News Briefing
Highlights from ASTRO 2019

Monday, September 16, 2019
10:30-11:30 a.m. CT
News Briefing: Highlights from ASTRO 2019 (Monday)

Moderator: Geraldine M. Jacobson, MD, MPH, FASTRO, West Virginia University Cancer Institute

Final Results of a Phase II Prospective Trial Evaluating the Combination of Stereotactic Body Radiotherapy (SBRT) with Concurrent Pembrolizumab in Patients with Metastatic Non-Small Cell Lung Cancer (NSCLC) (Abstract 74)

   Allison Campbell, Yale Cancer Center

Patterns of Disease Progression with Durvalumab in Stage III NSCLC (PACIFIC) (Abstract LBA-6)

   Andreas Rimner, Memorial Sloan Kettering Cancer Center

Applying a Machine Learning Approach to Predict Acute Radiation Toxicities for Head and Neck Cancer Patients (Abstract 141)

   Jay Reddy, The University of Texas MD Anderson Cancer Center

The Impact of the Closure of Women’s Health Clinics on Cervical Cancer in the United States (Abstract 202)

   Amar Srivastava, Washington University School of Medicine in St. Louis
Final Results of a Phase II Prospective Trial Evaluating the Combination of Stereotactic Body Radiotherapy and Pembrolizumab in Metastatic NSCLC

Allison Campbell, MD, PhD

Yale Cancer Center
Disclosures

• Dr. Campbell works for the Yale University School of Medicine
• Dr. Campbell has no conflicts of interest to disclose

Full author list:

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Background

• **Why this trial:**
  • We need more therapies for patients with metastatic lung cancer
  • Immunotherapy activates the immune system to attack cancer
  • Adding radiation to immunotherapy has been shown to result in therapeutic synergy
    • When high dose radiation is given to patients on immunotherapy, tumors that weren’t targeted by the radiation can shrink
    • This is called the “abscopal effect”

• **Trial Question:**
  • Can the addition of high dose radiation given in a few fractions to a single site of disease reinvigorate an immune response in patients who have progressed on anti-PD-1 therapy?
Trial Design

• **Patient eligibility**
  - Metastatic NSCLC
  - $\geq 2$ measurable sites of disease (one for treatment, others for measurement)
  - PD-L1+ histology was NOT required

• **Methods**
  - After patients progressed on immunotherapy, we gave high dose radiation in 3 or 5 fractions
  - Only one site of disease was treated with radiation
  - Other sites of disease were measured and tracked over time
  - Blood was drawn so circulating immune cells could be characterized
Results: Responses occurred outside the radiation field

- Waterfall plot representing best change in OVERALL RECIST v1.1 score after SBRT
  - All patients had progressed on anti-PD-1 therapy at the time of SBRT
- Responses are abscopal and represent DISTANT DISEASE
  - The SBRT-target lesion is NOT reflected in this waterfall plot
- 3 patients achieved either a PR or SD that lasted for one year or more
  - Better responses trended toward lasting longer

![Waterfall plot](image-url)
Results: 10% of patients had a partial response that lasted > 1 year

- Disease control rate: 57%
- 2 patients (10%) achieved a partial response sustained for longer than one year
- 10 patients (48%) achieved stable disease after SBRT
- PD-L1+ status trended toward increased PFS, but this did not achieve statistical significance

<table>
<thead>
<tr>
<th>Outcome</th>
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<tbody>
<tr>
<td><strong>Outcome</strong></td>
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<tr>
<td>Disease control rate after SBRT</td>
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<tr>
<td>Median Overall Survival after SBRT</td>
<td>Median Overall Survival after SBRT</td>
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<tr>
<td>Median PFS after SBRT</td>
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- Median Overall Survival after SBRT: 7.6 months (5.3-19.3)
- Median Follow-up from time of enrollment (whole trial): 15.2 months (10.7-19.3)
- Disease control rate after SBRT: 57.14%
- Patients achieving a PR after SBRT: 9.52%
- Patients achieving SD after SBRT: 47.62%
- Patients with PD after SBRT: 28.57%
- Patients with no scans after SBRT: 14.29%
- Median PFS after SBRT: 4.1 months (2.1-6.5)
- Median PFS after SBRT in patients with a PD-L1 status of 0: 2.4 months (0.8-6.2)
- Median PFS after SBRT in patients with a PD-L1 status > 0: 6.5 months (2.1-12.1)
- Median PFS after SBRT in patients with TIL scores of 0-1: 2.2 months (0.8-2.9)
- Median PFS after SBRT in patients with TIL scores of 2-3: 6.7 months (2.1-12.1)
- Median PFS after SBRT patients with NO immune-related adverse event: 2.2 months (1.5-4.2)
- Median PFS after SBRT patients with an immune-related adverse event: 6.5 months (2.7-12.1)
Results: T cells in the tumor biopsy were associated with longer PFS

- Patients with TIL scores of 2-3 had a median of 6.7 months before disease progression; patients with TIL scores of 0-1 had a median PFS of 2.2 months.

- Patients with ANY immune-related adverse event had a median of 6.5 months prior to disease progression; patients with NO immune-related adverse event had a median PFS of 2.2 months.

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<td>Median PFS after SBRT patients with NO immune-related adverse event</td>
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</tr>
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<td>Median PFS after SBRT patients with an immune-related adverse event</td>
<td>6.5 months</td>
</tr>
</tbody>
</table>
Results: Patients who responded well had more CD8+ “killer” T cells in their blood

- CD8+ effector memory cells in the peripheral blood are enriched in patients with a partial response that lasted one year or more (cluster 10)
  - These cells can kill tumors

- CD4+ “regulatory” cells are enriched in the peripheral blood in patients who responded poorly to SBRT (clusters 0 and 1)
  - These cells inhibit immune responses
Conclusions

• 10% of patients had a partial response that lasted > 1 year
  • These patients had already progressed on immunotherapy when they got SBRT
  • These patients had many sites of disease, but only got radiation at a single site

• Some responses were abscopal (occurred outside the radiation field)

• T cells in the tumor biopsy were associated with longer progression free survival

• Patients with an immune-mediated adverse event had longer progression free survival

• Patients who responded well to SBRT had more CD8+ “killer” T cells in their blood

• Patients who responded poorly to SBRT had more CD4+ “regulatory” T cells in their blood
Patterns of Disease Progression with Durvalumab in Stage III NSCLC (PACIFIC)

Andreas Rimner, MD

Memorial Sloan Kettering Cancer Center
Disclosures

- Andreas Rimner has received consulting fees and research grants from AstraZeneca
- This study was sponsored by AstraZeneca
- The author affiliated with MSKCC confirms that, in accordance with GPP3, he did not receive any payment from AstraZeneca related to this publication; additionally, MSKCC did not receive any funding from the study sponsor, AstraZeneca, for this study and its resulting publications. The author affiliated with MSKCC is acting in his individual capacity.

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Background

• In the phase 3 PACIFIC trial, durvalumab significantly prolonged PFS (HR, 0.52; P <0.0001) and OS (HR, 0.68; P = 0.00251) versus placebo in patients with unresectable, Stage III NSCLC who did not progress after concurrent chemoradiotherapy (cCRT)\textsuperscript{1,2,3}

• Time to death or distant metastasis (TTDM) was longer with durvalumab versus placebo (28.3 vs. 16.2 months; HR, 0.53), and the frequency of new lesions was 22.5\% and 33.8\%, respectively\textsuperscript{2}

• Durvalumab was associated with manageable safety and did not detrimentally impact patient-reported outcomes compared to placebo\textsuperscript{1,2,4}

• Durvalumab has received global approvals,\textsuperscript{3,5} and the ‘PACIFIC regimen’ (durvalumab after cCRT) has become SoC\textsuperscript{6}

• Here, we report exploratory analyses to characterize patterns of disease progression, including the sites of first progression, in patients from PACIFIC

Methods

• Disease progression was assessed by blinded independent central review (BICR; RECIST v1.1)

• Scans were re-evaluated for unequivocal new lesions by a new, independent reviewer*

• New lesions identified within the lung parenchyma or chest wall, including the diaphragm, were categorized as intrathoracic
  - Information on ‘in-RT-field’ versus ‘out-of-RT-field’ intrathoracic location was not available

• The proportions of patients with progression (or death), region of first progression, location and number of organs with new lesions, and number of new lesions at progression were descriptively summarized

• Time to progression by region was estimated by Kaplan–Meier method with between-treatment HRs calculated by stratified Log rank test

* A new, separate reviewer to the BICR assessment used for the primary analysis of PFS
First Progression by Location (BICR)*

- Durvalumab reduced first progression versus placebo in all regions (45.4% vs. 64.6%, respectively)
- Overall, intrathoracic progression was the most common (80.6% vs. 74.5% of progressors)

<table>
<thead>
<tr>
<th></th>
<th>ITT Population</th>
<th>Subpopulation with Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Durvalumab (N=476)</td>
<td>Placebo (N=237)</td>
</tr>
<tr>
<td>Any RECIST progression, n (%)</td>
<td>216 (45.4)</td>
<td>153 (64.6)</td>
</tr>
<tr>
<td>Intrathoracic only</td>
<td>174 (36.6)</td>
<td>114 (48.1)</td>
</tr>
<tr>
<td>Extrathoracic only</td>
<td>33 (6.9)</td>
<td>31 (13.1)</td>
</tr>
<tr>
<td>Intrathoracic and extrathoracic simultaneously</td>
<td>9 (1.9)</td>
<td>8 (3.4)</td>
</tr>
</tbody>
</table>

*With a data cutoff of March 22, 2018, median duration of follow-up was 25.2 months (range 0.2–43.1)
## Time to Progression or Death per BICR (ITT)*

- Durvalumab improved the times to intrathoracic progression only, extrathoracic progression only and simultaneous intrathoracic and extrathoracic progression

<table>
<thead>
<tr>
<th>Type of progression (or death)</th>
<th>Median time (95% CI) months</th>
<th>HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Durvalumab (N=476)</td>
<td>Placebo (N=237)</td>
</tr>
<tr>
<td>Intrathoracic only</td>
<td>25.2 (19.2–NR)</td>
<td>9.2 (5.6–13.6)</td>
</tr>
<tr>
<td>Extrathoracic only</td>
<td>NR (NR–NR)</td>
<td>NR (29.3–NR)</td>
</tr>
<tr>
<td>Intrathoracic and extrathoracic simultaneously</td>
<td>NR (NR–NR)</td>
<td>NR (NR–NR)</td>
</tr>
</tbody>
</table>

NR, not reached

*With a data cutoff of March 22, 2018, median duration of follow-up was 25.2 months (range 0.2–43.1)
New Extrathoracic Lesions at First Progression (BICR)*

- Durvalumab reduced new extrathoracic lesions at first progression versus placebo (8.8% vs. 16.5%, respectively)
- Approximately 2/3 of patients had 1 or 2 extrathoracic lesions at first progression

<table>
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<th>ITT Population</th>
<th>Subpopulation with Progression and New Extrathoracic Lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Durvalumab (N=476)</td>
<td>Placebo (N=237)</td>
</tr>
<tr>
<td>Any new extrathoracic lesion, n (%)</td>
<td>42 (8.8%)</td>
<td>39 (16.5%)</td>
</tr>
<tr>
<td>1 lesion</td>
<td>19 (4.0)</td>
<td>15 (6.3)</td>
</tr>
<tr>
<td>2 lesions</td>
<td>9 (1.9)</td>
<td>13 (5.5)</td>
</tr>
<tr>
<td>3–5 lesions</td>
<td>9 (1.9)</td>
<td>8 (3.4)</td>
</tr>
<tr>
<td>&gt;5 lesions</td>
<td>5 (1.1)</td>
<td>3 (1.3)</td>
</tr>
</tbody>
</table>

*With a data cutoff of March 22, 2018, median duration of follow-up was 25.2 months (range 0.2–43.1)
New Extrathoracic Lesions at First Progression by Site (BICR)*

- Most new extrathoracic lesions occurred in a single organ, most commonly in the brain.
- The distribution of extrathoracic lesions across organs was similar regardless of treatment.

<table>
<thead>
<tr>
<th>Subpopulation with Progression and New Extrathoracic Lesions</th>
<th>Durvalumab (n=42, 8.8% of ITT)</th>
<th>Placebo (n=39, 16.5% of ITT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of organ locations, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>40 (95.2)</td>
<td>37 (94.9)</td>
</tr>
<tr>
<td>2</td>
<td>2 (4.8)</td>
<td>2 (5.1)</td>
</tr>
<tr>
<td>Organ location, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brain</td>
<td>26 (61.9)</td>
<td>26 (66.7)</td>
</tr>
<tr>
<td>Bone</td>
<td>6 (14.3)</td>
<td>3 (7.7)</td>
</tr>
<tr>
<td>Liver</td>
<td>6 (14.3)</td>
<td>5 (12.8)</td>
</tr>
<tr>
<td>Lymph nodes</td>
<td>3 (7.1)</td>
<td>3 (7.7)</td>
</tr>
<tr>
<td>Other (adrenal gland, myelum, spleen)</td>
<td>3 (7.1)</td>
<td>4 (10.3)</td>
</tr>
</tbody>
</table>

*With a data cutoff of March 22, 2018, median duration of follow-up was 25.2 months (range 0.2–43.1)
New Extrathoracic Lesions at First Progression per Site (BICR)*

- The patterns of extrathoracic lesion numbers per organ were similar regardless of treatment

<table>
<thead>
<tr>
<th>BRAIN</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of new brain lesions</td>
<td>Durvalumab (n=26)</td>
</tr>
<tr>
<td>1</td>
<td>12 (46.2)</td>
</tr>
<tr>
<td>2</td>
<td>8 (30.8)</td>
</tr>
<tr>
<td>3–5</td>
<td>6 (23.1)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>0</td>
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</tbody>
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<table>
<thead>
<tr>
<th>LYMPH NODES</th>
<th>No. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of new lymph node lesions</td>
<td>Durvalumab (n=3)</td>
</tr>
<tr>
<td>1</td>
<td>1 (33.3)</td>
</tr>
<tr>
<td>2</td>
<td>1 (33.3)</td>
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<tr>
<td>3–5</td>
<td>0</td>
</tr>
<tr>
<td>&gt;5</td>
<td>1 (33.3)</td>
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</table>

<table>
<thead>
<tr>
<th>BONE</th>
<th>No. of patients (%)</th>
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<tbody>
<tr>
<td>No. of new bone lesions</td>
<td>Durvalumab (n=6)</td>
</tr>
<tr>
<td>1</td>
<td>6 (100)</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3–5</td>
<td>0</td>
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<tr>
<td>&gt;5</td>
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<table>
<thead>
<tr>
<th>LIVER</th>
<th>No. of patients (%)</th>
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</thead>
<tbody>
<tr>
<td>No. of new liver lesions</td>
<td>Durvalumab (n=6)</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
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</tr>
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<td>&gt;5</td>
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*With a data cutoff of March 22, 2018, median duration of follow-up was 25.2 months (range 0.2–43.1)
Conclusions

- The addition of durvalumab after cCRT (PACIFIC regimen) reduced rates of progression versus placebo at both intrathoracic and extrathoracic sites.

- Durvalumab improved the time to progression versus placebo, regardless of location.
  - Most patients experienced an intrathoracic recurrence at first progression, regardless of treatment.

- The extrathoracic recurrence patterns at first progression were similar with both treatments.

- Most patients who progressed had 1 or 2 extrathoracic lesions, making them potentially amenable to local ablative therapies.
Expert Perspective

Benjamin Movsas, MD, FASTRO

ASTRO Board of Directors
Chair of Radiation Oncology, Henry Ford Cancer Institute
Use the “Question” tab in GoToWebinar to submit your questions.
Applying a Machine Learning Approach to Predict Acute Radiation Toxicities for Head and Neck Cancer Patients

Jay Reddy, MD, PhD
University of Texas MD Anderson Cancer Center
Disclosures for Dr. Reddy

• I am employed by MD Anderson Cancer Center.
• I have previously received travel expenses from VisionRT.

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¹Department of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX, ²Oncora Medical, Philadelphia, PA, ³The University of Texas MD Anderson Cancer Center, Houston, TX, ⁴Department of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Sugar Land, TX, ⁵1840 Old Spanish Trail, Houston, TX
Background

• Radiation therapy (RT) plays an integral role in the management of head and neck cancers.

• Nearly all patients receiving RT will experience some toxicity.
  • Dysphagia, weight loss and need for feeding tube
  • Hospitalization for pain management, rehydration, nutritional support

• When and how to intervene represents a common clinical decision in the management of these patients.

• Precision oncology refers to the application of big data and predictive analytics to tailor specific treatments to patients and offer expected outcomes and toxicities

• This approach requires structured data for multiple variables, including clinical and pathologic characteristics, outcome, and acute toxicities
Oncora Medical
On Premises

Predictive models trained on Integrated data
Similar Case Metrics Data
Patient-Specific Predictions

Oncology Information System
Procedures, Rx, Chemo, Stage
MOSAIQ Brocade

Brocade + Mosaiq Data

Nightly + Real Time

Integrated data available for analysis

Machine learning driven analysis

Predictive models trained on Integrated data

Nightly

EHR
Encounters, Diagnoses, Drugs, Labs
Legacy Epic

IAI / FIRE Aggregated Data

OncoLog
Tumor Registry
Stage, Past Outcomes, Diagnostics

1 year lag

Epic Legacy

OncoLog Tumor Registry
Stage, Past Outcomes, Diagnostics

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Integrated data available for analysis

Machine learning driven analysis

Predictive models trained on Integrated data

Nightly
Objective

• To develop predictive models of acute toxicity during radiation for HN cancer patients.
  • Unplanned hospitalization (≤ 3 months from RT start)
  • Significant weight loss (>10% during RT)
  • Feeding tube placement
Methods

• 2121 consecutive courses of radiation treatment for HN cancer from May 2016—Aug 2018

• >700 clinical and treatment variables extracted
  • Demographics
  • Clinical and pathological characteristics
  • Treatment variables (RT details)

• Outcomes
  • Unplanned hospitalization (≤ 3 months from RT start)
  • Significant weight loss (>10% during RT)
  • Feeding tube placement
Methods

• **Training set:** first 1896 RT courses for HN cancer
  • Three machine learning models to predict outcome
    • Random forest—100 boosted decision trees
    • Extreme gradient boosted decision tree—100 boosted decision trees
    • Logistic regression with trained L1 regularization

• **Validation set:** subsequent 225 courses of RT
  • Final models for each toxicity were then evaluated
  • AUC > 0.7 considered clinically valid
## Descriptive Statistics (n=2121)

<table>
<thead>
<tr>
<th>Gender, count (%)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>527</td>
<td>24.8%</td>
</tr>
<tr>
<td>Male</td>
<td>1594</td>
<td>75.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age, median (IQR)</th>
<th>Years</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>63 yrs</td>
<td>55.1—70.3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RT Dose, median (IQR)</th>
<th>Gy</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>30—69.3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of fractions, median (IQR)</th>
<th>Number</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>9—33</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment Site</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oropharynx</td>
<td>743</td>
<td>35.1%</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>314</td>
<td>14.8%</td>
</tr>
<tr>
<td>Skin</td>
<td>233</td>
<td>11%</td>
</tr>
<tr>
<td>Larynx</td>
<td>171</td>
<td>8.1%</td>
</tr>
<tr>
<td>Salivary gland</td>
<td>129</td>
<td>6.1%</td>
</tr>
<tr>
<td>Thyroid</td>
<td>106</td>
<td>5.0%</td>
</tr>
<tr>
<td>Nasopharynx</td>
<td>87</td>
<td>4.1%</td>
</tr>
<tr>
<td>Nasal cavity</td>
<td>62</td>
<td>2.9%</td>
</tr>
<tr>
<td>Sinus</td>
<td>48</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
Outcomes

Data shows the following outcomes:

- **Unplanned hospitalization**: 13.2% in Train and 14.2% in Validation.
- **Significant weight loss**: 16.9% in Train and 14.2% in Validation.
- **Feeding tube placement**: 17.8% in Train and 23.1% in Validation.

Table:

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Train (n=1896)</th>
<th>Validation (n=225)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unplanned hospitalization</td>
<td>13.2%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Significant weight loss</td>
<td>16.9%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Feeding tube placement</td>
<td>17.8%</td>
<td>23.1%</td>
</tr>
<tr>
<td></td>
<td>Unplanned hospitalization (13.2%)</td>
<td>Significant weight loss (16.9%)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Random forest</td>
<td>0.676</td>
<td>0.834</td>
</tr>
<tr>
<td>Gradient boosted</td>
<td>0.672</td>
<td>0.843</td>
</tr>
<tr>
<td>decision trees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistic regression</td>
<td>0.666</td>
<td>0.838</td>
</tr>
</tbody>
</table>
### AUC for Validation Set Models (n=225)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unplanned hospitalization (14.2%)</th>
<th>Significant weight loss (14.2%)</th>
<th>Feeding tube placement (23.1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random forest</td>
<td>0.640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gradient boosted decision trees</td>
<td></td>
<td>0.751</td>
<td>0.755</td>
</tr>
<tr>
<td>Logistic regression</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• Application of three machine-learning models to a structured dataset enabled the development of predictive models for acute radiation toxicities for HN cancer patients.

• The models for predicting significant weight loss and feeding tube placement met criteria for clinical validity.

• This study demonstrates the feasibility of employing precision oncology to predict acute radiation toxicities.

• May facilitate the identification of patients for whom early intervention is warranted.
Future Use Case

- Place feeding tube up front
- Nutritional supplementation
- Wait and monitor

Work-up/Staging

Personalized Predictions

- Unplanned hospitalization: 23%
- Significant weight loss: 47%
- Feeding tube placement: 40%

ML Model

Decison Support

➢ Place feeding tube up front
➢ Nutritional supplementation
➢ Wait and monitor

Age
BMI
Stage
Biomarker
Risk Factors
Vitals
Treatment Plan

2019 AMERICAN SOCIETY FOR RADIATION ONCOLOGY (ASTRO) ANNUAL MEETING
The Impact of the Closure of Women’s Health Clinics on Cervical Cancer in the United States

Amar J. Srivastava, MD, MPH

Washington University School of Medicine in St. Louis
Disclosure

I have no conflicts of interest to disclose... except that I consider myself an epidemiologist, of sorts

Full author list:

A. Srivastava¹, J. M. Barnes², S. Markovina¹, J. K. Schwarz¹, and P. W. Grigsby¹

¹Department of Radiation Oncology, Washington University School of Medicine, St. Louis, MO, ²Saint Louis University, Saint Louis, MO
Background

- Cervical cancer is a **highly-preventable and screening-detectable** cancer and if diagnosed at an early stage is very **curable with low mortality**

- Women are generally diagnosed through Pap smears, which can be obtained at low-cost women’s health clinics (WHCs)

- Between 2010-13, ~100 WHCs in the U.S. closed due to funding and new laws

- In this study, we evaluated the association between clinic closures and screening for cervical cancer, stage at diagnosis, and mortality associated with this disease
Methods

- States were divided into two cohorts—DIC (decrease in clinics) and NDIC (no decrease in clinics) based on changes in the number of facilities providing comprehensive reproductive services between 2010-13 using national survey data.

- We used the BRFSS database to compare changes in screening and SEER to compare changes in stage at diagnosis and mortality using a difference-in-differences analysis.
Results

PREVENT

DETECT

REDUCE
Results

**PREVENT**

BRFSS- Screening with a Pap Smear

- Hispanic Women, 5.32%, p<0.01
- Unmarried Women, 4.37%, p<0.01
- Women 21-34 y/o, 4.81%, p<0.01
- Uninsured Women, 6.18%, p=0.01

- 5% DIC
- 2% DID p<0.01
- 3% NDIC
Results

SEER- Stage at Diagnosis

Early-Stage Diagnoses among 18-34 y/o pts
- DETECT DIC: 3%
- NDIC: 3%

Adjusted DID: p=0.03

Late-Stage and Metastatic Diagnoses among 18-34 y/o pts
- Adjusted DID: p=0.14
- Adjusted DID: p=0.16

8%
4%
Results

SEER- Mortality in Women with Cervical Cancer

REDUCE

36% Risk of Death

Adjusted Hazard Ratio (aHR)=1.36
p=0.04

Mortality in Women with Cervical Cancer
Results

**PREVENT**

- 2% DID (p<0.01)

**DETECT**

- 14% EARLY STAGE
  - Adjusted DID (p=0.14)
  - LATE STAGE
  - Adjusted DID (p=0.03)

**REDUCE**

- 8% LATE STAGE
  - Adjusted DID (p=0.14)
  - METS (ST. IV)
  - Adjusted DID (p=0.16)

- 4% METS (ST. IV)
- 36% Risk of Death
  - Adjusted Hazard Ratio (aHR)=1.36 (p=0.04)
Conclusions

• In this retrospective (observational) study, we noted that closures of women’s health clinics throughout the U.S. between 2010 and 2013 were associated with decreased screening for cervical cancer, fewer women being diagnosed with early-stage disease, a trend towards more women being diagnosed with late-stage disease, and significantly increased mortality.

• Though causality cannot be confirmed, these findings are concerning and suggest that further consideration should be given to funding and other factors influencing the closure of women’s health clinics.
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PREVENT

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  - DETECT DIC: 3%
  - NDIC: 3%
  - Adjusted DID = 14%, p=0.03

- Late-Stage and Metastatic Diagnoses among 18-34 y/o pts:
  - Adjusted DID = 8%, p=0.14
  - Adjusted DID = 4%, p=0.16
Results

SEER - Mortality in Women with Cervical Cancer

36% Risk of Death
Adjusted Hazard Ratio (aHR) = 1.36
p = 0.04
Results

PREVENT

2% DID p<0.01

14% EARLY STAGE

Adjusted DID p=0.03

LATE STAGE

14% p=0.14

REDUCE

8% Adjusted DID p=0.16

METS (ST. IV)

4%

EARLY STAGE

14% p=0.01

LATE STAGE

14% p=0.14

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Expert Perspective

Geraldine M. Jacobson, MD, MPH, FASTRO

ASTRO Board of Directors
Chair of Radiation Oncology, West Virginia University Cancer Institute
Use the “Question” tab in GoToWebinar to submit your questions.
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