CANCER RESEARCH INSTITUTE
IMMUNOTHERAPY PATIENT SUMMIT

San Francisco • Chicago • New York • Houston • Tampa

Chicago August 5, 2017
Brian Brewer
Cancer Research Institute

WELCOME
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A special thank you to those who helped promote the summit

Addario Lung Cancer Foundation
BrainUp
Coalition for Clinical Trial Awareness
Colon Cancer Alliance
Gilda’s Club
Fight Colorectal Cancer
Focused Ultrasound Foundation
FORCE
GI Cancers Alliance

Imerman Angels
Immunotherapy Foundation
Let Life Happen
Melanoma Research Foundation
National Ovarian Cancer Coalition
Parker Institute for Cancer Immunotherapy
Patient Empowerment Network
University of Chicago Medicine Comprehensive Cancer Center
Our Guest Faculty

Scientific Experts

Gavin Dunn, M.D., Ph.D.
Washington University

Thomas Gajewski, M.D., Ph.D.
University of Chicago

Kunle Odunsi, M.D., Ph.D.
Roswell Park Cancer Institute

Cassian Yee, M.D.
MD Anderson Cancer Center

Patient Experts

Janie Ferling
Melanoma

Donna Fernandez
Lung Cancer

Carol Roth
Brain Cancer
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>9:00am</td>
<td>Registration and networking</td>
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<tr>
<td>10:00am</td>
<td>Program commences</td>
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<tr>
<td>10:15am</td>
<td>Welcome</td>
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<tr>
<td></td>
<td>Brian Brewer</td>
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<tr>
<td></td>
<td><em>Introduction to the Cancer Research Institute</em></td>
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<tr>
<td></td>
<td>Jill O’Donnell-Tormey, Ph.D.</td>
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<tr>
<td>10:15am</td>
<td>Hear from the experts</td>
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<tr>
<td></td>
<td>Learn the basics of Immunotherapy</td>
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<td></td>
<td>Thomas Gajewski, M.D., Ph.D.</td>
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<tr>
<td></td>
<td>Latest research update panel</td>
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<td>Moderator</td>
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<td>Thomas Gajewski, M.D., Ph.D.</td>
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<td>Panelists</td>
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<td></td>
<td>Gavin Dunn, M.D., Ph.D.</td>
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<td>Kunle Odunsi, M.D., Ph.D.</td>
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<td>Cassian Yee, M.D.</td>
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<tr>
<td>11:30am</td>
<td>Patient perspective</td>
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<td>Hear from a melanoma survivor</td>
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<td>Janie Ferling</td>
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<tr>
<td>12:00pm</td>
<td>Lunch and networking</td>
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<tr>
<td>1:00pm</td>
<td>Demystifying clinical trials</td>
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<td>Learn about clinical trials and panel discussion</td>
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<td></td>
<td>Moderator</td>
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<td>Brian Brewer</td>
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<td>Panelists</td>
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<td>Janie Ferling</td>
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<td>Donna Fernandez</td>
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<td>Carol Roth</td>
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<tr>
<td>2:00pm</td>
<td>Refreshment break</td>
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<td>2:15pm</td>
<td>Breakout sessions</td>
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<td>Your choice of moderated discussion with our experts or a</td>
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<td></td>
<td>general networking session</td>
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<td></td>
<td>Brain Cancer</td>
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<td>Gynecologic Cancers</td>
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<td>Kunle Odunsi, M.D., Ph.D.</td>
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<td>General Immunotherapy &amp; Networking</td>
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<td>Thomas Gajewski, M.D., Ph.D.</td>
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<tr>
<td>3:15pm</td>
<td>Program closes</td>
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<tr>
<td>9:00am - 4:00pm</td>
<td>Clinical trial navigator appointments</td>
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<td>Appointments will be available all day. If you didn’t</td>
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<td>pre-register, check with the registration desk.</td>
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Jill O’Donnell-Tormey, Ph.D.
Cancer Research Institute

Introducing CRI
Thomas F. Gajewski, M.D., Ph.D.
AbbVie Foundation Professor of Cancer Immunotherapy
University of Chicago

IMMUNOTHERAPY BASICS
The New York Times

Patient’s Cells Deployed to Attack Aggressive Cancer

The Washington Post

New therapies raise hope for a breakthrough in tackling cancer
Dr. William Coley

- Noted a case of sarcoma that became cured due to a bacterial infection
- In 1891, deliberately infected sarcoma patient with \textit{Strep. pyogenes}
- By 1893, had developed a mixture of bacterial toxins rather than live bacteria
- Considered the first immunologic therapy
Immune Recognition of Cancer

Cancer cell

Class I MHC (HLA A, B) + peptide

Processing

Tumor Cell

Cytolytic T Lymphocyte (CTL)

TCR

CD8
Boosting immune system offense vs. overcoming cancer’s defense
Two general strategies to promote the immune system to destroy cancer

• Boost the offense
  – Increase the number and function of T cells capable of recognizing tumor cells

• Block the defense
  – Interfere with inhibitory pathways in the tumor site that resist T cell attack
A decade on, vaccine has halved cervical cancer rate

029 August 2016 | Australia
Successful Active Vaccination Against Virus-Induced Cancers

- Vaccine to feline leukemia virus for cats
- Vaccine to herpes virus (Marek’s virus) in chickens
- Vaccine to hepatitis B in humans to prevent liver carcinoma
- Vaccination to HPV prevents cervical cancer
T cell adoptive transfer

- T cells are isolated from tumor site or blood
- Expanded in laboratory
- Can be engineered to recognize new targets
- T cells are reintroduced back to the patient, usually with other agents
Adoptive “CAR” T cell therapy

Chimeric Antigen Receptor–Modified T Cells in Chronic Lymphoid Leukemia

David L. Porter, M.D., Bruce L. Levine, Ph.D., Michael Kalos, Ph.D., Adam Bagg, M.D., and Carl H. June, M.D.

- Isolate patient’s peripheral blood T cells
- Lentivirus transduced with “CAR” (chimeric antigen receptor)
- CAR – anti-CD19 antibody fragment fused to intracellular domains of potent T cell signaling subunits
- Re-infuse “CAR”-modified T cells into patient
- Successful for treating children with B cell malignancies
In Girl’s Last Hope, Altered Immune Cells Beat Leukemia

By DENISE GRADY  DEC. 9, 2012

Emma Whitehead, with her mother, Karl. Last spring, Emma was near death from acute lymphoblastic leukemia but is now in remission after an experimental treatment at the Children’s Hospital of Philadelphia.

Jeff Swensen for The New York Times
T cell-infiltrated tumors contain inhibitory pathways that turn the T cells back off: PD-L1/PD-1
Checkpoint Inhibitors – Antibodies to Inhibitory PD-1 Receptor

PD-L1/PD-1 binding inhibits T cell killing of tumor cell

Blocking PD-L1 or PD-1 allows T cell killing of tumor cell
Clinical activity of anti-PD-1 in metastatic melanoma

- FDA approved in 2014 for melanoma
- Now in 7 additional cancer entities, and counting
New immunotherapy drug behind Jimmy Carter’s cancer cure

Former president given pembrolizumab, one of the most promising new drugs in the treatment of cancer.
T cell-infiltrated tumors contain MULTIPLE inhibitory pathways

- Multiple “defense” pathways are co-opted in tumors once T cells enter
- Suggests the notion that blocking two together might be superior
Combination anti-PD-1 + IDO inhibitor

- Combination immunotherapy appears better than single drug
- This combo has entered late phase trials for melanoma and other cancers

Gangadhar et al. ESMO 2016
So many targets, so little time!

Activating receptors
- CD28
- OX40
- GITR
- CD137
- CD27
- HVEM

Inhibitory receptors
- CTLA-4
- PD-1
- TIM-3
- BTLA
- VISTA
- LAG-3

Agonistic Abs

Blocking Abs

T cell stimulation
Useful resources about cancer immunotherapy

https://www.cancerresearch.org/patients/what-is-immunotherapy

https://cancer.uchicago.edu/research/highlights/immunotherapy/

https://www.roswellpark.org/immunotherapy

https://www.mdanderson.org/treatment-options/immunotherapy.html

https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html
Panel Discussion

LATEST RESEARCH UPDATE
Scientific Panel

Moderator

Thomas Gajewski, M.D., Ph.D.

Panel

Gavin Dunn, M.D., Ph.D.
Brain Cancer

Kunle Odunsi, M.D., Ph.D.
Gynecologic Cancers

Cassian Yee, M.D.
Melanoma
Janie Ferling
Melanoma Survivor

PATIENT PERSPECTIVE
LUNCH AND NETWORKING
What Are Clinical Trials?

- Research studies that involve people
- Designed to answer specific questions about new and existing treatments
- Aim to improve treatments and the quality of life for people with disease
Getting from Discovery to Approval
Getting from Discovery to Approval

Drug Discovery

Preclinical

~ 5,000–10,000 COMPOUNDS

3 – 6 YEARS

250

Source: AppliedClinicalTrials.com
Getting from Discovery to Approval

- **Drug Discovery**: ~5,000–10,000 Compounds
- **Preclinical**: 250
- **Clinical Trials**: 5

- **Pre-Discovery**: 3 – 6 Years
- **IND Submitted**: 6 – 7 Years

- **Phase 1**: 20–100
- **Phase 2**: 100–500
- **Phase 3**: 1,000–5,000

Source: AppliedClinicalTrials.com
What Are Clinical Trial Phases?

**Phase 1**
- **Is the treatment safe?**
- **Purpose:**
  - First study in humans
  - Find best dose, delivery method, and schedule
  - Monitor for side effects
  - Determine safety
- **Number of people:** 20-100

**Phase 2**
- **Does it work?**
- **Purpose:**
  - Look for effect on specific type(s) of cancer
  - Continue monitoring for side effects and safety
- **Number of people:** 100-500

**Phase 3**
- **Does it work better?**
- **Purpose:**
  - Compare new treatment (or new use of a treatment) with current standard treatment
  - Determine risk vs. benefit
- **Number of people:** 1,000-5k+

### Pros and Cons of Clinical Trials

<table>
<thead>
<tr>
<th>Potential Advantages</th>
<th>Potential Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to best possible care</td>
<td>Unknown side effects or risks</td>
</tr>
<tr>
<td>Receiving new drugs before they’re widely available</td>
<td>Unknown benefits—drugs may not work as intended</td>
</tr>
<tr>
<td>Close monitoring by medical team</td>
<td>Not all patients may benefit</td>
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<tr>
<td>Chance to play active role in healthcare and research</td>
<td>Frequent tests and clinic visits</td>
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<tr>
<td>Help future generations</td>
<td>Possible need to travel to trial sites</td>
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</tbody>
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Questions to Ask Before Volunteering

• Why is this trial being done?
• Why is it believed that the treatment being studied may be better than the standard treatment?
• What are my other options (standard treatments, other trials)?
• How did patients do in any previous studies of this treatment?
• How will the doctor know if treatment is working?
• How long will the trial last?
Questions to Ask Before Volunteering

• Can I continue to receive this treatment after the trial ends?
• What kinds of procedures or tests are involved?
• What impact will the trial have on my daily life?
• Will I have to travel for treatment? Will I be compensated?
• How often will I need to travel to receive treatment?
• Will I be hospitalized as part of the trial?
• What costs (if any) will be my responsibility to pay?

Getting into a Clinical Trial Isn’t Always a Given

Trials are designed to ask specific questions, and must adhere strictly to entry criteria to ensure data is accurate and meaningful.

This also helps ensure patients who could be made worse by treatment are not exposed to the risk.

Common criteria include:

- cancer type or stage
- treatment history
- genetic factors
- age
- medical history
- current health status
Clinical Trials: Myth versus Fact

I might only get placebo ("sugar pill") instead of treatment.

Fact: Placebos are rarely used and never given in the absence of some form of treatment.

Trials are only for people who have run out of treatment options (a “last resort”).

Fact: Clinical trials are designed for people with cancer of all types and stages.

*Patient Resource*, “Understanding Clinical Trials: A Guide for Patients and Their Families”
I need to travel to a large hospital or cancer center to participate in a clinical trial.

Fact: Trials take place at local hospitals, cancer centers, and doctors’ offices in all parts of the country, in both urban and rural areas.
My health insurance doesn't cover the cost of care in a clinical trial.

Fact: Doctor visits, hospital stays, and certain testing procedures may be covered by insurance. Research costs are typically covered by the trial sponsor.

Clinical Trials: Myth versus Fact

Signing a consent form “locks” me into staying in a trial.

Fact: You are free to change your mind for any reason about participating in a trial anytime before or during a trial.

I will be made to feel like a “guinea pig” experiment.

Fact: The overwhelming majority of trial participants say they were treated with dignity and respect, and report having had a positive experience in a trial.

Clinical trials aren't safe.

Fact: Safeguards including an Institutional Review Board, Data and Safety Monitoring Board, and an ongoing informed consent process ensure patients’ rights and safety are protected.

*Patient Resource,* “Understanding Clinical Trials: A Guide for Patients and Their Families”
A Word About Informed Consent

Informed consent = having all the facts before and during a trial

• Study purpose
• Length of time of the study
• Predictable risks
• Possible benefits
• Expectations
• Patient’s rights

• Treatment alternatives
• Patient health monitoring
• Safeguards in place
• How to withdraw from study

Be bold in asking for details. It’s YOUR treatment plan.
How Can I Find a Clinical Trial?

• Ask your doctor
• Ask another doctor if necessary...
• Contact a patient advocacy organization
  – Seek assistance from a clinical trial navigator, if offered
  – CRI Clinical Trial Finder: 1 (855) 216-0127
• Search online
  – https://www.cancerresearch.org/patients/clinical-trials
  – https://clinicaltrials.gov/
Panel Discussion

IMMUNOTHERAPY CLINICAL TRIALS
Patient Panel

Moderator
Brian Brewer

Panel
Janie Ferling
Melanoma
Donna Fernandez
Lung Cancer
Carol Roth
Brain Cancer
BREAKOUT SESSIONS
Breakout Rooms

Brain Cancer
Gavin Dunn, M.D., Ph.D.

Gynecologic Cancers
Kunle Odunsi, M.D., Ph.D.

Gynecologic Cancers
State (3rd Floor)

Melanoma
Cassian Yee, M.D.

General Immunotherapy
Thomas Gajewski, M.D., Ph.D.

State (3rd Floor)

Gynecologic Cancers
Grand Ballroom A (Next Door)

Melanoma
Van Buren (3rd Floor)

General Immunotherapy
Grand Ballroom BC (Here)
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