Novel Membrane-based Cancer Vaccines

From the lab of
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Presented by
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Licensing Associate

Emory OTT Breakfast Club
December 8th, 2010
2010 Estimated US Cancer Cases*

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>789,620</td>
<td>739,940</td>
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</tbody>
</table>

Prostate 28%  
Lung & bronchus 15%  
Colon & rectum 9%  
Urinary bladder 7%  
Melanoma of skin 5%  
Non-Hodgkin lymphoma 4%  
Kidney & renal pelvis 4%  
Oral cavity 3%  
Leukemia 3%  
Pancreas 3%  
All Other Sites 19%  

Breast 28%  
Lung & bronchus 14%  
Colon & rectum 10%  
Uterine corpus 6%  
Thyroid 5%  
Non-Hodgkin lymphoma 4%  
Melanoma of skin 4%  
Kidney & renal pelvis 3%  
Ovary 3%  
Pancreas 3%  
All Other Sites 20%

Source: American Cancer Society, 2010.

*Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.
T Cell Proliferation Requirements

Antigen Presenting Cell

- MHC
- Co-stimulator

T Cell

- T Cell Proliferation & CTL Development

Tumor Cell

- MHC
- Co-stimulator

T Cell

- Anergy or Apoptosis
Glycosyl Phosphatidylinositol (GPI)-anchored proteins

Purified GPI-anchored proteins spontaneously incorporate into cell membranes

Cell Membrane

Co-stimulator

GPI

Lipid Tail

Tumor Cell modified by protein transfer

Purified GPI-protein

Tumor Cell with MHC expression

37 °C / 2 hr

Tumor Cell modified by protein transfer
Membrane-based cancer vaccine therapy

Immunization

Facility

Harvest tumor cells from patient

Anti-tumor immune response
Membrane-anchored CoStimulators induce protective antitumor immunity in mice and tumor regression.

**T-cell Lymphoma Mouse Study**

Mice immunized with:
- **Saline solution** (green triangles)
- **Non-modified cancer membranes** (blue triangles)
- **Modified cancer membranes** (red circles)

**Breast Cancer Mouse Study**

- **Non-modified cancer membranes** (blue squares)
- **Modified cancer membranes** (pink squares)
Advantages

<table>
<thead>
<tr>
<th>Collection</th>
<th>One-time harvest</th>
<th>Every 2 weeks</th>
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<tbody>
<tr>
<td>Processing</td>
<td>2-hour incubation</td>
<td>3-day expansion</td>
</tr>
<tr>
<td>Dosing</td>
<td>Repeated dosing</td>
<td>Harvesting for each does</td>
</tr>
</tbody>
</table>
Intellectual Property and R&D Status

- US patent 6,491,925 (December 10, 2002)
  - Broad claims encompass immunogenic compositions incorporating GPI-anchored CoStimulators

- GRA grant
  - Scale-up of GPI-anchored CoStimulators production
  - Creation of a development plan