LIQUIDIA TECHNOLOGIES

Precisely Engineering the Future of Healthcare
Healthcare Needs Nanotechnology

- Industry Issues
  - Rapidly eroding patent protection
  - Increasing need for more effective products
  - Growing regulatory pressures
  - Accelerating cost pressure and proof-of-cost benefit

“We spend billions each year to get innovation, but where does innovation come from, and how do we get more of it?... We need transformational change.”

- Bernard Munos, InnoThink Center for Research in Biomedical Innovation
Nanotechnology: The Potential to Transform Product Development

Nanomedicine market Estimated to reach $130.9 billion

Source: BCC Nanomedicine Market Forecast - 2012

Current Technologies aren’t sufficient to realizing the full opportunity.

- Limitations in particle design parameters
- Lack particle consistency and reproducibility
- Scale and cost challenges
- Growing regulatory pressures

Nano Diagnostic Sales
Total Nanopharmaceutical Sales
Total Nanomedicine Market

$Billions

Year

Nano - Stars - Northwestern University
SIO2, Particles - MIT

Chantecaille™
Abraxane™
Sunstick™

“Nano-Cluster”- Univ. of Kansas

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FDA Advisory Committee Comments

- “Nanotechnology has great potential to impact medical research and drug discovery”
- Further work on characterization should be done
  - Evaluating how nanoparticle size and shape effect drug PK and PD
    • Change in particle size can affect performance
  - Traditional analytics may not be adequate
- Further guidance needed
  - Including additional studies required for a change to nanosized API

From Aug meeting of FDA Advisory Committee on Pharmaceutical Sciences and Clinical Pharmacology
Key Ingredients for Continued Strong Growth of Nanotechnology in Health Care?

- Compelling product efficacy and safety data
- Multi-disciplinary collaborations
- Scalable, well-characterized, cost-effective manufacturing
- Clear and reasonable regulatory guidelines
- Funding
- Evangelical pursuit and excellent execution
Liquidia Corporate Profile

- Founded in 2004
- Located in RTP, NC
- Novel technology platform
- Strong patent protections
- Experienced management team
- Robust investor syndicate
- Transformative partnerships

"Scientists now are engineering these exquisitely small particles to deliver more potent and less toxic vaccines and medicines."

Story titled: “Particle Technology Delivers Medicines and Vaccines”
Gaining Momentum

Liquidia is poised to be a leader in the development of nanotechnology-based healthcare products and a catalyst for the growth anticipated across this industry.

- Developed Roll-to-Roll Manufacturing
- Initiated 1st Phase 1 Trial (LIQ001)
- Signed multiple corporate collaborations
- Bill & Melinda Gates Foundation Equity Investment

Timeline:
- ‘07: Life Science Focus
  - Initiated Vaccines Program
  - Mfg Scale-Up (Gram quantities)
- ‘08
- ‘09
- ‘10: Established cGMP Manufacturing
  - Completed Phase 1 Clinical Trial
- ‘11
- ‘12: GSK Collaboration
Precise. Powerful. PRINT®

PRINT (Particle Replication in Non-wetting Templates) Platform:

- Utilizes the precision of the microelectronics industry
- Transforms particle engineering and product development
- Offers a scalable, cost-effective manufacturing platform

PRINT is revolutionizing the way that companies engineer healthcare products
PRINT is the only technology in the world that enables independent design of particle size, shape and chemistry.
PRINT Manufacturing Advantages

- **Quality by Design:**
  - Precise control of size, shape and composition
  - Uniform particle population, easily characterized
  - Demonstrated batch-to-batch consistency

- **Scalable cGMP Manufacturing Platform:**
  - Existing cGMP manufacturing capability
  - Leveraging the breadth of Roll-to-Roll technology
  - Commercially Relevant Scale and Cost

- **Minimal Facilities Burden:**
  - Small footprint, low CapEx equipment
  - Low bioburden process, minimal water needs (reduced maintenance and monitoring cost)
  - No exotic utilities (drop-in-place equipment)
  - Concept for aseptic manufacturing, if required

Supported by robust IP portfolio and “know-how”: protection from competition
PRINT Particles have Broad Product Benefits

- New Delivery Routes
- Programmable Pharmacokinetics
- Enhanced Deposition
- Tissue/Cellular Targeting
- Co-Delivery/Combinations
- Biologics
- Stable Formulations/Bioavailability
PRINT Benefits Can Drive Products in Many Large Markets

PRINT offers the potential to create innovative products across large markets

- Pulmonary
- Imaging
- Cancer
- Gene Sequencing
- Pneumo Vaccine
- CNS
- Consumer
- siRNA
- Ocular
- High Conc. Abs
- Controlled Release
- Enhanced Deposition
- Co-Delivery/Combination
- Stable Formulations/Bioavailability
- Tissue/Cellular Targeting
- Biologics
- Diagnostics
- Animal Health
- Agriculture
- Derm.
- Vaccines
- NCEs
- Artificial Blood
- PAH
- Vaccines
- Mat.Sci Apps
- Veterinary Health
Liquidia Enables Next Generation Vaccines

PRINT Vaccines Offer the Potential for Rationally Designed Vaccines Optimizing Efficacy, Safety and Cost for New and Existing Targets

1st Generation: Whole Pathogens

2nd Generation: Sub-Unit and Nucleic Acids

Next Generation: PRINT Vaccines

- Protein-Adjuvant Co-delivery
- Virtual-conjugates
- Synthetic Delivery System

Sub-Unit Protein
Sub-Unit Polysaccharide Conjugates
Nucleic Acids: Vectored or Naked
Potential Benefits of PRINT Vaccines

- Controlled loading of components (antigens, proteins, adjuvants, etc.) to optimize safety, efficacy and cost
- Unique particle sizes and shapes to enhance immune response and improve manufacturing
- Highly consistent, scalable manufacturing with attractive vaccine COGS
PRINT has Potential in Pulmonary Medicine

**Tunable Aerodynamic Properties**

<table>
<thead>
<tr>
<th>Particle #1</th>
<th>Particle #2</th>
<th>Particle #3</th>
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<tbody>
<tr>
<td>AD: 0.65</td>
<td>AD: 1.09</td>
<td>AD: 2.45</td>
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<tr>
<td>GSD: 1.25</td>
<td>GSD: 1.25</td>
<td>GSD: 1.49</td>
</tr>
</tbody>
</table>

**Enhanced Pulmonary Delivery**

<table>
<thead>
<tr>
<th></th>
<th>Marketed DPI Product</th>
<th>PRINT DPI</th>
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</thead>
<tbody>
<tr>
<td>Fill wt.</td>
<td>5 mg</td>
<td>5 mg</td>
</tr>
<tr>
<td>MMAD</td>
<td>3.4 μm</td>
<td>2.2 μm</td>
</tr>
<tr>
<td>Respir. Dose</td>
<td>1200 μg</td>
<td>2900 μg</td>
</tr>
<tr>
<td>FPF</td>
<td>25%</td>
<td>83%</td>
</tr>
<tr>
<td>&lt; 1.6 μm</td>
<td>220 μg</td>
<td>1000 μg</td>
</tr>
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</table>

PRINT has Potential in Pulmonary Medicine

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Unlocking the Next Frontier in Cancer Therapeutics

Novel Therapeutics and Targeting Molecules
- Small molecules
- Biologics (e.g., engineered proteins)

PRINT nanoparticles for systemic and intracellular delivery

Surface targeting for enhanced selectivity
Opportunities for PRINT in Ocular Drug Delivery

- Iontophoretic delivery
  Independently modulate carrier charge and drug loading

- Local delivery with “engineered” particle designs that:
  - Minimize clearance
  - Optimize cell uptake
  - Control release kinetics

- Extended release of small molecules, biologics, siRNA

PRINT particles can translocate sclera, conjunctiva (w/ Eyegate)
Business Model: Prioritize Products and Markets for Partnerships or Internal Development

Partnerships drive revenue, validation and capabilities

High Value, High Risk

Select Programs offer capital efficient path to products or value inflection milestones

Development Time

Product/Regulatory Risk

Near-Term Recurring Commercial Revenue

Vaccines

Immunology

Cancer

CNS

siRNA

Pulmonary

Derm

Animal Health

Consumer

Diagnostics

Surgical Products

Products

Consumer

Animal Health

Diagnostics

Surgical Products

Partnerships drive revenue, validation and capabilities

Near-Term Recurring Commercial Revenue

High Value, High Risk

Select Programs offer capital efficient path to products or value inflection milestones

Development Time

Product/Regulatory Risk
Liquidia’s Plan for Successful Nano Health Care Product Commercialization

- Portfolio of products
  - select portfolio of products that balance risk and return

- Compelling Product Benefits
  - demonstrate benefit and safety of PRINT products and mechanistic understanding

- Manufacturing
  - leverage robust, regulatory friendly manufacturing platform

- Partnerships Matter
  - find motivated, experience and collaborative partners

- Execution
  - Rapidly deliver on smart, capital efficient plan
One Company. One Incredibly Powerful Platform.

Through its novel technology platform and unrivaled IP positions, Liquidia is poised to be a leader in the development and manufacturing of nanotechnology-based healthcare products and a catalyst for the growth anticipated across this industry.
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