Weill Cornell Medicine

Ultrasound-Activated Chemotherapeutics for Targeted Tumor Ablation

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Background & Unmet Need

- Tumor ablation is a minimally-invasive procedure in which cancerous tissue is killed via exposure to extreme heat or cold
- However, the high energy particles which are typically used to kill tumor cells can cause severe side effects due to damage to nearby tissues
- Moreover, thermal heat sources like radiofrequency (RF) or high intensity focused ultrasound (HIFU) are attenuated near blood vessels, where the convective cooling of blood flow reduces their efficacy
- Cancer cells left near blood vessels from thermal ablation may in turn cause aggressive tumor recurrence
- **Unmet Need:** An effective, low energy, non-thermal tumor ablation method

Technology Overview

- **The Technology:** A new type of sonoexcitable drug that can be paired with low intensity ultrasound for tumor ablation
- **The Discovery:** A derivative of Rose Bengal, RB-4, was identified to have low-intensity, ultrasound-inducible cell killing capability
- RB4 appears to act as a membrane destabilizer and induces a complete loss of membrane integrity when combined with ultrasound
- **PoC Data:** RB4 and ultrasound in combination killed 90% of cells in a TNBC line, compared to less than 20% of cells killed by either treatment alone
- Experiments in TNBC xenograft models showed that the average size of the RB4/ultrasound treated tumors were only 20% of that of the control tumor

Inventors:
Ching-Hsuan Tung

Patents:
US Application Filed

Publications:
Tung et al. *J Control Release*. 2017.

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Technology Applications

- A safe alternative to current high-energy tumor ablation technology
- An alternative to other high-energy ablation procedures such as cardiac ablation

Technology Advantages

- Applied ultrasound is safe and not harmful to tissues
- RB4 is less likely to develop drug resistance issues as membranes are less prone to mutation

Supporting Data / Figures

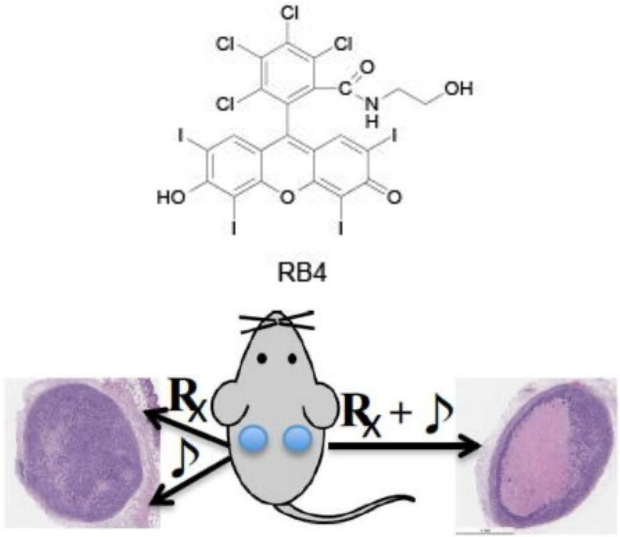

Figure 1: Top: Chemical structure of RB4 **Bottom:** Graphical abstract on ultrasound-inducible cell killing capability of RB4.

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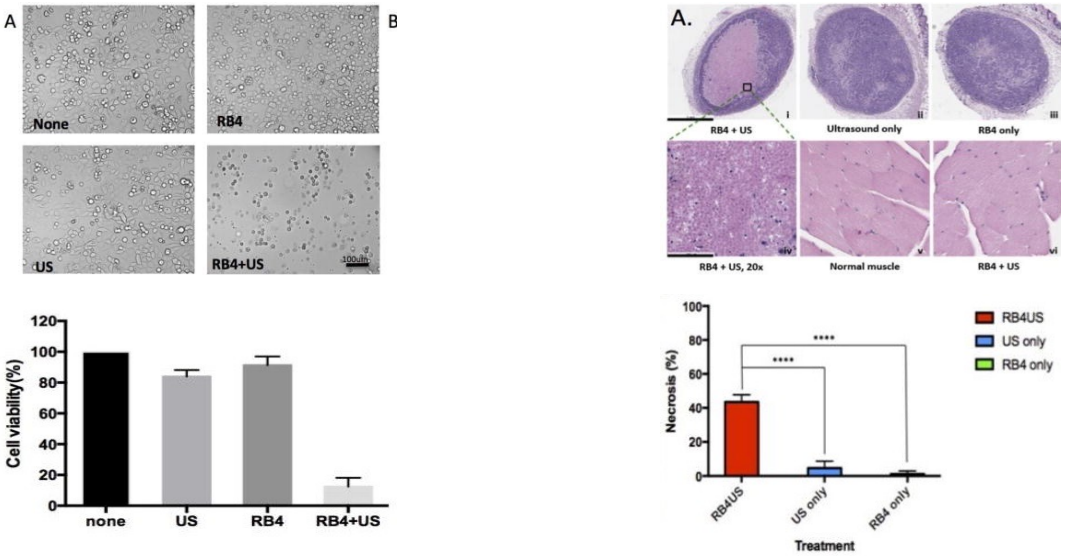

Figure 2: Left: Cell viability of a TNBC line is reduced with RB4 and ultrasound treatment in combination **Right:** Tumor necrosis is increased in a mouse xenograft TNBC model.

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