Nasal Colonization with Staphylococcus Aureus Before Radiotherapy Predicts Radiation Dermatitis

Alexandra Rzepecki BS (MD Candidate 2019)¹,², Mathew Birnbaum MD², Nitin Ohri MD³, Johanna Dailey MD⁴, Jana Fox MD³, William Bodner MD³, Rafi Kabarriti MD³, Madhur Garg MD³, Keyur Mehta MD³, Shalom Kalnicki MD³, Beth McLellan MD²

¹University of Michigan Medical School. Ann Arbor, MI  ²Division of Dermatology, Montefiore Center for Cancer Care. Bronx, NY ³Department of Radiation Oncology, Montefiore Medical Center. Bronx, NY ⁴Division of Infectious Diseases. Albert Einstein. Bronx, NY
Faculty Disclosure

We have nothing to disclose.
Background:

- Radiation dermatitis (RD) is a common adverse event of radiation therapy, with an incidence rate of up to 95%
- There is no gold standard approach in the prevention and management of RD
Background:

- Risks for RD are multi-factorial
- Microbial colonization has a role in inflammatory skin disorders that are similar to RD
- \textit{Staphylococcus aureus} can facilitate skin barrier defects and drive inflammation
- Little is known regarding the baseline incidence of microbial colonization prior to radiation therapy
Objectives:

1. Characterize the incidence of bacterial colonization in patients undergoing radiation therapy
2. Examine the association between radiation dermatitis severity and bacterial colonization

We hypothesize that microbial colonization prior to initiation of radiation therapy is associated with development of radiation dermatitis
Methods:

- Patients with cancers of the head & neck, breast, or anus underwent bacterial culture from 2 sites at 2 time points

<table>
<thead>
<tr>
<th>Montefiore</th>
<th>Nares</th>
<th>Skin in irradiated region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to RT initiation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Final week of RT</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

- Patients were evaluated weekly during treatment and dermatitis was graded using CTCAE version 4.03

CTCAE = Common Terminology Criteria for Adverse Events
## Results:

<table>
<thead>
<tr>
<th>Total patients</th>
<th>n = 83</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cancer:</strong></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>41</td>
</tr>
<tr>
<td>Head &amp; neck</td>
<td>37</td>
</tr>
<tr>
<td>Anal</td>
<td>5</td>
</tr>
<tr>
<td><strong>Dermatitis grade</strong></td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td>49</td>
</tr>
<tr>
<td>Grade 2</td>
<td>27</td>
</tr>
<tr>
<td>Grade 3</td>
<td>7</td>
</tr>
<tr>
<td><strong>Baseline culture SA (+)</strong></td>
<td></td>
</tr>
<tr>
<td>Nares</td>
<td>17</td>
</tr>
<tr>
<td>Radiation skin</td>
<td>5*</td>
</tr>
</tbody>
</table>

*all 5 subjects with a (+) skin culture also had a (+) nares culture
Results

Positive nares culture for *Staphylococcus aureus* at baseline was associated with increased risk of grade 2-3 dermatitis (65% vs. 34%, OR = 3.6, p=0.025)
Conclusions:

- Bacterial colonization with *Staphylococcal aureus* in the nares prior to initiation of radiotherapy is a risk factor for development of high-grade radiation dermatitis
- The role of antimicrobial therapy prior to initiation of radiotherapy ought to be explored
- Future directions
Thank you!

Division of Dermatology
Beth McLellan, MD
Mathew Birnbaum, MD

Division of Infectious Diseases
Johanna Daily MD

Department of Radiation Oncology
Nitin Ohri, MD
Jana Fox, MD
William Bodner, MD
Rafi Kabarriti, MD
Madhur Garg, MD
Keyur Mehta, MD
Shalom Kalnicki, MD

My email: arzepeck@umich.edu