

# STATISTICS AT MERCK: A BRIEF OVERVIEW



**MERCK**

**INVENTING** FOR LIFE

# Merck Fact Sheet

**Businesses:** Pharmaceuticals, Vaccines, Animal Health

**Headquarters:** Kenilworth, NJ

**2018 Revenue:** \$42.3B

**2018 Employees:** ~69K

**Ticker:** MRK

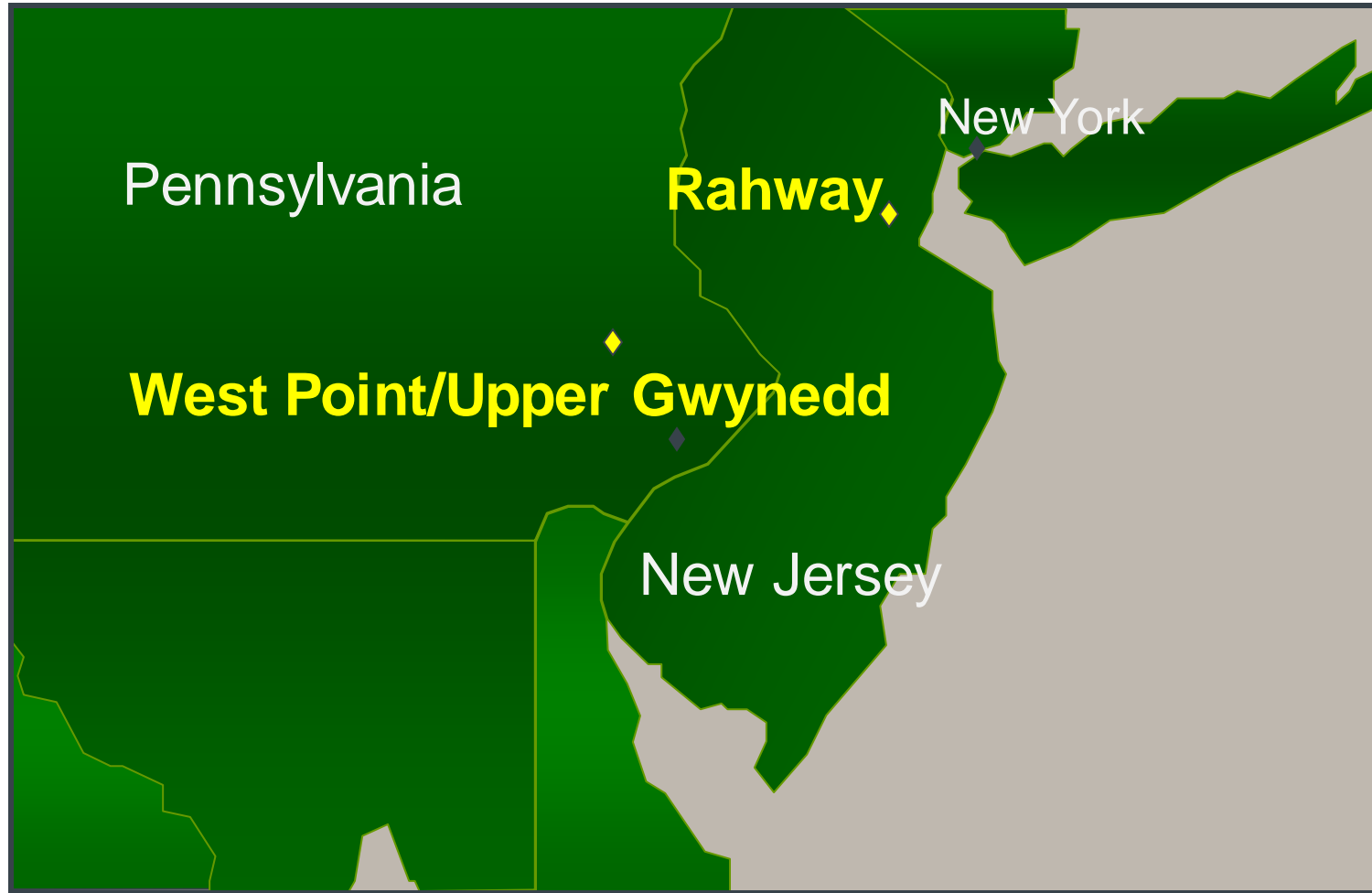
**Senior Leadership:** Kenneth C Frazier, COB & CEO



# Mission

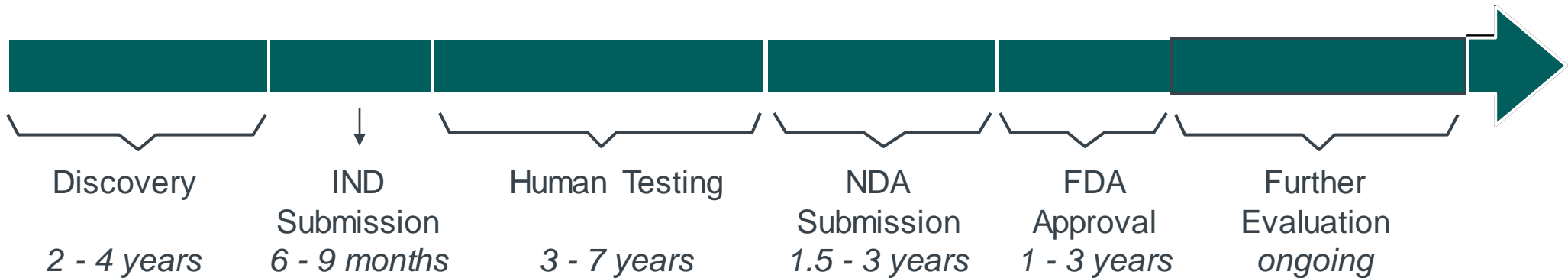
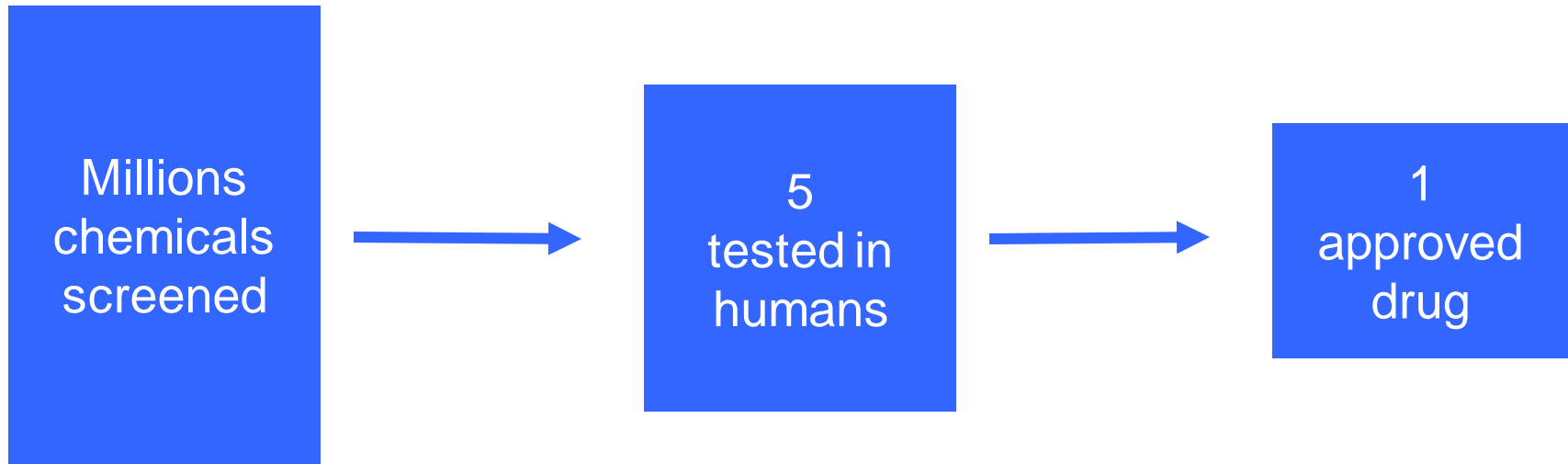
To discover, develop and provide innovative products and services that save and improve lives around the world

# Merck Research Laboratories with Statisticians



Also: Beijing (China), Brussels (Belgium), London (UK)

# New Drug Development: Timeline



# New Drug Development: Discovery

## Discovery

Target ID/Validation

Drug discovery

Chemical synthesis/Formulation

Lab/Animal testing

Assays & Biomarkers

(2 - 4 Years)

## Role of Statistician

Analyze high throughput screening results  
(eg. ML for QSAR)

Design screening strategies

Analyze dose-response studies

Employ bioassay techniques (DoE)

Evaluate reproductive and genetic toxicology

Evaluate carcinogenic potential

Discover/Evaluate Biomarkers



# New Drug Development: Human Testing

## Human Testing

Phase I - Safety

Phase II a - Proof of Concept

Phase II b - Dose-Ranging

Phase III - Safety and Efficacy

(3 - 7 Years)

## Role of Statistician

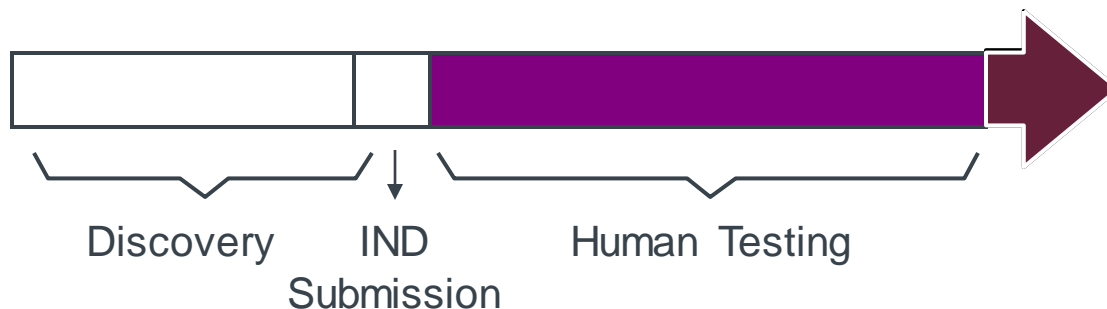
Propose statistical methodology (eg. Umbrella trials, Basket Trials)

Approve study protocols

Interact with Project Team

Analyze and interpret early studies

Discover/Evaluate Biomarkers



# New Drug Development: NDA

## New Drug Application (NDA)

Submission and review to Regulatory Agencies

New drug available to patients and physicians

(1 - 3 years to prepare,  
1 year to review)

## Role of Statistician

Design & Analyze Clinical Studies

**Adaptive Designs**

Summarize across studies

Present methodology and results to Regulatory Agencies





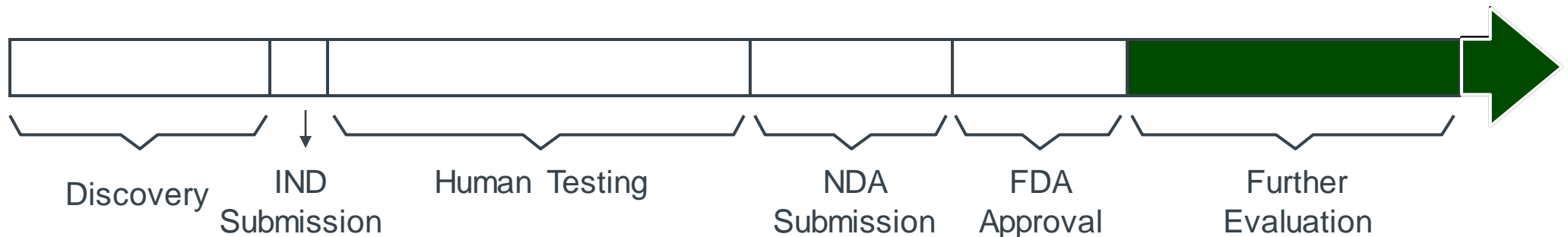
# New Drug Development: Further Evaluation

## Further Evaluation

- Additional uses
- Additional side effects
- Modification of dosage or form
- Health Technology Assessment

## Role of Statistician

- Design and analyze post-marketing studies
- Health Technology Assessment
- Publish papers
- Real-World Data Analysis



# Statistical Groups at Merck Research Labs

Early Development Statistics: Discovery/Early Clinical Phase 1&2

Late Development Statistics: Phase 3 Clinical

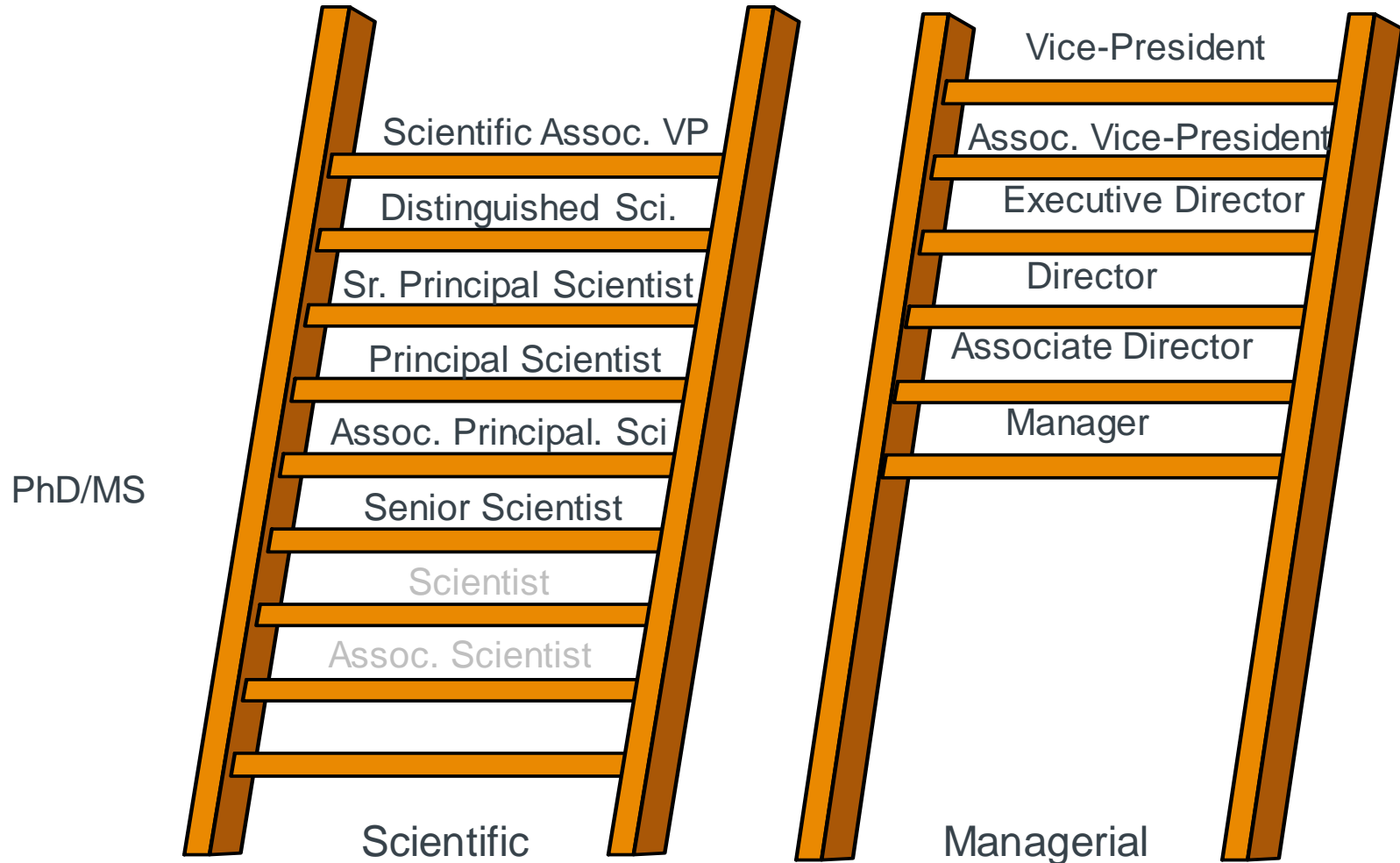
Health Technology Assessment: Proof of value

Clinical Safety Statistics: Comprehensive Safety

Methodology Research: All Stages

Statistical Programming: All Stages

# Career Advancement



# What Companies Look For

Problem Solving/Technical Knowledge

Computer Skills

Motivation/Passion

Cooperation/Teamwork

Communication Skills

Biology/Medicine helpful

Experience (applications)



# George W. Merck Credo (1950)

We try never to forget that medicine is for the people. It is not for the profits. The profits follow, and if we remembered that, they have never failed to appear.



# Career Information Resources

Residents of US/Canada/PuertoRico

<https://jobs.merck.com/us/en>

Residents of other countries

<https://jobs.msd.com/gb/en>

# The 5 questions

1. What are the job opportunities for statisticians in your organization? **Covered**
2. Describe the range of skills statisticians need to succeed in your organization? **Covered**
3. What is the career path for statisticians in your organization? **Covered**
4. Is your organization currently hiring statisticians? **Yes, almost always**
5. What advice would you give to students based on your experience?

Don't underestimate the value of good communication skills

Statisticians at Merck work on a wide variety of projects

Working for Merck (or other pharma) can be very rewarding