

# The Science of Molecular Diagnostics

**The Science of Molecular Diagnostics** is a one-day course exploring the growing role of molecular diagnostics within healthcare. Participants learn how mutations happen and cause disease, and which diagnostics are used to identify where and how disease occurs. If you have a limited science background and are new to the diagnostics sector this course is a great introduction.

## Five takeaways:

1. Scientific background to understand how mutations occur and cause diseases
2. An overview of the most innovative diagnostics within the biopharma industry
3. Importance of biomarkers in disease and diagnostics
4. An understanding of how DNA- and protein-based diagnostics work
5. How to interpret diagnostic results

## Course Agenda

### **Diagnostics Overview 9:00-9:45**

Diagnostic defined  
Uses of diagnostics  
Types of diagnostics  
Biomarkers

### **Science Driving Molecular Diagnostics:**

#### **DNA and Proteins 9:45-10:45**

DNA structure and function  
Chromosomes and genes  
How DNA codes for proteins  
Protein structure and function  
Proteome  
*Lab: DNA isolation and extraction*

**Break 10:45-11:00**

**Break 2:30-2:45**

### **Genetic Variation: Basis of Disease**

*11:00-12:00*

Alleles  
Mutations: genetic variation  
Genetic basis of disease  
Personalized medicine  
Companion diagnostics  
*Activity: genetic variation taste test*

**Lunch 12:00-1:00**

### **How Molecular Diagnostics Work:**

#### **DNA-Based Diagnostics 1:00-2:30**

Polymerase chain reaction (PCR)  
Reverse-transcriptase PCR (RT-PCR)  
DNA microarrays and SNP chips  
Next generation sequencing  
Big data and rare disease  
Third generation sequencing  
*Activity: microarray to determine drug metabolism*

**How Molecular Diagnostics Work:**

**Protein-Based Diagnostics** 2:45-3:45

Antibodies

Enzyme-linked immunosorbant assay (ELISA)

Multiplexed ELISA

Bead immunoassay

Lateral flow immunochromatographic assay

Protein chromatography

**Liquid Biopsies** 3:45-4:15

Cell-free DNA

Exosomes

Circulating tumor cells

**Review/Q&A** 4:15-4:30