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Snapshot

Highly specific DNA testing

- Platform technology for multiple markets
- Best-of-class specificity: microbial strain
- Highly multiplexed
- Handheld capable
- Simple to use POC
- Low cost
- USDA CRADA
- IP protection

Financial

Company Stage: Seed
Terms: Convertible Note
Notes to date: ~$1.8M, plus access to portions of ~$50 M non-dilutive R&D

Series A Capital: $10-12M
Timeframe: Q1 2017

Team

David Medin, CEO
Gabriel Matus,
Process Engineering
Veronica De Guzman Ph. D.
Molecular Biology
Russ Lehrman Ph.D.
Chemistry/Biochemistry
Paul Haje
Corporate Development
Philip Ishii
Signal Processing

Board

David Medin
Les Vadasz
Regis McKenna
Jaleh Daie, Ph.D.
Paul Russo, Ph.D.
Mark Breier (Board Observer)

SnapDNA, Inc.
Next Generation DNA Detection Platform

Summary

SnapDNA offers the next generation DNA detection platform for multiple global markets including food safety, food traceability, supply chain transparency and provenance, source authentication, agriculture production (e.g. GMO tests), soil, medical diagnostics, forensics, veterinary and direct-to-consumer testing with a combined TAM exceeding $10B.

SnapDNA is developing a semiconductor-based bio-sensor to electronically detect DNA binding in real-time with the potential to enable highly sensitive, fast (2 minutes) detection, with up to 500 simultaneous assays and the specificity to differentiate and detect strains of microorganisms. Total sample collection and prep for the assay is intended to be simple and automated with sample-to-answer times in as little as 15 minutes. The final instrument is expected to be small, portable and cost only a few hundred dollars to produce.

SnapDNA is positioned to become the best-of-breed in DNA detection. Major pain points in current systems are specificity at the level of microbial strains in a multiplexed, fast and low cost test. SnapDNA is looking to provide solution for all these factors. All proprietary technology is being developed in house and the feasibility has been demonstrated, thus allowing for a highly defensible, multiple IP portfolio.

SnapDNA has a small talented management team with 150 years of cumulative experience and board members who are distinguished semiconductor, biotech, VC and marketing veterans of Silicon Valley. In addition to non-dilutive cooperative food safety testing development agreement with the USDA that leverages $50M R&D, the company has been funded by high caliber investors such as In-Q-Tel and Silicon Valley veterans.

Technology

DNA detection has revolutionized numerous industries including criminal justice, medical diagnostics, food safety, food traceability and source authentication, supply chain transparency and provenance and agriculture production, especially GMO detection.

Currently, DNA testing requires technicians in specialized labs and most often relies on high precision optical measurements. The optical components in the test instruments tend to be expensive, easily damaged, and require calibration for each test, costing tens of thousands of dollars in price and rendering them unsuitable for portable use.

The key attributes for DNA detection are sensitivity, specificity, reproducibility done rapidly, at low cost, ideally at the point of need. Specificity and time to results are the main bottlenecks with available technology. SnapDNA has demonstrated over an order of magnitude higher specificity with a detection approach that is expected to reduce detection time from hours to less than two minutes and enable high margin tests even at the most aggressive sales prices.

SnapDNA is looking to address these limitations through bio chip detection with direct electrical resonance measurements, detection with no moving parts and a dramatically simplified instrument design. The instrument is expected to cost as little as a few hundred dollars to build and could even operate as an accessory to smartphone.

SnapDNA is developing the next generation, best-of-breed DNA detection platform. The bio-chip sensor is based on inexpensive RF filters and the company has developed state-of-the art processes to protect the bio-chip from corrosion and attach DNA at specific densities while creating a "non-stick" surface around the DNA to block contaminants. SnapDNA proprietary microfluidic treatments that enable leach-free and bubble-free operation can be mass produced and at low cost without specialized equipment. All proprietary technology is being developed entirely in house allowing for multiple highly defensible patents on DNA detection and bio-chip analysis.

Significantly, SnapDNA has access to portions of $50M non-dilutive R&D through a USDA CRADA (Cooperative Research and Development Agreement). Under the CRADA, USDA will co-develop and validate foodborne pathogen tests specifically for the SnapDNA platform. SnapDNA tests are expected to be validated for use by USDA and FDA inspectors before launch, which will provide the company with a significant market advantage.

Team

David Medin has developed and marketed advanced semiconductors for applications that include wireless communications, flat panel HDTVs and personal computers. He has been at the forefront of the transformation of consumer electronics and is looking to bring the same semiconductor-based capabilities, ease-of-use and affordability to DNA testing. Veronica De Guzman, Ph. D. is a molecular biologist with over a decade of technical development experience in single molecule detection coupled with project management experience in process development and pilot scale manufacturing for drug formulation and delivery devices. Gabriel Matus is a processing engineer with 17 years of experience developing specialized semiconductor and MEMS processes including novel surface modification chemistries. SnapDNA board of directors are distinguished veterans of semiconductor electronics, biotechnology and venture investment, adding significant executive, business and investment acumen to the company.

Applications and Markets

- **Food safety**

Our launch strategy is to capture the largest available existing market; food safety testing (over $3B). There are over 1 billion food safety tests performed each year. DNA testing is fastest growing with 25% of the all tests. The Food Safety Modernization Act (FSMA) rolls out starting September 2016, requiring expanded testing across the food supply chain. The USDA has invested ten years and over $50M on advanced research to reduce health-related food recalls and expedited tracing of contamination to the source. They've developed DNA processes to rapidly detect the harmful strains for the highest priority food-borne pathogens - Salmonella, Listeria, E. Coli, Campylobacter, Norovirus and Hepatitis.

To commercialize their research, USDA conducted a peer reviewed analysis of available DNA detection systems and selected SnapDNA as the preferred platform and awarded a CRADA to SnapDNA to jointly develop the next generation food safety testing. USDA and SnapDNA are working together to enable the most rapid, the most specific, and the only strain-specific tests for foodborne pathogens with the goal of reducing the time to result up to 83% (from over 24 hours to 4-6 hours). As an example, most rapid DNA Listeria or Salmonella tests take 24 hours. One of the key attributes in USDA decision was SnapDNA unique and superior specificity. Strain-specific food safety testing requires the ability to discern up to 200 molecular assays per sample with many samples containing similar DNA sequences. SnapDNA demonstrated over an order of magnitude higher specificity than any other detection technology.

- **Agriculture (GMO, authentication, provenance)**

Seed companies perform tens of millions of tests each year to determine genetic purity and trait uniformity. Farmers perform testing on soil, water, manure, compost and bio-solids. Livestock feed is tested for mycotoxins and pathogens. In addition, GMO seed companies want testing at silos to ensure proper and fair payments.

DNA testing can also verify, authenticate provenance and protect the "premium" of a brand. This is a fast growing segment.

- **Medical applications**

Often an otherwise effective drug does not treat a disease, because a specific *strain* is not responding to that treatment. For example, there are dozens of anti-tuberculous drugs. Because tuberculous tests cannot identify the strain, patients can end up trying one drug after another, often over the course of weeks or months before a cure can be found. Major differentiators of SnapDNA include DNA detection at the specificity level of microbial strain in a field deployable instrument that is expected to enable rapid, strain-specific, low cost, POC testing for tuberculous, pneumonia, and other drug resistant strains that may lead to sepsis.

- **Microbiome and food waste applications**

A burgeoning area of innovation is microbiome analysis across diverse industries for applications ranging from soil, beekeeping to cattle to forestry to fisheries. These and other applications could benefit greatly from the unique SnapDNA advantages of rapid, handheld and highly specific DNA testing. Nearly 30% of food is wasted. Reducing waste can help address global food security. SnapDNA' s rapid test can reduce food storage time by a day or more, thereby reducing waste and increasing profits.

Competitive Analysis

Our closest competitors fall into two categories; a) established microarray instruments (Affymetrix, Illumina and Agilent), and b) Real-time PCR detection instruments.

Established microarray instruments

The established microarray instruments trade off speed for specificity. They can perform detection in as little as four hours but, for specificity, detection time is extended to as long as 15-17 hours. Prior to selecting SnapDNA, the USDA analyzed and rejected virtually every established microarray instrument for lack of specificity, even at the longest times. SnapDNA has demonstrated over an order of magnitude higher specificity and detection is expected to take as little as 2 minutes.

Real-time PCR detection instruments

Current DNA food testing instruments utilize real-time PCR detection. Real-time PCR detection can be rapid and low cost but they lack the specificity to distinguish strains of microorganisms. Real-time PCR detection cannot multiplex more than 3 or 4 DNA so products tend to provide a single yes/no answer with no details on the integrity of the results or the quality of the sample preparation.

SnapDNA detection

SnapDNA expects to significantly exceed the specificity of the established microarray instruments. The company intends to compete head-to-head with Real-time PCR on detection time cost with strain-specific, highly accurate tests that ensure proper, repeatable and automated sample preparation in a portable instrument. In addition, SnapDNA' s CRADA with the USDA provides an opportunity for SnapDNA to deliver a USDA-validated, leapfrog product in a mature market and circumvent many of the technical barriers to entry.

Business Model

The SnapDNA business model is to make one-time use disposable testing cartridges and to work with the leading companies in each industry to provide portable or handheld testers, allowing SnapDNA to launch a wide range of rapid DNA testing applications across multiple industries. SnapDNA is targeting food safety testing as its initial launch application.

Funding and next steps

SnapDNA was initially funded by In-Q-Tel, the strategic investor for the US Intelligence Community along with angel investors. The In-Q-Tel funds were both non-dilutive and dilutive. SnapDNA board of directors includes Les Vadasz, part of the Intel founding team and founder/president of Intel Capital, Regis McKenna, acclaimed Silicon Valley marketing guru, Jaleh Daie Ph.D. and Paul Russo Ph.D. SnapDNA is seeking $10-12 million in a Series A round, which it will use to secure an instrument partner, build a USDA-validated commercial food safety prototype and secure a sales commitment from a leading food contract lab.