



A Case Study

Commercial Molecular Quality Controls

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www.mmqci.com

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Agenda

- Outline of the planning process
 1. The problem and the goal
 2. The analysis
- Results to date
- Your comments

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The Process

Observe Problem



Analyze Problem
and
Design a Solution



Test the Solution → Problem Solved?

Business sells solutions to problems

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Goal

Overriding

- Benefit to public health

Laboratory

- Ensure useful test results
 1. Accurate
 2. Affordable
 3. Timely

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Analysis

How the laboratory ensures its goal of 99.XX% accuracy.

1. Monitor test system functions that are likely to fail
2. Develop predictive statistics
3. Develop preventive and corrective action guidelines
4. Implement quality system based on these data

Levy-Jennings charts, QC rules, etc.

Ultimately 6 Sigma or related

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Analysis

Statistical definition of test characteristics:

The error rate is known for each mutation and genotype.
Guides usage of the test results.

Used to design testing schemes to achieve a desired medically allowable error rate.

Used to design quality schemes to efficiently ensure a desired performance level.

Six sigma, LEAN

Statistical QC for Genetic Testing: Steep climb – but achievable goal



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Analysis

QC materials requirements

1. Need to monitor all steps in the test process.
2. QC needs to monitor all genotypes being tested
3. QC needs to yield constant values over time
4. QC needs to be easy to manufacture and convenient in use
5. QC needs multiple genotypes in one sample
6. Rare QC genotypes need to be easily generated

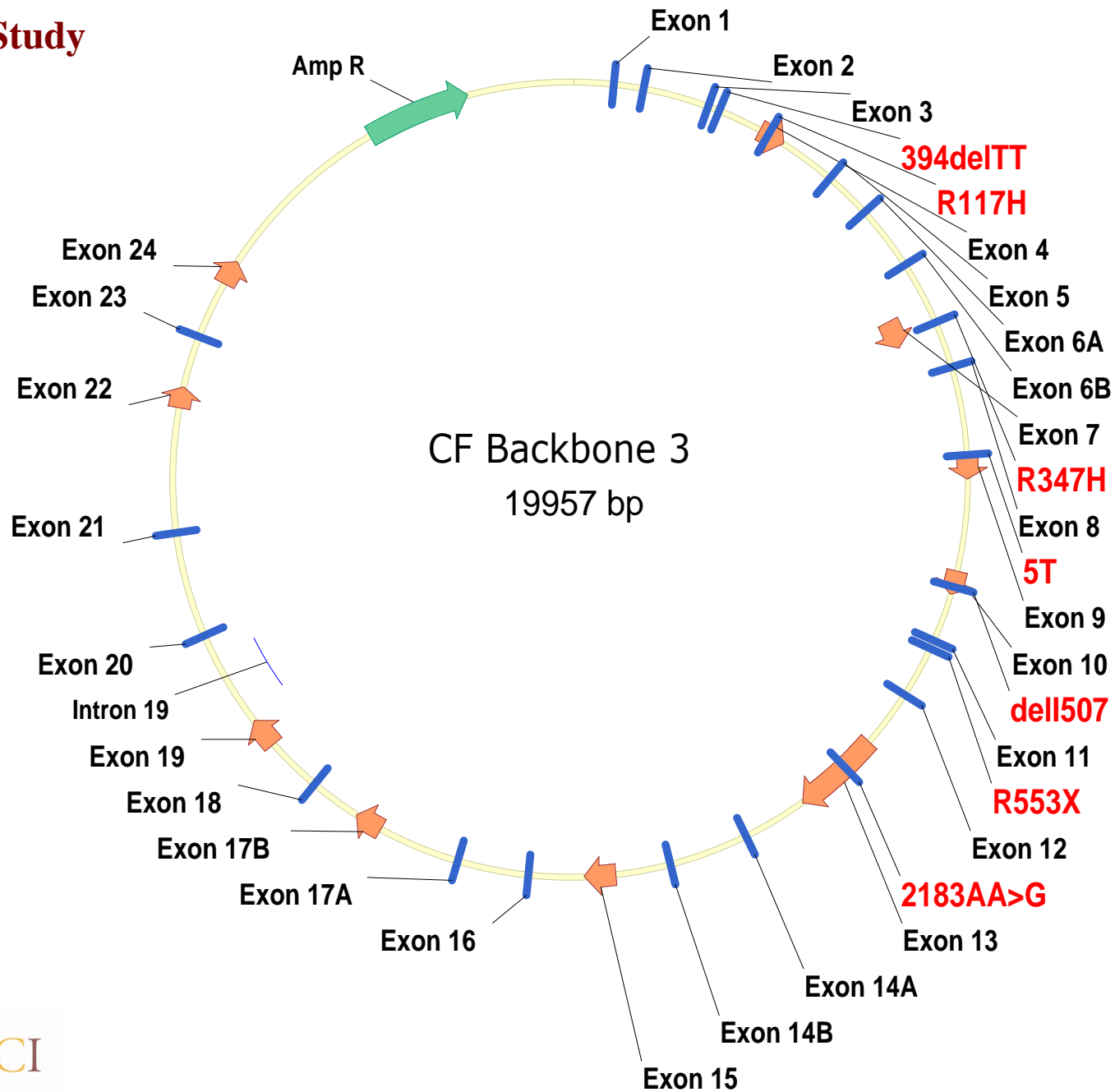
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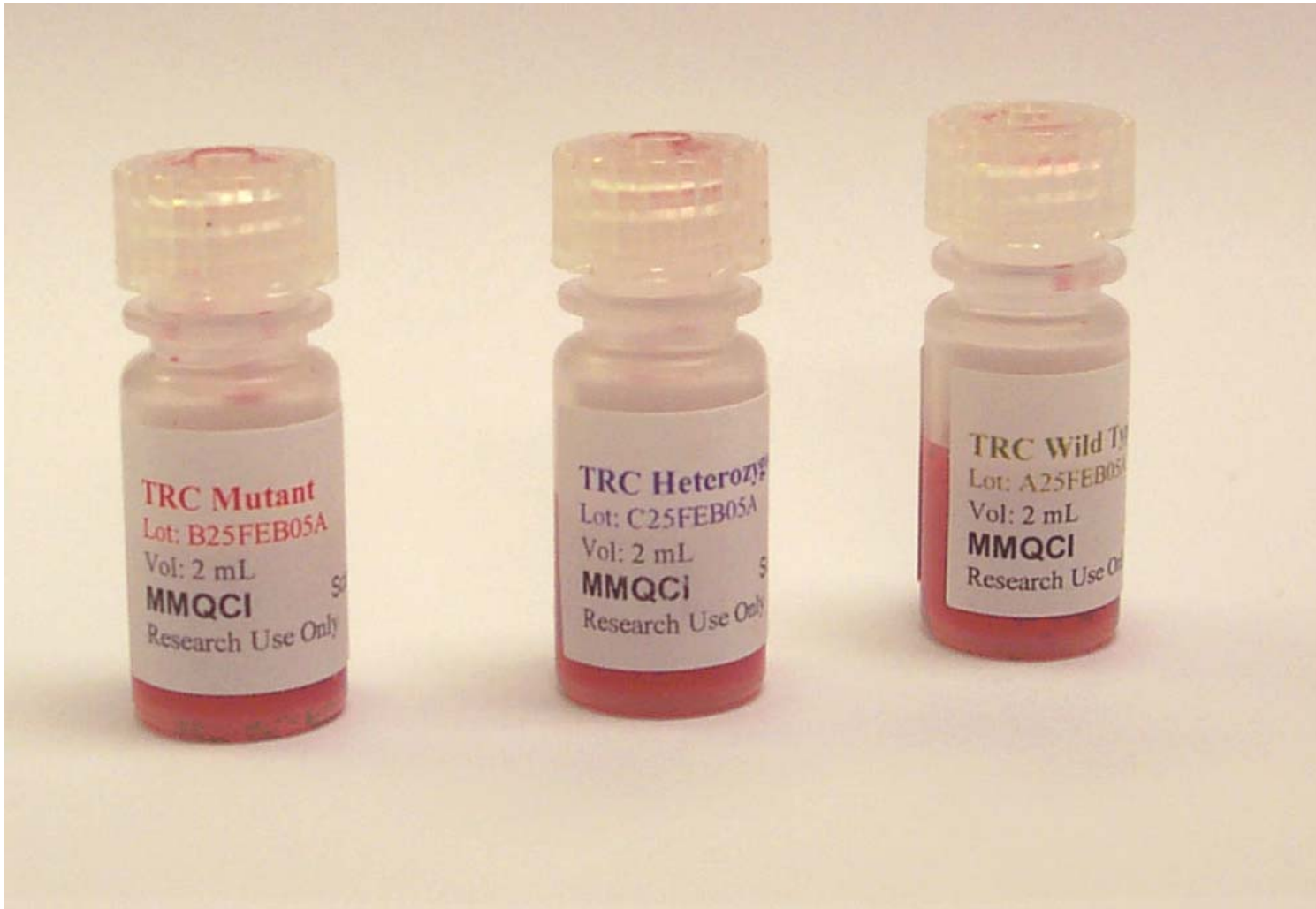
Synthetic Molecular Quality Control Solution design

- DNA control sequences are synthesized
- Mutations are created *in vitro*
- Sequences are validated
 - ~180,000 bases QS sequenced for 5 CF constructs
- Constructs are stabilized
 - >2 yr at 4°C
- Wild type & mutant “alleles” are combined to form genotypes

U.S Patents Issued

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The controls are designed to be extracted and tested in the same manner as whole blood samples.

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Synthetic Control Features

- Precision manufactured.
- Contain all analytes being tested, including rare mutations.
- Affordable and cost effective.
- DNA is extracted. Monitors the entire testing process.
“A control material must detect errors in the entire testing process.” CLIA Final Rule 2003.
- Stable.
- Traceable.

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Available now:

Cystic Fibrosis

Thrombotic Risk

MTHFR

38 Mutation Control Panel I

FVL, Prothrombin G20210A

C677T, A1298C

Under Development:

Hematologic Translocation Controls

Tuberculosis Control

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The Process

Goal: Offer excellent solution(s) to the problem.

Requirement: 1) Fully understand the needs.
2) React quickly to new information.

Questions?

What are the most important outstanding issues?

What would be an ideal solution?

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