WHAT IS ELECTROCHEMOTHERAPY?

• Administration of Chemotherapeutic Drugs via Electroportation.
• **Electroporation**- Exposure of cells to an electric field, which transmutes them to a permeable state.
• Two types:
  • Enhanced Delivery via Electroporation (EDE)
    • April 1990 - First used in medical practice
    • Unknown date of discovery
  • Irreversible Electroporation (IRE)
    • Still in testing
    • Invented July 2007
PROBLEMS WITH CURRENT TECHNOLOGY

• Cost: Chemotherapeutic drugs -- $7,000 – $30,000
• Radiation treatment is detrimental to the human body
• Standard Chemotherapy (Long Term):
  • Chronic Pain
  • Permanent Damage to Internal and Reproductive Organs.
  • Cognitive Dysfunction
  • Neuropathy
  • Death
EDE vs IRE

EDE
- Singular electrical impulse via electroporation
- Forces cells to enter reversible permeability stage
- Cells then treated with chemotherapeutic drugs
- Problems:
  - Uses cytotoxic drugs
  - Expensive
  - Tissue can return to impermeable state before treatment can have an effect.

IRE
- Multiple electrical impulses via electroporation
- Forces cells into irreversible permeability stage
- Cells monitored until termination
- Any living cells are treated again
- Problems:
  - Untested on real patient
  - If applied incorrectly, can kill healthy cells
RESULTS

• EDE
  • Effectively kills cells with a minimal chance of recurrence.
  • Is more efficient in treating -- cytotoxicity of drugs reduced to 50%
  • Efficacy increased 300 – 700 fold
  • Still cheaper than classic treatment

• IRE
  • Effectively kills cells -- have been no tests where recurrence has taken place
  • No cytotoxic drugs used -- minimal damage to healthy tissue
  • Cost of treatment is cut drastically
  • Electroporation machine: $2,000 - $10,000
### RESULTS (CONT.)

<table>
<thead>
<tr>
<th>Primary tumors</th>
<th>Histology</th>
<th>Area treated with ECT</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>Transitional cell carcinoma</td>
<td>Cutaneous metastases on the head, chin and jaw</td>
<td>(31)</td>
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<tr>
<td>Breast</td>
<td>Adenocarcinoma</td>
<td>Cutaneous metastases</td>
<td>[23], [28], [33] and [98]</td>
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<td>Head and neck</td>
<td>Adenocarcinoma</td>
<td>Primary tumor</td>
<td>[25], [33] and [99]</td>
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<td>Head and neck</td>
<td>Adenoid cystic carcinoma</td>
<td>Primary tumor</td>
<td>[25] and [99]</td>
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<td>Head and neck</td>
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<tr>
<td>Kaposi’s sarcoma</td>
<td>Kaposi’s sarcoma</td>
<td>Primary tumor</td>
<td>(32)</td>
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<tr>
<td>Kidney</td>
<td>Adenocarcinoma (hypernephroma)</td>
<td>Subcutaneous metastasis</td>
<td>(30)</td>
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<tr>
<td>Lung</td>
<td>Squamous cell carcinoma</td>
<td>Cutaneous metastases</td>
<td>(33)</td>
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<td>Skin</td>
<td>Malignant melanoma</td>
<td>Cutaneous metastases</td>
<td>[23], [24], [26], [27], [28], [32] and [98]</td>
</tr>
</tbody>
</table>
WHAT IS IN STORE?

- Practical use of IDE
- More common use of EDE
- Elimination of Chemotherapy drugs altogether
- Increase in availability of treatments to all people
- Reductions in:
  - Classic treatments
  - Cost of treatments
  - Effects of treatment on patient
  - Recurrence of cancer
QUESTIONS?
REFERENCES


