CENTER FOR INFECTION RESEARCH IN CANCER

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Director
Number of Cancers Caused by Infections*

(*That we know of)
### Examples of Tumor Types Known to be Caused by Infections

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Infectious Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervix; anal and perianal cancers (&gt;90%)</td>
<td>Various HPV types</td>
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<tr>
<td>Vulvar, penile and vaginal cancers (~50%)</td>
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<tr>
<td>Head and neck cancers (~78%)</td>
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<tr>
<td>Squamous cell carcinomas of skin (unknown attributable fraction)</td>
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<tr>
<td>Hepatocellular carcinomas</td>
<td>Hepatitis B and C viruses</td>
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<tr>
<td>B-cell lymphomas in immunocompromized patients (50%) and in some T-cell lymphomas</td>
<td>Epstein-Barr Virus</td>
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<tr>
<td>Burkitt’s lymphoma</td>
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<tr>
<td>Nasopharyngeal cancer</td>
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<tr>
<td>Hodgkin’s lymphoma (30-40%)</td>
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<tr>
<td>Gastric cancer (10%)</td>
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<tr>
<td>Adult T-cell leukemias</td>
<td>HTLV-1</td>
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<tr>
<td>Seminomas</td>
<td>Endogenous retroviruses</td>
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<tr>
<td>Kaposi’s sarcoma</td>
<td>HHV-8</td>
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<tr>
<td>Gastric cancer and gastric lymphoma</td>
<td><em>Heliobacter pylori</em></td>
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<tr>
<td>Bladder cancer; rectal cancer</td>
<td>Schistosoma species</td>
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<tr>
<td>Cholangiocarcinoma</td>
<td>Opisthorchis species; <em>Clonorchis sinensis</em></td>
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</tbody>
</table>
• Clues to discovery of infections that cause tumors
• Reduced radiation doses, patient-sparing effective treatment for tumors caused by infections
The Microbiome: New Area of Research:

- Protect against cancer?
- Increase progression to cancer?
- Tumor microbiome profiles and clinical response to cancer treatment
  - Head and neck cancers
  - Colorectal Cancers
  - Breast Cancers
  - Melanoma
High and Costly HPV Disease Burden Among Males and Females Worldwide

Global Estimated Annual New HPV-Related Disease Cases in Males and Females

- Penile cancer: 11,000 (Male: 11,000, Female: 21,000)
- Vulvar & vaginal cancer: 21,000 (Female: 528,000)
- Oropharyngeal cancer: 17,000 (Male: 17,000, Female: 4,400)
- Anal cancer: 11,000 (Male: 11,000, Female: 13,000)
- Cervical cancer: 17,300,000 (Male: 17,300,000, Female: 14,400,000)
- Genital warts: 17,300,000 (Male: 17,300,000, Female: 14,400,000)
- Cervical dysplasia: Millions of cases

Footnotes:

1. Male
2. Female
3. Cervical dysplasia
4. Oropharyngeal cancer
5. Anal cancer
6. Genital warts
7. Cervical cancer
8. Vulvar & vaginal cancer
Burden of HPV-Related Disease in Males

- Genital warts
- Recurrent respiratory papillomatosis (RRP)
- Anal cancer
- Penile cancer
- Oropharyngeal and oral cavity cancers

>90% caused by HPV 6 & 11

~30%–90% caused by HPV 16 & 18

There are no routinely available reliable screening methods for cancers caused by HPV in men.
Local Florida HPV Vaccine Coalition

• PITCH – (Partnership to Immunize Teens and Children against HPV) was one of 18 supplements awarded to NCI Cancer Centers

• January 14, 2015
First meeting of PITCH Stakeholders to discuss strategies to increase HPV vaccination in FL
Increasing HPV Vaccination in the U.S. from 36% to 80%:
A Collaboration of NCI-funded Cancer Centers

• Discussion of national strategy, common goals and approaches
• 76 representatives from 37 cancer centers
• Top-level representatives from the NCI, CDC, ACS, and U.S. Congress
Vaccination Success to Date: The HPV Story

Efficacy of Quadrivalent HPV Vaccine against HPV Infection and Disease in Males

Anna R. Giuliano, Ph.D., Joel M. Palefsky, M.D., Stephen Goldstone, M.D., Edson D. Moreira, Jr., M.D., Mary E. Penny, M.D., Carlos Aranda, M.D., Efthyia Vardas, M.D., Harald Moi, M.D., Heiko Jessen, M.D., Richard Hillman, M.D., Yen-Hwa Chang, M.D., Daron Ferris, M.D., Danielle Rouleau, M.D., Janine Bryan, Ph.D., J. Brooke Marshall, Ph.D., Scott Vuocolo, Ph.D., Elia Barr, M.D., David Radley, M.S., Richard M. Haupt, M.D., and Dalya Guris, M.D.

89% reduction in HPV 6, 11, 16, 18

Proportion of Australian Born Women <21 years with Genital Warts, 2004-2011

Start of vaccination program

Percent


Slide courtesy of Andrew Grulich, MD
Infections: Preventable through Vaccination

- Extending the benefits of prevention vaccines to other infection and cancer endpoints (head and neck cancers)
- Extending the benefits of immunotherapeutic approaches to cancers caused by infection (anti-PD1, TIL therapy)
Thank you!