The Biology of Pancreatic Cancer

Webinar

Presented by
Pancreatic Cancer Action Network
www.pancan.org

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The Biology of Pancreatic Cancer

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Pancreatic cancer is projected to become the 2nd leading cause of cancer death by 2020.

How can we change this?

- Clinical practice
  - Clinical research
  - Translational research
  - Basic research

BIOLOGY
The Pancreas

The 1-2-3’s of the Pancreas

One Organ

Two Functions

Digestive

Make enzymes that digest food

Endocrine

Make hormones, in particular insulin

Three Cell Types

1: Acinar
(makes digestive enzymes)

2: Islet cells
(endocrine)

3: Ductal
(carryes digestive enzymes to intestine)
The Pancreas Gets Cancer

Ductal cells

Pancreatic Ductal Adenocarcinoma (PDAC)

Digestive enzymes “messed up”

Islet cells

Pancreatic Neuroendocrine Tumor (PNET)

Hormones “messed up”

What happens?

Normal
Benign
Malignant
Metastatic
What causes cancer?

Skin: UV irradiation from the sun
Lung: Cigarette smoke
Prostate, breast: ? + hormones
Pancreatic: ? (smoking, obesity are risk factors)

Sometimes mistakes just happen! Once/gene/million replications

DNA Mutations
DNA master plan

Protein → Cell
materials

Cell parts

DNA

Protein

Cell behaves differently!

DNA → Protein

TTGATG
Hallmarks of Cancer

GROW!
- Sustaining proliferative signaling
- Evading growth suppressors
- Deregulating cellular energetics
- Resisting cell death
- Genome instability & mutation
- Inducing angiogenesis
- Activating invasion & metastasis

DON’T DIE!
- Avoiding immune destruction
- Enabling replicative immortality
- Tumor-promoting inflammation

IGNORE SIGNALS TO STOP GROWING!

LIVE FOREVER!

SPREAD!

The changes accumulate

DNA mutations:
- T
- T
- G
- A
- T
- G

Disconnect brakes
Endless gas tank
Go offroad

Ignore stop signs
Step on gas

Cell 144, 646-674, 2011
How do we treat cancer?

- **Surgical Resection**: Manages *localized* disease
- **Radiation Therapy**: For *local and regional* disease
- **Chemotherapy**: Treats *systemic* disease, but targets all growing/dividing cells

Treatment depends where the cancer cells are located.

How do we find better therapies?

- **Clinical Trials**: Standard of care + or – experimental drug

Survival over time is plotted, illustrating the effectiveness of new standard of care versus standard of care.
How do we find better therapies?

Pancreatic Cancer Clinical Trials

Standard of care + or – experimental drug

Survival

Time

In 2011, there were 129 clinical trials for pancreatic cancer in the US

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNET</td>
<td>11%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>Optimization</td>
<td></td>
</tr>
<tr>
<td>Delivery</td>
<td>33%</td>
</tr>
<tr>
<td>Radiation</td>
<td></td>
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<tr>
<td>Metabolism</td>
<td></td>
</tr>
<tr>
<td>Stroma</td>
<td>38%</td>
</tr>
<tr>
<td>Targeted</td>
<td></td>
</tr>
<tr>
<td>Immunotherapy</td>
<td>11%</td>
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Can we make what we have better? 33%
Can we treat PNET better? 11%
Can we take advantage of what we’ve learned about the biology of pancreatic cancer? 38%
Can we turn our immune system against the cancer? 11%
Can we be smarter?

DNA → Protein

Cancer cell behavior

New generation of treatment strategies

TARGETED THERAPIES!
**Clinical Trials for “Precision medicine”**

Success with targeted therapy in leukemia, breast cancer, melanoma, and others!


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**Double pancreatic cancer survival by 2020!**

Clinical practice

Clinical research

Translational research

Basic research

SUPPORT PATIENTS & FAMILIES

BUILD AND SUSTAIN FEDERAL SUPPORT

ADVANCE RESEARCH DISCOVERIES

MOBILIZE THE TROOPS
Thank you for your participation

Questions?

Join us for our next free webinar on January 10:
Clinical Trials: A Physician’s Perspective

For more information, please visit www.pancan.org.

If you have any questions about our Patient and Liaison Services (PALS) program, please call (877) 272-6226 or e-mail pals@pancan.org.