40% of cancer patients have unexplained weight loss at first diagnosis.
- 80% experience weight loss in advanced stages.
- More than 5% weight loss causes reduced response to therapy.

Olleinschlager, 1991
Kondrup, AJCN 2002
Frequency/severity of weight loss associated with cancer

Weight loss and poor nutrition status

• Is associated with morbidity outcomes and mortality:
  • Hospital admissions and readmissions
  • Hospitalary length of stay
  • Quality of life
  • Tolerance to RT and CT treatment
  • Mortality

Malnutrition or cachexia

- Up to 20% of cancer death

Fearon 2011, Definition and classification of cancer cachexia: an international consensus
Clinical practice experience of a specialized clinical nutrition service in a public hospital in Mexico City
Was determined % of malnutrition.

Assessed:
- BMI
- Starvation
- Food intake
- LOS

Patients:
- Gastroenterology (%)
- Intensive therapy
- Neurology
- Oncology
- General Surgery
- Internal Medicine

Resumen

**Objetivo:** Determinar la frecuencia de desnutrición en los pacientes hospitalizados y relacionarla a su índice de masa corporal, ayuno, consumo de alimentos durante la estancia —nivel energético y proteico— y a los días de hospitalización.

*Métodos (población de estudio, sujetos, intervención):* Se evaluó la pérdida de peso en los últimos seis meses, el índice de masa corporal (IMC), los porcentajes de peso ideal y habitual, días de hospitalización, porcentaje de adecuación de alimento consumido (en kilocalorías y gramos de proteína), los días y razones del ayuno según fuera el caso en pacientes hospitalizados en diferentes servicios del Hospital General de México. Los pacientes se dividieron en grupos de acuerdo a su estado nutricional (con/en riesgo de desnutrición o normal) y se llevó a cabo un análisis descriptivo, así como diversas pruebas t para estimar la diferencia entre medias y comparar los dos grupos.

**Resultados:** Se evaluaron 561 pacientes. Se observaron diferentes frecuencias de desnutrición de acuerdo a varios indicadores: 21,17% de acuerdo al IMC, 38,07% y 19,57% por porcentaje de peso habitual e ideal respectivamente y una pérdida de peso en 69,57% de los pacientes.

NUTRITIONAL STATUS IN HOSPITALIZED PATIENTS IN A PUBLIC HOSPITAL IN MEXICO CITY

**Abstract**

**Objective:** To determine the frequency of malnutrition among hospitalized patients and to relate nutrition status with body mass index, fasting time, adequacy intake of protein and energy during hospitalization and length of stay.

**Methods (study population, subjects, intervention):** We evaluated weight loss in the last 6 months prior to admission, body mass index (BMI), ideal and usual body weight percentages, days of hospitalization, energy and protein intake adequacy, fasting days and cause in hospitalized patients at different wards at Hospital General de Mexico. Patients were divided into groups according to their nutritional status (at risk/with malnutrition or normal) and data was assessed descriptively and comparatively by t-tests to determine mean differences.
### Population 2008 Vs 2015

<table>
<thead>
<tr>
<th></th>
<th>2008 (N=303)</th>
<th></th>
<th>2015 (N=443)</th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>157.34</td>
<td>10.381</td>
<td>159.53</td>
<td>9.867</td>
<td>0.004</td>
</tr>
<tr>
<td>Weight</td>
<td>62.22</td>
<td>15.714</td>
<td>63.98</td>
<td>14.675</td>
<td>0.122</td>
</tr>
<tr>
<td>BMI</td>
<td>25.22</td>
<td>6.375</td>
<td>25.07</td>
<td>5.007</td>
<td>0.722</td>
</tr>
<tr>
<td>Usual Weight</td>
<td>68.63</td>
<td>30.523</td>
<td>69.45</td>
<td>17.164</td>
<td>0.669</td>
</tr>
<tr>
<td>Usual Weight (%)</td>
<td>93.47</td>
<td>14.947</td>
<td>92.91</td>
<td>11.237</td>
<td>0.578</td>
</tr>
</tbody>
</table>

Patients with cancer have the same pattern of weight loss despite the passing years so better strategies must be applied.
Prevalencia de riesgo de desnutrición evaluada con NRS-2002 en población oncológica mexicana

Karolina Álvarez-Altamirano, Tania Delgadillo, Antonio García-García, Gabriela Alatríste-Ortiz y Fuchs-Tarlovsky Vanessa

Servicio de oncología del Hospital General de México, México. Universidad Autónoma de Sinaloa. Dirección general de investigación del Hospital General de México, México.

NRS-2002 Cancer patients 40.5% with score +3

<table>
<thead>
<tr>
<th>WEIGHT LOSS</th>
<th>NUTRITIONAL RISK (%)</th>
<th>NO RISK (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>9.9</td>
<td>11.3</td>
</tr>
<tr>
<td>LOW</td>
<td>8.8</td>
<td>13.1</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>9.7</td>
<td>0</td>
</tr>
<tr>
<td>HIGH</td>
<td>21.8</td>
<td>0</td>
</tr>
</tbody>
</table>

it's just a matter of time
OVARIAN CANCER

• Does not affect digestive system
• However nutritional status is affected
Nutritional deficiencies

- Ovarian cáncer:
  - Benign vs malign tumors affecting Body Composition in patients
  - 64 benign ovary tumour patients vs 56 malignant ovary cancer patients.
  - Measure of the following parameters: biochemical, anthropometric, body composition with the use of DEXA, BIA and cutaneal folds.
## Body composition (benign vs. malignancy)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Malign n=56</th>
<th>Benign n=64</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>60.7 ± 11.7</td>
<td>63.7 ± 11.9</td>
<td>NS</td>
</tr>
<tr>
<td>BMI</td>
<td>26.1 ± 4.9</td>
<td>27.6 ± 4.4</td>
<td>NS</td>
</tr>
<tr>
<td>CM</td>
<td>14.8 ± 1.2</td>
<td>15.1 ± 0.9</td>
<td>NS</td>
</tr>
<tr>
<td>TCF</td>
<td>19.6 ± 7.7</td>
<td>25.5 ± 8.02</td>
<td>0.00**</td>
</tr>
<tr>
<td>% fat (anthropometric)</td>
<td>19.0 ± 7.4</td>
<td>41.7 ± 5.2</td>
<td>0.00**</td>
</tr>
<tr>
<td>% BIA</td>
<td>*28.4 ± 8.6</td>
<td>*32.6 ± 8.1</td>
<td>NS</td>
</tr>
<tr>
<td>% DEXA</td>
<td>*33.5 ± 9.3</td>
<td>*39.0 ± 6.8</td>
<td>0.07 NS</td>
</tr>
</tbody>
</table>

- n= 20 benignos
- n= 10 maligno

Prueba t-student muestras independientes  **p > 0.05

Álvarez C, Hernández H, Oliva JC, Fuchs V
# Biochemical data

<table>
<thead>
<tr>
<th>Indicador</th>
<th>Tumor</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Benigno (n=35)</td>
<td></td>
</tr>
<tr>
<td>Proteínas totales</td>
<td>6.8 ±0.732</td>
<td>6.62 ±1.170</td>
</tr>
<tr>
<td>Albúmina</td>
<td>3.951 ±0.568</td>
<td>3.396 ±0.733</td>
</tr>
<tr>
<td>Transferrina</td>
<td>255 ±57.29</td>
<td>203.61 ±63.91</td>
</tr>
<tr>
<td>Hemoglobina</td>
<td>13.16 ±1.78</td>
<td>12.17 ±2.16</td>
</tr>
<tr>
<td>Hematocrito</td>
<td>38.91 ±4.8</td>
<td>36.47 ±5.8</td>
</tr>
<tr>
<td>Leucocitos</td>
<td>7596.76 ±3490.51</td>
<td>6651.74 ±2917.97</td>
</tr>
<tr>
<td>Linfocitos</td>
<td>2462.85 ±940.80</td>
<td>1971.70 ±1190.22</td>
</tr>
<tr>
<td>CA-125</td>
<td>315.72 ±966.63</td>
<td>1163.42 ±1550</td>
</tr>
</tbody>
</table>
Nutritional status and body composition are already affected before oncology treatment in ovarian cancer

Vanessa Fuchs-Tarlovsky PhD¹, Karolina Alvarez-Altamirano RD², Deborah Turquie-Sacal MSc, RD³, Carolina Alvarez-Flores RD³, Hellen Hernandez-Steller MSc⁴

¹Hospital General de Mexico, Oncology ward, Cuauhtémoc, Mexico  
²Nuevo León Autonomous University, Nuevo Leon, Mexico  
³Iberoamerican University, D.F., Mexico  
⁴Nutritional Support Unit, San Juan de Dios Hospital, San José, Costa Rica, Mexico

Ovarian cancer women had lower fat reserves by skin-fold thickness and lower serum proteins (albumin, transferrin, and lymphocytes) even though they were overweight.
Clinical Nutrition Department*

• 43,731 inpatients were treated and assessed by the Clinical Nutrition Department in 2015.
  • Male: 41%
  • Female: 51%
  • Mean hospitalary length stay: 3.7 days

During the entire 2015, according to the NRS-2002 parameters, 21.4% of inpatients were at nutritional risk.

Currently malnutrition is a nowadays issue that continues to prevail in the hospitalary background.
Comparative analysis

Fasting: 6.5%
Per oral feeding: 71.9%
Enteral nutrition: 8.1%
Parenteral nutrition: 7.4%

<table>
<thead>
<tr>
<th>Per oral</th>
<th>Enteral Nutrition</th>
<th>Parenteral nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncology (n=10320)</td>
<td>Neurology (n=1395)</td>
<td>Oncology (n=3593)</td>
</tr>
<tr>
<td>Internal Medicine (n=2261)</td>
<td>Oncology (n=562)</td>
<td>General Surgery Unit 307 (n=143)</td>
</tr>
<tr>
<td>Neurology (n=1786)</td>
<td>Internal Medicine (n=207)</td>
<td>General Surgery Unit 305 (n=139)</td>
</tr>
<tr>
<td>Infectology (n=1452)</td>
<td>Pediatrics (n=194)</td>
<td>Pediatrics (n=133)</td>
</tr>
<tr>
<td>Internal Medicine Unit 110 (n=1215)</td>
<td>Internal Medicine Unit 110 (n=191)</td>
<td>Infectology (n=130)</td>
</tr>
</tbody>
</table>
There is an increasing demand for nutritional care therapy in the hospitals, internal medicine and geriatrics.

NRS-2002 (%)

- Oncology: 38.0%
- Pediatrics: 12.2%
- Neurology: 4.9%
- Internal Medicine: 4.6%
- Geriatrics: 3.8%
- Others: 36.5%
Nutritional assessments

- Detect patients that need nutritional support.
- Prevents deficiencies and excess in nutritional status which can affect the clinical evolution of inpatients.

SURGICAL PROCEDURES MODIFY THE NUTRITIONAL STATUS OF INPATIENTS; THIS MUST BE TAKEN INTO ACCOUNT TO PRESERVE THE INTEGRITY OF TISSUES, THE FUNCTIONAL REPAIRING PROCESSES AND THE PROGNOSIS OF INPATIENTS.
Head and neck cancer

- Regions which affection can impair feeding
  - Nasal cavity.
  - Oral cavity.
  - Nasopharynx.
  - Oropharynx.
  - Larynx.
Original

Evaluación del impacto de un tratamiento nutricional intensivo sobre el estado nutricional de pacientes con cáncer de cabeza y cuello en estadio III y IV

V. Fuchs, V. Barbosa, J. Mendoza, A. Vargas, O. Amancio, A. Hernández-Cuellar y E. Arana-Rivera

Servicio de Oncología. Hospital General de México. México.
Head and neck cancer

General Objective

Assess the effect of intensive nutritional therapy in patients with head and neck cancer, stages III and IV (Anthropometric/biochemical/dietetic data)

Patients: 41
Inpatients weight loss: 69.57%

Mean daily feeding parameters: \(987.45 \pm 103.73\) Kcal and \(78.87 \pm 32.13\) g of protein in average.

Methods

Cohort, comparative, experimental study design.

Conventional treatment

- Feeding advice (instructed by physician and/or nurse)
- Enteral nutrition feeding tube for the patients with malnutrition
- Enteral nutrition

Methods

Intensive Nutritional Care

- Nutritional assessment every 21 days (anthropometric, biochemical, clinical, and dietetic)
- Individual nutritional requirements calculation
- Nutritional supplement delivery to inpatients
- Feeding tube for enteral nutrition in case requirements are not reached.

Anthropometric results

TREATMENT

## Anthropometric results

### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Basal (n=31)</th>
<th>21 days (n=31)</th>
<th>TNI (n=22)</th>
<th>42 days (n=31)</th>
<th>TNI (n=15)</th>
<th>63 days (n=31)</th>
<th>TNI (n=11)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>50.27 ± 12.42</td>
<td>47.19 ± 9.60</td>
<td>59.60 ± 14.31</td>
<td>59.14 ± 13.52</td>
<td>44.9 ± 9.05</td>
<td>43.52 ± 8.98</td>
<td>58.02 ± 10.85</td>
<td>&lt;0.011</td>
</tr>
<tr>
<td><strong>BMI(Kg/m2)</strong></td>
<td>21.01 ± 4.73</td>
<td>20.20 ± 3.20</td>
<td>24.32 ± 4.77</td>
<td>22.98 ± 4.26</td>
<td>19.12 ± 3.21</td>
<td>18.32 ± 3.04</td>
<td>23.73 ± 3.40</td>
<td>&lt;.0.00</td>
</tr>
<tr>
<td><strong>% Fat</strong></td>
<td>21.14 ± 7.2</td>
<td>18.95 ± 7.5</td>
<td>27.30 ± 11.24</td>
<td>26.67 ± 11.58</td>
<td>17.2 ± 7.7</td>
<td>15.37 ± 7.5</td>
<td>29.50 ± 9.59</td>
<td>&lt;0.002</td>
</tr>
<tr>
<td><strong>ICC</strong></td>
<td>0.89±0.86</td>
<td>0.88±0.75</td>
<td>0.89±0.10</td>
<td>0.90±0.10</td>
<td>0.87±0.79</td>
<td>0.88±0.77</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>% Usual weight</strong></td>
<td>89.58 ± 9.98</td>
<td>86.53 ± 8.76</td>
<td>87.65 ± 11.98</td>
<td>87.22 ± 13.08</td>
<td>82.17 ± 8.74</td>
<td>79.22 ± 9.49</td>
<td>90.57 ± 9.36</td>
<td>&lt;0.002</td>
</tr>
<tr>
<td><strong>% Weight loss</strong></td>
<td>10.10 ± 9.9</td>
<td>13.16 ± 9.0</td>
<td>12.77 ± 13.08</td>
<td>12.34 ± 11.98</td>
<td>17.25 ± 9.4</td>
<td>19.84 ± 10.5</td>
<td>9.4 ± 9.37</td>
<td>&lt;0.008</td>
</tr>
</tbody>
</table>

Biochemical results

![Graph of Hemoglobin](image1)

*P<0.002

![Graph of Albumin](image2)

## Biochemical parameters

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Basal</th>
<th>21 days</th>
<th>42 days</th>
<th>63 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TC (n=31)</td>
<td>TNI (n=22)</td>
<td>P*</td>
<td>TC (n=31)</td>
</tr>
<tr>
<td>Hemogobline</td>
<td>12.99 ± 1.55</td>
<td>13.95 ± 1.98</td>
<td>NS</td>
<td>12.50 ± 1.36</td>
</tr>
<tr>
<td>Hematocrite</td>
<td>37.51 ± 6.46</td>
<td>41.42 ± 5.83</td>
<td>&lt;0.038</td>
<td>37.19 ± 4.16</td>
</tr>
<tr>
<td>Albumine</td>
<td>3.58 ± 0.63</td>
<td>4.1 ± 0.42</td>
<td>&lt;0.000</td>
<td>3.36 ± 0.71</td>
</tr>
<tr>
<td>Total lymphocytes</td>
<td>2544.5 ± 1695.3</td>
<td>1700.91 ± 579.79</td>
<td>&lt;0.027</td>
<td>2529.6 ± 1750.1</td>
</tr>
<tr>
<td>ICT</td>
<td>61.0 ± 24.6</td>
<td>86.01 ± 34.9</td>
<td>&lt;0.001</td>
<td>57.49 ± 22.3</td>
</tr>
<tr>
<td>Transferrine</td>
<td>258.6 ± 68.02</td>
<td>214.59 ± 72.95</td>
<td>&lt;0.026</td>
<td>253.1 ± 64.39</td>
</tr>
</tbody>
</table>

---

Significant weight loss before oncology treatment is related to inflammation level and lean body mass reserves in head and neck cancer patients

- Objective: To compare inflammatory parameters, body composition and quality of life of patients with squamous cell head and neck cancer who had lost more than 10% of their body weight before starting cancer treatment with those who did not lose weight.
Methodology

- Descriptive observational study
  - Patients with head and neck cancer before starting their oncology treatments
  - Levels of inflammatory cytokines TNF-\(\alpha\), IL-1\(\beta\) and IL-6 were measured
  - Body composition & QOL
  - Groups: weight loss of 10% before cancer therapy or with out it.
Outcomes

Table 3: Proinflammatory cytokines

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total population n=79</th>
<th>Percent weight loss</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt;10% (n=43)</td>
<td>&gt;10% (n=36)</td>
</tr>
<tr>
<td>CRP (mg/dL)</td>
<td>31.35 ±51.21</td>
<td>30.40 ±57.06</td>
<td>32.45 ±44.19</td>
</tr>
<tr>
<td>TNF-α</td>
<td>153.46 ±182</td>
<td>111.30 ±170.40</td>
<td>203.83 ±185.04</td>
</tr>
<tr>
<td>IL-1β</td>
<td>84.47 ±189.13</td>
<td>38.57 ±138.12</td>
<td>139.29 ±226.15</td>
</tr>
<tr>
<td>IL-6</td>
<td>271.93 ±317.35</td>
<td>190.72 ±319.66</td>
<td>398.64 ±289.90</td>
</tr>
<tr>
<td>IFN-γ</td>
<td>188.95 ±321.47</td>
<td>191.57 ±395.15</td>
<td>185.83 ±207.16</td>
</tr>
</tbody>
</table>

TNF-α: tumor necrosis factor alpha, IL-1β: interleukin 1-beta and IFN-γ: interferon gamma. PCR: C reactive protein. Equalvariances assumed. * t-Student test; p<0.05
## Outcomes

### Table 4: Body composition

<table>
<thead>
<tr>
<th>Element</th>
<th>Total population</th>
<th>Percent weight loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n=79$</td>
<td>$&lt;10%$ ($n=43$)</td>
</tr>
<tr>
<td>Usual weight (Kg)</td>
<td>68.08 ±13.39</td>
<td>70.16 ±12.48</td>
</tr>
<tr>
<td>Weightloss (Kg)</td>
<td>9.51 ±9.44</td>
<td>4.99 ±2.58</td>
</tr>
<tr>
<td>Current weight (Kg)</td>
<td>59.04 ±13.15</td>
<td>64.76 ±11.16</td>
</tr>
<tr>
<td>IMC (Kg/m²)</td>
<td>22.88 ±5.18</td>
<td>25.15 ±3.81</td>
</tr>
<tr>
<td>Fat mass (Kg)</td>
<td>18.55 ±6.70</td>
<td>19.57 ±6.22</td>
</tr>
<tr>
<td>Fat free mass (Kg)</td>
<td>40.33 ±9.99</td>
<td>44.88 ±8.74</td>
</tr>
<tr>
<td>Phase angle (°)</td>
<td>5.74 ±1.29</td>
<td>5.92 ±1.17</td>
</tr>
</tbody>
</table>

IMC: body mass index. Not equal variances are assumed: Fat free mass. * t-Student test; $p<0.05$
# Outcomes

## Table 1: Blood chemistry

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total population</th>
<th>Percent weight loss</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=79</td>
<td>&lt;10% (n=43)</td>
<td>&gt;10% (n=36)</td>
</tr>
<tr>
<td>Lymphocytes (# x10e3/uL)</td>
<td>1.68 ±0.67</td>
<td>1.77 ±0.59</td>
<td>1.56 ±0.75</td>
</tr>
<tr>
<td>Leukocytes (x10e3/uL)</td>
<td>8.79 ±4.94</td>
<td>8.56 ±5.50</td>
<td>9.06 ±4.23</td>
</tr>
<tr>
<td>Erythrocytes (x10e6/uL)</td>
<td>4.58 ±0.64</td>
<td>4.70 ±0.58</td>
<td>4.43 ±0.70</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>13.70 ±1.86</td>
<td>14.10 ±1.78</td>
<td>13.23 ±1.86</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>41.60 ±5.57</td>
<td>45.57 ±5.23</td>
<td>40.45 ±5.81</td>
</tr>
<tr>
<td>Platelets (x10e3/uL)</td>
<td>266 ±94</td>
<td>255 ±91</td>
<td>279±98</td>
</tr>
</tbody>
</table>

Not equal variances are assumed to: Leukocytes and hemoglobin. * t-Student test; p<0.05
Outcomes

• There are important differences in inflammatory parameters and in lean body mass reserves between patients who lost weight and those who did not, previous to oncology treatment.

• Weight loss should be evaluated in every patient and a nutritional tailored treatment should start as soon as possible in those patients who lost weight.
Effect of eicosapentaenoic acid on body composition and markers of inflammation in patients with head and neck cancer

**Objective:** The main objective of the assignment, was to evaluate the effects of the eicosapentaenoic acid towards the corporal composition and inflammatory markers in patients diagnosed with head and neck tumors that were submitted to antineoplastic treatment
Methods and Materials:

- A controlled clinical trial was conducted, in which patients with head and neck cancer were administered with a 2 gram dose of eicosapentaenoic acid during a period of 6 weeks, doing so approximately 15 days before beginning the antineoplastic treatment (surgery, radiotherapy, chemotherapy, or mixed treatment)
Methods and Materials:

Body composition
- Weight (BMI)
- Weightloss
- The bioimpedance JRL Quatium IV system

Inflammatory markers
- Elisas technique with the Bio-Rad PRO HU-CYTO 17-PLEX

Quality of life
- Evaluated with the questionnaires which were validated by The European Organisation for Research and Treatment of Cancer (EORTC): QLQ-C30
Results

64 patients with Head and neck cancer

32 with Supplemented EPA

Eicosapentaenoic acid
Results:

- **Weight**
  - CONTROL: 2.11 kg
  - EXPERIMENTAL: 0.36 kg

- **Fat mass**
  - CONTROL: 1.18 kg
  - EXPERIMENTAL: 0.19 kg

- **Fat-free mass**
  - CONTROL: 1.35 kg
  - EXPERIMENTAL: 0.18 kg
Inflammatory markers

**Interleukin-1β**
- Change in pg/mL:
  - Control: 11.08
  - Experimental: 31.08

**Interleukin-6**
- Change in pg/mL:
  - Control: 42.31
  - Experimental: 10.98

**Interleukin-10**
- Change in pg/mL:
  - Control: 24.72
  - Experimental: 3.25

**TNF-α**
- Change in pg/mL:
  - Control: 11.16
  - Experimental: 18.86

**INF-γ**
- Change in pg/mL:
  - Control: 636.8
  - Experimental: 59.16

Tesis de Maestría: Obed Solís Martínez, Escuela Superior de Medicina, Instituto Politécnico Nacional, 2016
Quality of life

Changing global health in percentage

<table>
<thead>
<tr>
<th></th>
<th>CONTROL</th>
<th>EXPERIMENTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TREATMENT

- Emotional function
  - CONTROL: 4.16
  - EXPERIMENTAL: 13.02
  - * indicates significance

- Social function
  - CONTROL: 4.68
  - EXPERIMENTAL: 4.68

Tesis de Maestría: Obed Solís Martínez, Escuela Superior de Medicina, Instituto Politécnico Nacional, 2016
EPA SUPLEMENTATION
modulating pro-inflammatory cytokine synthesis
IL-1β, IL-6, IFN-γ y TNF-α.

EPA SUPLEMENTATION
Improving the inflammatory state
IL-10

EPA SUPLEMENTATION
Maintains fat and weight free mass was intact
Improvement in their QOL.

Tesis de Maestría: Obed Solís Martínez, Escuela Superior de Medicina, Instituto Politécnico Nacional, 2016
Antioxidant supplementation has a positive effect on oxidative stress and hematological toxicity during oncology treatment in cervical cancer patients

Vanessa Fuchs-Tarlovsky · María Amanda Casillas Rivera · Karolina Alvarez Altamirano · Juan Carlos Lopez-Alvarenga · Guillermo Manuel Ceballos-Reyes

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Abstract
Background and aim Hematological toxicity and oxidative stress are common in cancer patients. Antioxidant supplementation has been shown to decrease oxidative stress, but there is still controversy on this topic. The aim of this study was to determine the effect of antioxidant supplementation on oxidative stress, hematological toxicity, and quality of life (QoL) in cervical cancer patients.
Methods Randomized, single-blinded controlled trial in women with cervical cancer treated with radiotherapy and chemotherapy with cisplatin. Subjects were randomly

quality of life questionnaire was applied before and after oncology treatment. Student’s t test for independent samples and $\chi^2$ for categorical variables were performed.
Results One hundred three patients were randomly assigned to receive treatment with antioxidants 49 (48 %) or placebo 54 (52.40 %). At the end of the oncology treatment, hemoglobin levels were maintained, and global QoL was better only in the supplemented group ($p<0.025$).
Conclusions Antioxidant supplementation in patients treated with chemotherapy and radiotherapy apparently decreased oxidative stress, maintained hemoglobin levels.
Antioxidant supplementation with oncology therapy (Cysplatin)

n= 103 patients: 54 placebo group/49 treatment.

Cervicouterine cancer stages II b y III a.

Cisplatine 40mg/m2 y radiotherapy 5Gy en 25 sessions.

Placebo VS suplementados con antioxidantes:

4.80 mg de B-caroteno, 200 mg de vitamina C, 200 UI de vitamina E, 50 mg de selenio y 15 mg de Zinc.

Support Care Cancer (2013) 21:1359–1363
Table 1  Analysis of variables of oxidative stress before and after cancer treatment

<table>
<thead>
<tr>
<th>Oxidative stress markers</th>
<th>Placebo initial mean±SD n=54</th>
<th>Placebo final mean±SD n=54</th>
<th>p</th>
<th>Suplemented initial mean±SD n=49</th>
<th>Suplemented final mean±SD n=49</th>
<th>p</th>
<th>p INTERGROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDA (nmol/mL)</td>
<td>8.29±6.4</td>
<td>10.65±11.3</td>
<td>0.10</td>
<td>12.05±8.7</td>
<td>14.75±12.3</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td>Carbonyls (nmol/mL)</td>
<td>84.60±67.3</td>
<td>126.8±143.7</td>
<td>0.06</td>
<td>91.26±68.7</td>
<td>75.85±57.9</td>
<td>0.25</td>
<td>0.000*</td>
</tr>
<tr>
<td>Carbonyl/mg protein (mmol)</td>
<td>1.5±1.4</td>
<td>2.53±3.1</td>
<td>0.05*</td>
<td>1.55±1.4</td>
<td>1.41±1.6</td>
<td>0.65</td>
<td>0.003*</td>
</tr>
</tbody>
</table>

*P<0.05

Table 2  Hematologic variables between placebo and supplemented groups before and after cancer treatment

<table>
<thead>
<tr>
<th>Blood count variables</th>
<th>Placebo initial mean±SD n=54</th>
<th>Placebo final mean±SD n=54</th>
<th>p</th>
<th>Suplemented initial mean±SD n=49</th>
<th>Suplemented final mean±SD n=49</th>
<th>p</th>
<th>p INTERGROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lympocytes (X 10^3 U/mm³)</td>
<td>1.95±0.86</td>
<td>0.61±0.99</td>
<td>0.000*</td>
<td>1.78±0.86</td>
<td>0.46±0.23</td>
<td>0.000*</td>
<td>0.487</td>
</tr>
<tr>
<td>Eritrocites (g/dL)</td>
<td>4.60±0.56</td>
<td>3.86±0.46</td>
<td>0.000*</td>
<td>4.46±0.36</td>
<td>4.03±0.41</td>
<td>0.000*</td>
<td>0.990</td>
</tr>
<tr>
<td>Hemoglobine (g/dL)</td>
<td>13.13±1.49</td>
<td>11.62±1.36</td>
<td>0.000*</td>
<td>13.31±1.35</td>
<td>12.50±1.22</td>
<td>0.04*</td>
<td>0.003*</td>
</tr>
<tr>
<td>Hematocrite (%)</td>
<td>37.73±5.02</td>
<td>33.86±3.78</td>
<td>0.000*</td>
<td>38.83±3.44</td>
<td>36.49±2.03</td>
<td>0.000*</td>
<td>0.004*</td>
</tr>
<tr>
<td>Platelets (X 10^5 U/mm³)</td>
<td>301.28±76.61</td>
<td>240.98±65.52</td>
<td>0.000*</td>
<td>318.89±91.97</td>
<td>255.46±81.34</td>
<td>0.000*</td>
<td>0.379</td>
</tr>
</tbody>
</table>

*P<0.05
Original

Efecto de la suplementación con antioxidantes sobre el estrés oxidativo y la calidad de vida durante el tratamiento oncológico en pacientes con cáncer cérvico uterino

V. Fuchs-Tarlovska\(^1\)\(^,\)\(^2\), M. Bejarano-Rosales\(^1\), G. Gutiérrez-Salmeán\(^2\), M.\(^a\) A. Casillas\(^3\), J. C. López-Alvarenga\(^1\) y G. M. Ceballos-Reyes\(^2\)

\(^1\)Servicio de Oncología y Dirección de Investigación. Hospital General de México. \(^2\)Escuela Superior de Medicina. IPN. \(^3\)Iberoamerican University. Mexico City. México.

Resumen

Introducción: En México el cáncer cérvico uterino representa un grave problema de salud pública. El tratamiento depende de su extensión; para los estadios iniciales, cirugía y para los localmente avanzados combinación

EFFECT OF ANTIOXIDANT SUPPLEMENTATION OVER OXIDATIVE STRESS AND QUALITY OF LIFE IN CERVICAL CANCER

Abstract
• Antioxidant supplementation reduced oxidative stress mainly at the level of protein, did not affect food intake.
• Quality of life was better in the supplemented patients.
Original

Efecto de la suplementación con antioxidantes sobre el estrés oxidativo y la calidad de vida durante el tratamiento oncológico en pacientes con cáncer cérvico uterino

V. Fuchs-Tarlovsky1, M. Bejarano-Rosales1, G. Gutiérrez-Salmeán2, M.ª A. Casillas3, J. C. López-Alvarenga1 y G. M. Ceballos-Reyes2

1Servicio de Oncología y Dirección de Investigación. Hospital General de México. 2Escuela Superior de Medicina. IPN. 3Iberoamerican University. Mexico City. México.

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Introducción: En México el cáncer cérvico uterino representa un grave problema de salud pública. El tratamiento depende de su extensión; para los estadios iniciales, cirugía y para los localmente avanzados combinación de quimioterapia con cisplatino y radioterapia. Ambas terapias producen estrés oxidativo a nivel celular. Todo este proceso afecta el consumo de antioxidantes naturales y la calidad de vida.

Objetivo: Conocer el efecto que tiene la suplementación con antioxidantes (β-caroteno, vitamina C y vitamina E) en la calidad de vida de pacientes con cáncer cérvico uterino.

EFFECT OF ANTIOXIDANT SUPPLEMENTATION OVER OXIDATIVE STRESS AND QUALITY OF LIFE IN CERVICAL CANCER

Abstract

Background: Mexico has a high rate of cervical cancer which represents an important public health issue. The treatment for this disease depends on the extension of the tumor; for the initial stages surgery is recommended, and for locally advanced tumors, a combination of chemotherapy and radiotherapy is used. All this process affects natural consumption of antioxidants and quality of life. Therefore, this study aimed to evaluate the effect that antioxidant supplementation (β-carotene, vitamin C and vitamin E) has on the quality of life of patients with cervical cancer.
Antioxidant supplementation during oncology treatment has no effect on cervical cancer recurrence

*La suplementación con antioxidantes durante el tratamiento oncológico no tiene efecto sobre la recurrencia de cáncer cervicouterino*

Karolina Álvarez-Altamirano¹, Alma Nubia Mendoza-Hernández², Carolina Carcoba-Tenorio³, José Antonio García-García¹ and Vanessa Fuchs-Tariovsky¹


Abstract

**Introduction and aim:** Antioxidant therapy with chemotherapy and radiotherapy in cervical cancer patients is controversial. While some evidence suggests that the use of antioxidants diminishes side effects from anticancer therapy, there is also data to suggest that antioxidants increase the risk of recurrence by affecting oncology treatments.

**Methods:** We conducted a controlled clinical trial in cervical cancer patients supplemented with an antioxidant mixture or a placebo during four years after their antineoplastic treatment was completed and the effect on recurrence. We also conducted data on usual hemoglobin and albumin levels. Differences between groups were analyzed using chi-square test. Survival was calculated by the Multivariate COX regression with omnibus test and the enter method.

**Results:** 103 treated patients were in clinical stages IIB and IIIb of cervical cancer, 48% (n = 49) of the patients were treated with antioxidant supplementation and 52% (n = 54) of the patients were in the placebo group. Of the original 103 patients, 88 patients were able to follow up on 88 patients for an additional four years. 23.9% (n = 21) of the patients presented cancer recurrence and 76.1% (n = 67) did not. 21.6% (n = 19) patients showed metastasis. 8% (n = 7) patients were in the antioxidant group and 15.9% (n = 14) were in the placebo group (p > 0.05).

Regarding implications of cancer survivors, antioxidant supplementation apparently seems not to have interference with recurrence in cervical cancer patients but there is not enough evidence to prove it. A different dosage may have the expected effect; however, further studies with another dosage and criteria are necessary.

**Conclusions:** Supplementation with antioxidants during treatment of cervical cancer has no effect on cancer recurrence after 4 years of follow-up.
Antioxidants during antineoplastic treatment do not affect recurrence in cervical cancer.

Recurrence: 23.5%
8% Supplemented
15% Placebo

P > 0.05
Sin diferencias estadísticas entre grupos

Role of antioxidants in cancer therapy

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ABSTRACT

Oxidative stress is a key component in linking environmental toxicity to the multistage carcinogenic process. Reactive oxygen species (ROS) are generated in response to both endogenous and exogenous stimuli. To counterbalance ROS-mediated injury, an endogenous antioxidants defense system exists; however, when oxidation exceeds the control mechanisms, oxidative stress arises. Chronic and cumulative oxidative stress induces deleterious modifications to a variety of macromolecular components, such as DNA, lipids, and proteins. A primary mechanism of many chemotherapy drugs against cancer cells is the formation of ROS, or free radicals. Radiotherapy is based on the fact that ionizing radiation destroys tumor cells. Radiotherapy induces direct lesions in the DNA or biological molecules, which eventually affect DNA. Free radicals produced by oncology therapy are often a source of serious side effects as well. The objective of this review is to provide information about the effects of antioxidants during oncology treatments and to discuss the possible events and efficacy. Much debate has arisen about whether antioxidant supplementation alters the efficacy of cancer chemotherapy. There is still limited evidence in both quality and sample size, suggesting that certain antioxidant supplements may reduce adverse reactions and toxicities. Significant reductions in toxicity may alleviate dose-limiting toxicities so that more patients are able to complete prescribed chemotherapy regimens and thus, in turn, improve the potential for success in terms of tumor response and survival.
Take home message

• Malnutrition in oncology patients is a very frequent problem.
• Oncology patients are in very high risk of malnutrition and therefore increasing the risk of complications, length of hospital stay and poor quality of life.
• Nutrition strategies must be found in order to modulate or reduce caquexia and be able to improve quality of life, oncology treatment tolerance and survival in cancer.
THANK YOU!!!