

# Diagnosics: Patent Eligibility and the Industry Perspective

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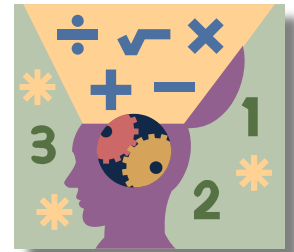
Presentation to MATTO

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# What is Patent Eligible Subject Matter?

## 35 U.S.C. § 101 - Any new and useful:

- ◆ Process
- ◆ Machine
- ◆ Manufacture or composition of matter or improvement thereof
- ◆ “Anything under the sun made by man”
- ◆ Unpatentable subject matter (**judicial exceptions**)
  - ◆ Laws of nature
  - ◆ Products of nature
  - ◆ Mathematical algorithms



# Subject Matter Eligibility: Products

ASSOC. FOR MOLECULAR PATHOLOGY v. MYRIAD  
GENETICS, Sup Ct June 2013

- *BRCA1* and *BRCA2* are genes that account for most inherited forms of breast and ovarian cancer.
- Myriad's genetic test identified women at increased risk of suffering from breast or ovarian cancer.
- Two types of claims were at issue:
  - (i) composition claims directed to isolated DNA molecules;
  - (ii) composition claims directed to cDNA

# Myriad

## Subject Matter Eligibility: Products

**Claims directed to isolated DNA molecules were held not patent-eligible.**

- Court found that isolating DNA molecules was not sufficient to confer patent eligibility, because “Myriad did not create or alter any of the genetic information encoded in the BRCA1 and BRCA2 genes [that exist in nature].”

**Claims directed to cDNA were held patent eligible**

- The fact that cDNA does not occur in nature persuaded the Court that cDNA is patent eligible.
- cDNA is not a “product of nature” and is patent eligible under § 101.

# **Subject Matter Eligibility: Processes**

## **Mayo v. Prometheus, Sup. Ct. March 2012**

- Prometheus Laboratories owned a patent claiming methods for determining the dosage of thiopurine used to treat gastrointestinal disorders.
- Mayo Clinic developed a similar test, and Prometheus sued Mayo for infringement.
- Mayo responded that Prometheus was seeking to protect an abstract idea that was not patent eligible subject matter.

# MAYO

## Subject Matter Eligibility: Processes

### What was known:

- At the time the patents were filed, it was well known that levels of certain metabolites correlated with the likelihood that a particular dosage of a thiopurine drug could cause harm or prove ineffective.
- The court found that medical tests that rely on correlations between drug dosages and treatment are not eligible for patent protection.
- The court reasoned that (i) natural laws themselves may not be patented, and (ii) natural laws cannot be patented in connection with processes that involve “well-understood, routine, conventional activity.”

# **CAFC Application of *MAYO* in *Ariosa v. Sequenom* (788 F.3d 1371 (Fed. Cir. 2015))**

- Sequenom is the exclusive licensee of a non-invasive test that provides for the prenatal diagnosis of genetic disorders and pre-eclampsia using a simple blood test that reduces or eliminates the need for amniocentesis and chorionic villus sampling.
- Sequenom's patent (US 6,258,540) covered methods of detecting paternally inherited DNA of fetal origin—based on discovery that cell-free fetal DNA (“cffDNA”) is detectable in pregnant woman's plasma.
- Ariosa challenged the patent as invalid under Section 101

# **CAFC Application of MAYO in Ariosa v. Sequenom (788 F.3d 1371 (Fed. Cir. 2015))**

CAFC adopted *Mayo's* rigid two part test :

- (1) Are claims directed to a patent ineligible concept?
  - cffDNA in maternal blood is a natural phenomenon
  - Paternally inherited cffDNA is a natural phenomenon
- (2) Examine other elements of the claim to determine if they “transform” natural phenomenon into an eligible invention
  - PCR methods to amplify and detect were well-known, conventional and routine in 1997



# CAFC Application of MAYO in Ariosa v. Sequenom (788 F.3d 1371 (Fed. Cir. 2015))

- The Court appreciated that the inventors had found cell-free fetal DNA (cffDNA) in maternal plasma or serum "*that other researchers had previously discarded as medical waste*"
- Judge Linn's concurring opinion
  - "Ground breaking" invention bringing about a "paradigm shift" that is deserving of patent protection. . .
  - Facts of *Mayo* clearly distinguishable from this case
  - **BUT** "The Supreme Court's blanket dismissal of conventional post-solution steps leaves no room to distinguish *Mayo* from this case"

# How do *Myriad* and *Prometheus* affect patent eligibility for diagnostics?

- The Court's analysis of patent eligibility in *Myriad* focused on whether products occurred in nature.
  - Include claims to compositions that are not naturally occurring.
    - Capture molecules (Abs/Nucleic acids) fused to a substrate.
    - Polynucleotides comprising a detectable moiety.
    - Humanized or chimeric antibodies.
- The Court's analysis of patent eligibility in *Prometheus* focused on laws of nature, mental steps, and routine conventional activity.
  - Include claims to diagnostic methods featuring patentable compositions (e.g., antibodies, microarrays, detectable polynucleotide probes that hybridize to SNPs).
  - Claims to companion diagnostics (e.g., a method of treating a patient by administering drug X, wherein the patient is selected as having disease Y).

# Diagnositics: Patent Eligibility and the Industry Perspective

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# Patent Eligibility: Where Are We Now?

## US

- Interim Guidance on Patent Subject Matter Eligibility (December 2014)
- July Update to Interim Guidance (July 2015)
  - Developing Abstract Ideas & Pre-Emption Analysis
  - Federal Circuit Decisions (*Ariosa v. Sequenom*)

<u>Old Patent Examination</u>	<u>New Patent Examination</u>
Eligibility (§101)	Eligibility (§101 and §102, 103, 112)
Patentability (§102, 103, 112)	Patentability ??

# Patent Eligibility: Where Are We Now?



# Patent Eligibility: Where Are We Now? (Ex-US)

## ■ Australia

- High Court (unanimous): claims isolated to BRCA1 were not patentable (*D'Arcy v. Myriad Genetics*)
- IP Australia Guidance (2015)
  - What is the substance of the claim (i.e., not just its form)?
  - Has the substance of the claim been made or changed by man?
  - Does the invention have economic utility?
  - Does the invention as claimed represent a new class of claim?

## ■ Canada

- No key diagnostic cases...yet
- CIPO issued notice June 29, 2015
  - An invention solving a data acquisition problem (e.g., method of quantitating a marker) is patentable while a method “solving only a data analysis problem” (e.g., associating a marker with a disease condition) may be unpatentable.

# Patent Eligibility: Why Does It Matter ?

- US now has less patent protection available for biotech and software innovation than EU or China
- Confusion around patentability and validity leads to uncertainty and fewer investments
  - Patents being invalidated today were based on research that predated these new standards for eligibility
- Push for targeted, effective therapies is driving industry move to personalized medicine – diagnostics are critical
- Diagnostics are expensive and require years to develop (\$12-55 MM to develop and manufacture)
- Diagnostic IP can provide strong protection for drug label (CDx)

# Patent Eligibility: What Can We Do?

- Timing – wait for the invention, but move quickly through prosecution
- Drafting – avoid “well-known” “conventional,” & include actual examples
- Claiming – include active step, specific sequences, labels & remove mental step (comparing, analyzing)
- Prosecuting
  - Interview!
  - Follow the 2 step analysis
  - Rely on the Examples and draw parallels
  - Argue for significantly more, no pre-emption, specificity
- *Protect your inventions!*



# Patenting Case Studies

- Can a biomarker for a particular disease be protected?

## Examples:

- SNP correlates to assess risk of disease
- Specific mutation in a tumor
- Phosphorylation of a protein in a tumor
- Elevation of a protein biomarker in blood

# Patenting Case Studies #2

- Can that same biomarker be patented if it is connected to a specific measurement technology?

## Examples:

- High sensitivity measurement of a protein biomarker
- Fetal DNA measured by genetic sequencing
- Cancer-associated mutation measured as cell-free DNA, or in exosome, or in circulating tumor cell

# Patenting Case Studies #3

- Can a biomarker be protected in connection with selection of a specific therapeutic drug or drug class?

## Examples:

- HER2/HER2-neu to guide use of Herceptin
- KRAS mutant test to guide use of Erbitux

# Patenting Case Studies #4

- Can panels comprising multiple biomarkers be protected for these applications?

## Examples:

- Multi-gene expression panel for breast cancer prognosis and prediction
- Multi-protein biomarker panel for assessment of rheumatoid arthritis