New Trends in Brain Tumor Research

Kyle M. Walsh, PhD (University of California, San Francisco)
Monica Venere, PhD (Cleveland Clinic)
ABTA Research Grants

• The ABTA distributes research funding through four primary programs:
  – Basic Research Fellowship Program
  – Discovery Grant Program
  – Medical Student Summer Fellowship Program
  – Collaborative Research Partnerships
ABTA’s Basic Research Fellowship

• Two-year, $100,000 grant
• Supports early-career scientists entering the field of brain tumor research
• Four grants in the 2013-2015 cycle
  – James Purzner, MD - Stanford University
  – Xuanhua Xie, PhD - UT Southwestern
  – Stefanie Robel, PhD - The University of Alabama at Birmingham
  – Forrest Kievit, PhD - University of Washington
Basic Research Fellowship Highlight

- **Trainee**: Forrest Kievit
- **Mentor**: Richard Ellenbogen
- **Project**: “Pediatric Brain Tumor Gene Therapy for Overcoming Radiation Resistance Using Nanotheranostic SPIONs”
- **Motivation**: Radiotherapy is integral in the treatment of pediatric ependymoma and medulloblastoma, but can cause radiation-induced developmental disorders
- **Goal**: Increase the sensitivity of brain tumors to radiotherapy while sparing adjacent healthy brain
- **Approach**: Use a nanoparticle siRNA delivery vehicle to inhibit DNA repair in tumor cells and to sensitize tumors to radiotherapy
Basic Research Fellowship Highlight

• Trainee: Forrest Kievit
• Mentor: Richard Ellenbogen
• Reported results:
  – Successful development of a nanoparticle-based siRNA delivery vehicle for knocking down expression of a critical DNA-repair enzyme (Ape1)
  – Ape1 expression was reduced by >75% in medulloblastoma and ependymoma cells
  – Reduction in Ape1 activity correlated with increased sensitivity to radiotherapy and decreased tumor cell survival
  – “Nanoparticle-mediated silencing of DNA repair sensitizes pediatric brain tumor cells to \( \gamma \)-irradiation”
ABTA’s Discovery Grants Program

• One-year, $50,000 grant
• Supports high-risk/high-impact projects with the potential to change current diagnostic or treatment paradigms
• Eight grants in the 2014-2015 cycle
  – Three focused on immunotherapy/immune stimulation
  – Four focused on novel therapeutic agents, including novel combination therapy
  – One focused on tumor metabolism and improved tumor grading
Discovery Grants Program Highlight

- **Awardee**: Courtney Crane
- **Project**: “Improving Natural Killer cell anti-glioma immunity using chimeric cytokine receptors”
- **Motivation**: Glioma cells evade immune surveillance by down-regulating natural killer (NK) cells. Upregulation of NK cells is expected to have a therapeutic benefit.
- **Goal**: Develop a novel immune therapy for GBM patients by harnessing NK cells
- **Approach**: Use a chimeric cytokine receptor to target NK cells to glioma cells in order to activate NK-based glioma immunosurveillance
Discovery Grants Program Highlight

• **Awardee**: Courtney Crane

NK cells are degranulated in response to NKG2D ligand-bearing infiltrating myeloid cells. Lactate dehydrogenase induces NKG2D ligands on myeloid cells and disrupts NK-cell immunosurveillance. Lactate dehydrogenase and NKG2D ligands decrease following a decrease in tumor mass. "Immune evasion mediated by tumor-derived lactate dehydrogenase induction of NKG2D ligands on myeloid cells in glioblastoma patients"
How researchers share their outcomes

• Publications in scientific journals
  • Now most are available online
  • Many now use open-access options

• Talks and seminars
  • Departmental, institutional, or at conferences

• Conference posters
  • Best way to share and see a large amount of work in a short period of time
  • All ABTA-funded “Basic Research Fellowship” and “Discovery Grant” awardees will present posters this afternoon
What is a scientific poster?

• A poster that allows researchers to communicate our findings in a concise and informative manner with our peers, typically at conferences or in research buildings

• Ideally a poster should generate interest to engage scientific discussion
Additional purposes of a scientific poster

• To educate others about research findings
  • Represents an illustration of their work

• To get feedback and unique perspectives from peers
  • This can be helpful especially prior to submitting a manuscript for publication

• To network or develop collaborations with other researchers
  • Who may or may not be in the same field
Making a scientific poster
Introduction

An abstract or overview of the research problem. Should be a brief summary that provides rationale for the project and most importantly - entice the viewer to keep reading.
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Hypothesis
A prediction or proposed explanation for a phenomenon that can be tested by experimentation or observations

Background Data or Key Concepts

![Diagram](image)
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One of the most important parts of the poster! This should clearly describe the approach for the research.

Step 1
Step 2
Step 3

Background Data or Key Concepts

![Tumour cells are heterogeneous, but most cells can proliferate extensively and form new tumours.](image1.png)

![Tumour cells are heterogeneous and only the cancer stem cell subset (CSC; yellow) has the ability to proliferate extensively and form new tumours](image2.png)
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**Results**
Analysis and key findings. Can include charts, graphs, images. Will be the bulk of the poster, sometimes with sub-titles to describe each finding.

**Background Data or Key Concepts**
Figure 1. Gene “A” is expressed more in GBM than the normal brain

**Figure 2. Gene “A” is expressed in regions of high cell division**

**Figure 3. Gene “A” controls tumor growth by regulating how cells proliferate**
Result of increased Gene A

**Figure 4. Blocking the effects of Gene “A” causes tumors to shrink**

0 2 4 6 8 10 12
GBM1 GBM2 GBM3 GBM4

Proliferation
Migration
Invasion
Death
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How can these findings help others (patients, practitioners, educators, policy makers). How can the results direct future studies? Were there any limitations?
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Acknowledgements
Individuals who assisted with the project (lab members) and funding sources (ABTA)
Presenting posters at conferences
Advantages of presenting posters

• Allows for one-on-one communication directly with the author

• Provides a good survey of what is hot in the field

• Can see a lot of posters in a limited amount of time

• Posters provide the highlights of a body of work
Potential disadvantages of posters

• Can be hit-or-miss in terms of the number of interactions

• A pain to travel with (although now posters are being presented digitally or on fabrics)

• Can be expensive and time-consuming to make

• Possibility of someone running with your idea before you can publish

• Not all posters lead to publications
How to point out a good one...

Four keys to success

<table>
<thead>
<tr>
<th>Clear pictures and graphs – attention to details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not too much text – nobody likes to be bombarded</td>
</tr>
<tr>
<td>Easy flow – simple to read without too many explanations</td>
</tr>
<tr>
<td>An energetic presenter – a little enthusiasm can go a long way in connecting with your audience</td>
</tr>
</tbody>
</table>
Tips for viewing a poster

• Ask as many or as few questions as you want

• Don’t feel pressure to be interested in every poster

• Presenters should be able to tell you their story in a concise manner
What to take home when you visit or present a poster

A novel finding that complements my research or field of study
What to take home when you visit or present a poster

A new technique or technology
What to take home when you visit or present a poster

A collaboration or networking opportunity
Don’t be shy!

- All of the ABTA researchers are eager to share their research with you as well as hear your stories and questions!
THANK YOU

Any Questions?