DrugSlug: A Novel Hydrogel Drug Delivery System for Melanoma Treatment

Smita Gopalakrishnan, Esther Sim, Emily Tanner, Brent Vernon, Eric Nguyen
School of Biological and Health Systems Engineering, Creighton University Medical School

Clinical Need

Clinical Problem: Melanoma is the deadliest type of skin cancer, where pigment-producing cells become cancerous.

Drugs Delivery Systems:
- Drug delivery systems are technologies used to deliver therapeutic agents to patients (e.g., cancer treatment drugs).
- Current systems pose a large problem: they are single-use per unit, highly costly, and release drug(s) too rapidly.

Market Analysis

Global Melanoma Treatment Market $2.896 billion USD in 2017
US Melanoma Treatment Market $3.2 billion USD by 2023 CAGR of 8.3%
Our Market $32 million USD by 2023 (1% market share)

Mission Statement

DiffuGel, Inc. aims to develop a hydrogel drug delivery system that minimizes the cost of melanoma treatment and enhances the precision of drug delivery.

Product Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Metrics</th>
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<tbody>
<tr>
<td>Sale</td>
<td>Meets Industry Standards</td>
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<tr>
<td>Effective Drug Delivery</td>
<td>Stimuli-Sensitive Ultrasonic (~28KHz), Temperature (LST: ~32.5°C)</td>
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<tr>
<td>Effective Drug Delivery</td>
<td>Multi-Release Number of Releasable per Unit (~10)</td>
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<tr>
<td>Effective Drug Delivery</td>
<td>Drug Diffusion Rate Mesh Flux of Drug (≤10^-10 m^2/s)</td>
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<td>Low Cost</td>
<td>Cost Efficient Unit Manufacturing Cost ($48 USD)</td>
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<td>Low Health Risk</td>
<td>Biocompatible Inflammatory Cells Present (&lt;30 cells/mm^3)</td>
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Table 1. Target product specifications for DrugSlug.

House of Quality: Customer needs and target specifications are further broken down in our House of Quality, which can be viewed by scanning the QR code to the left.

Regulatory Standards:
DiffuGel, Inc. will implement Design Controls and a QSR to ensure high-quality manufacturing processes, safety and quality testing, and performance validation of our Class III medical device.

Device Concept and Design

DrugSlug is a hydrogel drug delivery system that:
1. Is placed topically near the lesion site
2. Responds to heat from ultrasound stimuli
3. Allows for controlled release of drug
4. Can release drug (Dacarbazine) multiple times

DrugSlug Prototype RTD

Future Directions

Apply for patent
Begin clinical trials
Submit PMA Class III device
Expand device to other conditions

Acknowledgements

We would like to thank Dr. Pizziomi and Dr. Courson for supporting our project throughout the Capstone design process. We would also like to thank our mentors, Dr. Vernon and Eric Nguyen, for their guidance and support. Additionally, we would like to acknowledge our facilitator, Angela Herseth, for aiding us throughout the design process.

References