Subject Matter Eligibility (101) Outside Perspectives: Impact and Challenges

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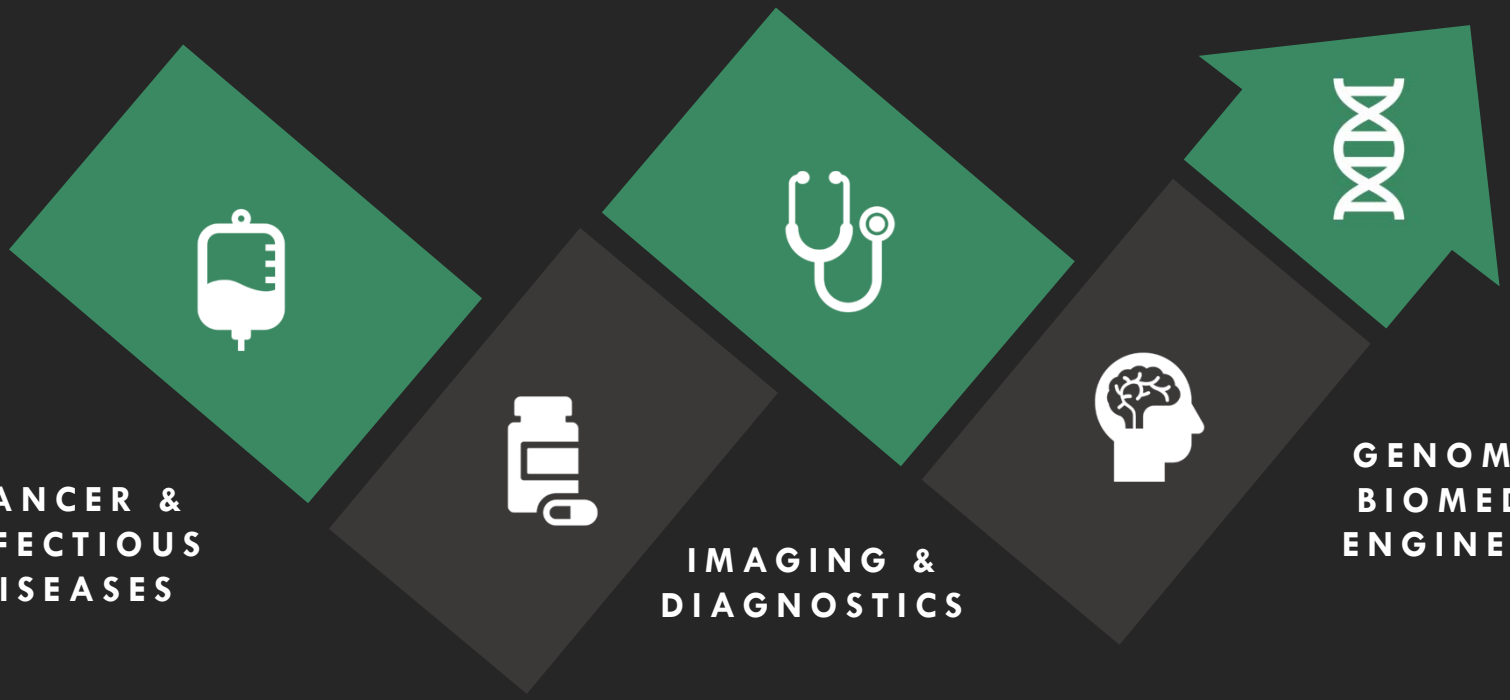
Biotechnology, Chemical, Pharmaceutical Customer Partnership 08 May 2019

A RESEARCH **POWERHOUSE**

OUR CORE COMPETENCIES



CANCER & INFECTIOUS DISEASES

DRUG DISCOVERY & FILTRATION/ PURIFICATION

IMAGING & DIAGNOSTICS

NEUROLOGY

GENOMICS & BIOMEDICAL ENGINEERING

WASHINGTON UNIVERSITY INNOVATIONS

FUNDING **SOURCES**

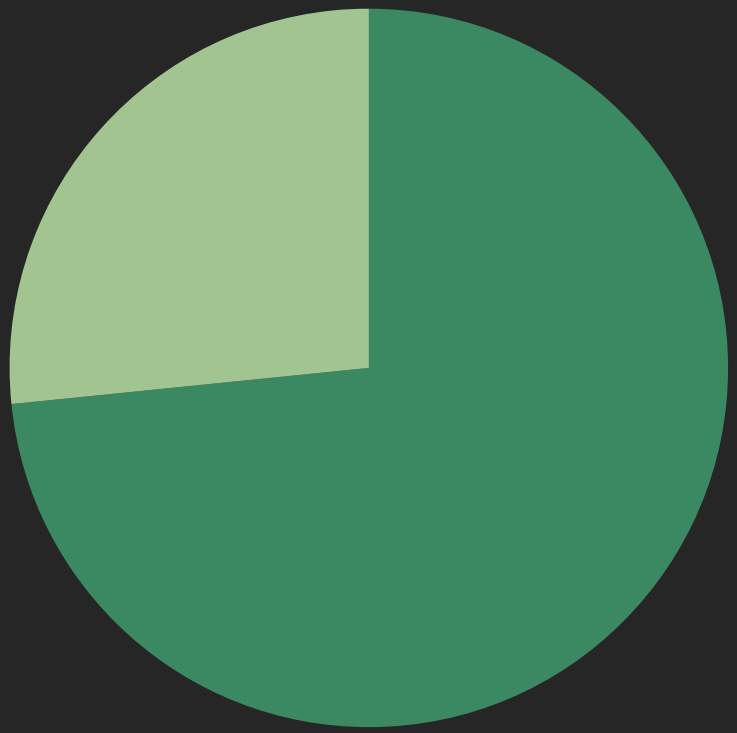
WHERE DOES OUR MONEY COME FROM?

$189M

PRIVATE NON-PROFIT

PRIVATE INDUSTRY

STATE/LOCAL/ INTERNATIONAL



$522M

FEDERAL

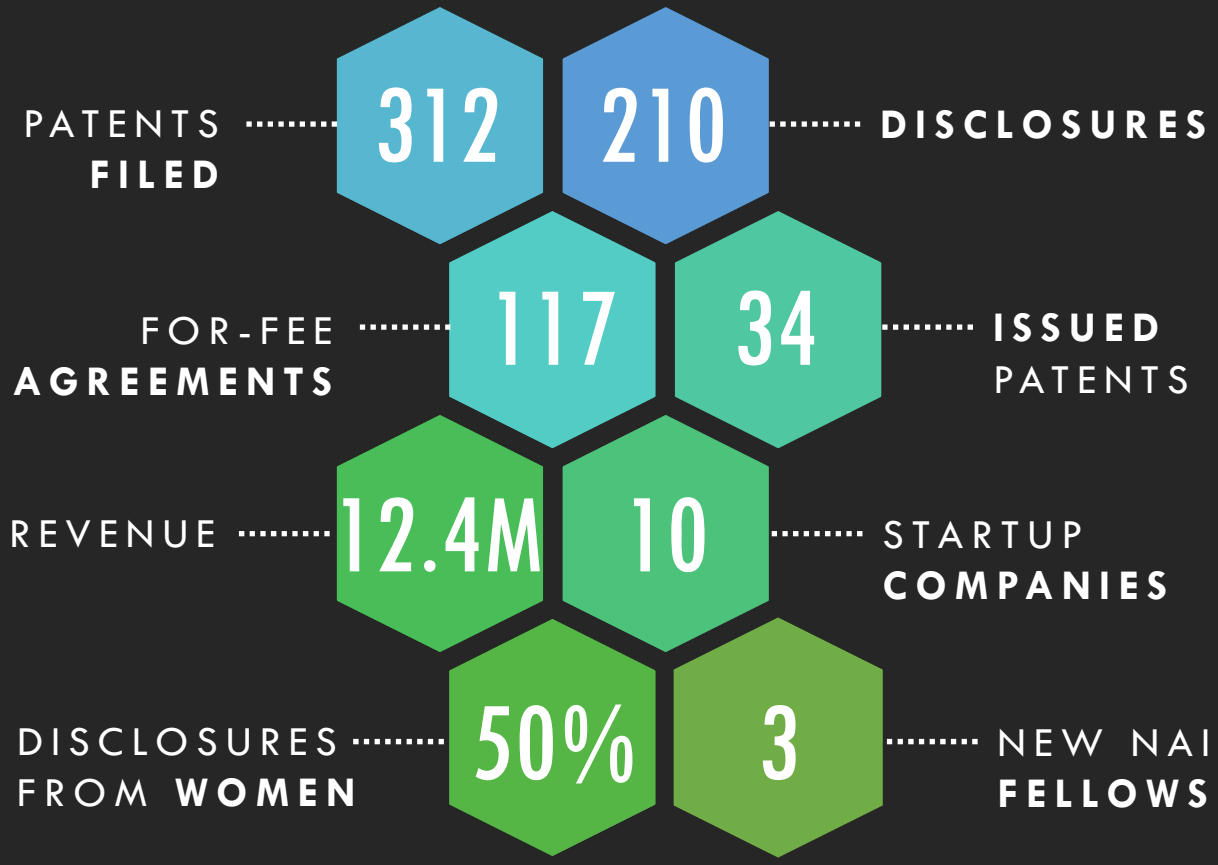
2018 RESEARCH FUNDING

OFFICE OF TECHNOLOGY MANAGEMENT (OTM)

To promote the public utilization of cutting-edge university innovations through the formation and management of commercial partnerships to create opportunities to benefit society.

OTM **STATISTICS**

WASHINGTON UNIVERSITY HAS BECOME A HOTSPOT FOR INNOVATION



FY18 STATISTICS

(July 1, 2017-June 30, 2018)

CREATION OF TECH TRANSFER – **BAYH-DOLE ACT**

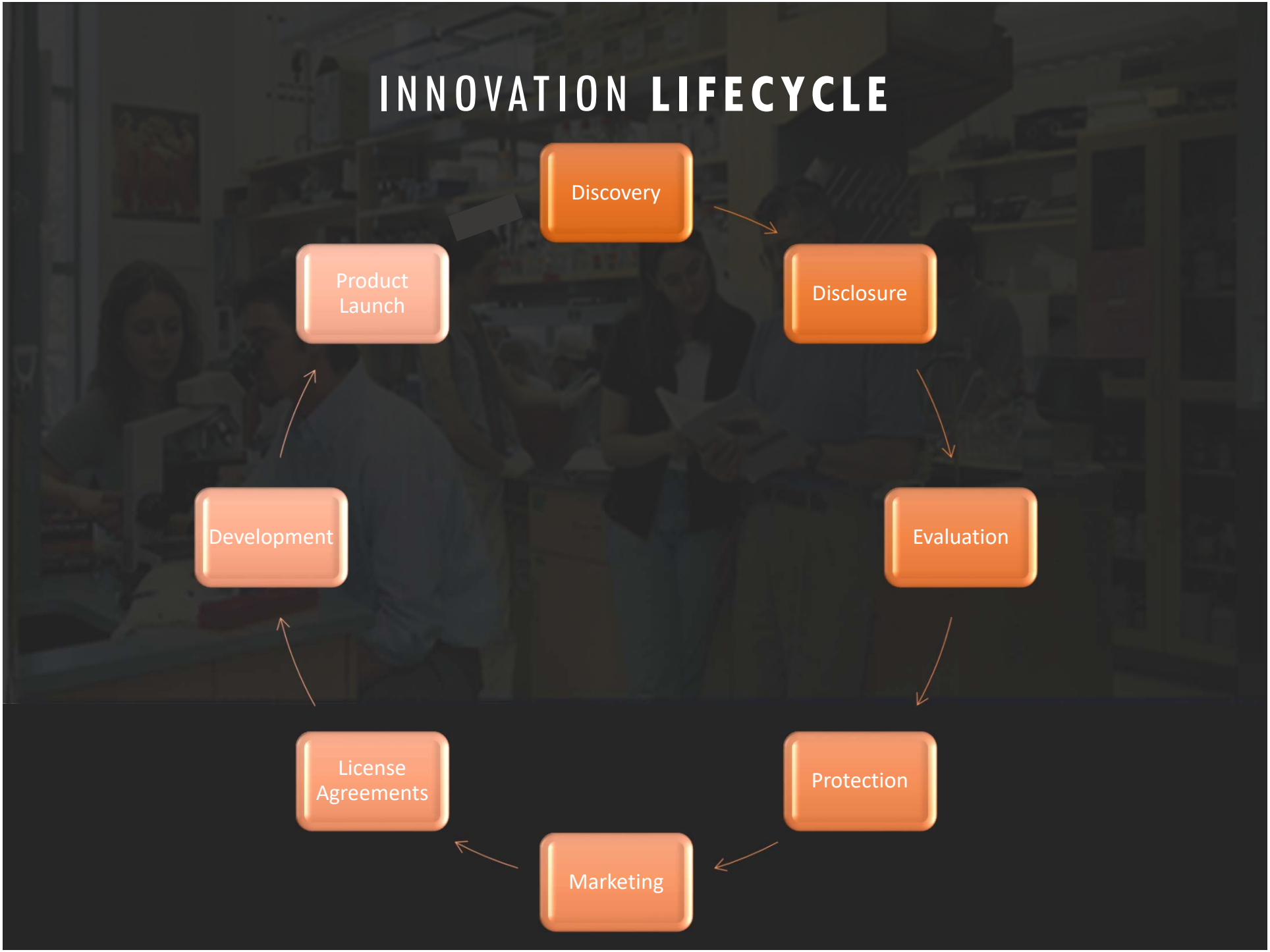
AT THE TIME, GOVERNMENT OWNED 28,000 PATENTS AND LICENSED LESS THAN 4%

PASSED IN 1980 AS BIPARTISAN LEGISLATURE AND **APPLIES TO ALL FEDERALLY FUNDED RESEARCH**

NONPROFITS AND UNIVERSITIES TO **RETAIN TITLE TO IP**

UNIVERSITY OBLIGATIONS INCLUDE **SHARING OF REVENUE** WITH INNOVATORS, **MANAGEMENT OF THE INTELLECTUAL PROPERTY** AND GOVERNMENT **REPORTING** OF INVENTIONS

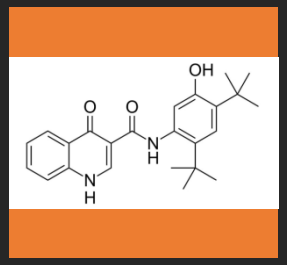
GOVERNMENT RETAINS MARCH-IN RIGHTS, BUT HAS NEVER EXERCISED THESE – PETITIONS TO NIH HAVE BEEN DENIED (CellPro, NORVIR, Xaraltan)

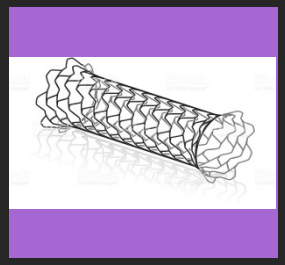

INNOVATION LIFECYCLE
Discovery
Disclosure
Evaluation
Protection
Marketing
License Agreements
Development
Product Launch

TYPES OF **INVENTIONS DISCLOSED TO OTM**

COMPOSITIONS OF MATTER

SMALL MOLECULES, BIOLOGICALS, ANTISENSE MOLECULES, IMAGING AGENTS





MEDICAL DEVICES

SURGICAL TOOLS, LAB EQUIPMENT, MEDICAL INTERVENTIONS

DIAGNOSTIC TESTS

BIOMARKERS, IMAGING AGENTS, GENOMICS, ASSAYS

TANGIBLE MATERIALS

HARDWARE/SOFTWARE, REAGENTS, ANTIBODIES, MICE, CELL LINES, ENGINEERING INVENTIONS

DECIDING TO **PROTECT IP**

IS THERE A MARKET?

WHAT IS THE PRODUCT & ITS UNIQUE FEATURES?

WHO ARE THE CUSTOMERS?

WHAT IS THE SIZE OF THE ADDRESSABLE MARKET?

WHAT IS THE COMPETITION?

WHO ARE THE DECISION-MAKERS?

CAN IT BE PROTECTED?

DOES IT FIT THE CRITERIA OF NEW, USEFUL, AND NON-OBVIOUS

SUBJECT MATTER ELIGIBLE

ENABLED

ARE THE PATENTABLE CLAIMS VALUABLE?

IS THE IP ENFORCEABLE?

CAN IT BE LICENSED?

IF THE MARKET IS LIMITED, IS THERE AN ADVANTAGE?

IF THERE IS NO PATENT OR COPYRIGHT, CAN IT STILL BE EXPLOITED?

WHAT ARE THE IMPEDIMENTS ON THE TECHNOLOGY?

PATENT STRATEGY

PRE-PARTNERSHIP

- Broad claim coverage
- Limited budget
- Amortization of costs
- License to company or create new startup company

POST-PARTNERSHIP

- Prosecution strategy based on partner's business model

WASHINGTON UNIVERSITY
STARTUPS AND COMMERCIAL PARTNERS

SUBJECT MATTER ELIGIBILITY IMPACT AND CHALLENGES

Mayo (2012) and Myriad (2013) **changed the scope** of patent eligible subject matter in the life sciences.

Previously Patentable Subject Matter:

- Purified or isolated naturally occurring biological substances
  - genes, proteins
- Diagnostics
  - methods of detection of a biological substance and subsequent actions
  - disease diagnostics to inform treatment
- Companion diagnostics
  - is patient a responder/non-responder to a drug?
  - will patient suffer adverse effects to a drug?

MAYO AND MYRIAD

Mayo v. Prometheus Laboratories, 2012 (Mayo) SCOTUS: INELIGIBLE

Patents drawn to **determining the optimal doses of certain drugs** used to treat people with autoimmune disorders, such as Crohn's disease.

Patients metabolize drugs differently. Too low—drug ineffective, too high—toxic. Requires adjustment depending on measurement of metabolite.

SCOTUS: correlation between metabolite and toxicity - "natural law". Method steps of administering drug, determining level, and adjusting dose if needed, "well understood, routine [and] conventional activity".

Huge impact in diagnostic/companion diagnostic/personalized medicine

Claims are not directed to a "diagnostic"

Molecular Pathology v. Myriad Genetics, 2013 (Myriad) SCOTUS: INELIGIBLE

Patents drawn to isolated segments of BRCA1 and BRCA2 genes (and mutants thereof) that can be use in cancer diagnostics.

SCOTUS: "the claimed DNA molecules comprised the same nucleotide sequences and information content as the DNA in nature".

Isolated DNA no longer patentable (whether useful for encoding a protein or for diagnostic purposes).

Exons-only cDNA was found to be patent-eligible.

Claims are not directed to "diagnostic" method claims (in fact **NO METHOD** claims at all)

SUPREME COURT GUIDANCE: MAYO

Mayo v. Prometheus

SC distinguished the claims at issue from typical method of treatment claims:

> *"Unlike, say, a typical patent on a new drug or a new way of using an existing drug, the patent claims [here] do not confine their reach to particular applications of those laws."*

SC attempted to approach the exceptions to patent eligibility with caution.

As the Court stated in Mayo, for example:

> *"The Court has recognized, however, that too broad an interpretation of this exclusionary principle could eviscerate patent law. For all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas. Thus, in Diehr the Court pointed out that "'a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm.'" .... It added that "an application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.""*

SUPREME COURT GUIDANCE: MYRIAD

Association for Molecular Pathology v. Myriad Genetics

SC was not addressing the patent eligibility of method claims:

> *"First, there are no method claims before this Court. Had Myriad created an innovative method of manipulating genes while searching for the BRCA1 and BRCA2 genes, it could possibly have sought a method patent."… "this case does not involve patents on new* ***applications*** *of knowledge about the BRCA1 and BRCA2 genes."*
>
> *"We merely hold that genes and the information they encode are not patent eligible under §101 simply because they have been isolated from the surrounding genetic material."*

SC decision does not implicate the patent-eligibility of **any type** of method claims.

The opinion expressly notes that Myriad could have sought to patent any "innovative method of manipulating genes" that it invented while searching for the BRCA1 and BRCA2 genes.

The Court also points out that

> "this case does not involve patents on new applications of knowledge about the BRCA1 and BRCA2 genes." [such as new diagnostic methods]

POST-MAYO/MYRIAD USPTO GUIDELINES

After Mayo:

USPTO extended the SC holding of Mayo beyond just adjusting dose levels based on detection of biomarker, to any diagnostic claim generally correlating a biomarker to a disease state as ineligible (*Law of Nature*).

- Mayo was not directed to diagnostic claims

After Myriad:

USPTO extended the SC holding of Myriad beyond nucleic acids to all natural products (e.g., proteins and antibiotics) (*Product of Nature*).

According to the 2014 Guidance, all claims directed to methods that "recite or involve" a "natural product" are subject to scrutiny under § 101.

- No SC decision undermines the patent eligibility of a method claim simply because it recites the manipulation or use of a natural product
- Method claims involving natural products were not at issue

LIFE SCIENCE EXAMPLES

Example 29: Diagnosing/treating julitis

ELIGIBLE: detection of JUL-1 in a plasma sample by contacting with anti-JUL-1 antibody.

ELIGIBLE: diagnosing using unconventional reagents, such as porcine Abs or specific antibody (new Ab or not routinely used for detecting the marker), or adding a treatment step.

INELIGIBLE: diagnosing julitis in a patient by obtaining a plasma sample, detecting if JUL-1 is present by contacting with a JUL-1 antibody, detecting binding, and diagnosing patient with julitis.

Example 31: Screening for gene alterations

ELIGIBLE: Detecting a hybridization product using scanning near-field optical microscopy (unconventional). Amplifying by Cool-Melt PCR step was unconventional at time of filing.

INELIGIBLE: Screening for an alteration of BRCA1 gene, comparing sequence of BRCA1 (gene, RNA), detecting differences from wt BRCA1. Hybridizing step-conventional activity. cDNA should be eligible.

REVISED 2019 GUIDANCE

STEP 1*:* Does claimed invention fall within statutory categories: process, machine, manufacture, or composition of matter?

YES → Go to 2A, Prong 1

NO → End of analysis (ELIGIBLE)

REVISED STEP 2A: is claim **DIRECTED** to a judicial exception?

NO→ELIGIBLE

YES→ Go to 2B

- *2A, Prong 1:* Does the claim recite a judicial exception - law of nature, natural phenomena, abstract idea?

  YES → If YES to law of nature or natural phenomenon, Go to 2A, Prong 2.
  If YES to abstract idea: further analysis-is it a math concept, method of human activity, mental process? If, YES→Go to 2A, Prong 2. If, NO→ ELIGIBLE

  NO → End of analysis (ELIGIBLE)

- *2A, Prong 2:* Does the claim recite additional elements that integrate the judicial exception into a practical application?

  YES → End of analysis (ELIGIBLE)

  NO → Go to 2B

2B: Search for an inventive concept

- *Do the additional elements "transform the nature of the claim" into a patent-eligible application?*
- *Are the additional elements not well-understood, conventional, or routine?*

YES →ELIGIBLE

REVISED 2019 USPTO GUIDANCE

- Claims eligible if they "integrate" a judicial exception into a "practical application"
- Mere inclusion of an abstract idea in a claim is not fatal, because such ideas form the basic building blocks of all patent claims
- Does not require the practical application itself to be unconventional (for purposes of eligibility)
- A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception.

NEW EXAMPLES 37-42

- According to the new Examples, judicial exceptions can be integrated into a practical application by providing an improvement over prior systems (see new Examples 37 (claim 1), 40 (claim 1), and 42 (claim 1)).

- Furthermore, limiting the use of a judicial exception (e.g., an abstract idea) to a practical application of transmitting a signal to a computer terminal, even though the step is well-understood, routine, and conventional (see e.g., new Example 41) is sufficient to be enough to show a practical application.

- These new Examples describe various improvements over prior systems (i.e., practical applications) that could potentially be analogized to diagnostics or other life science examples.

INTEGRATING EXCEPTION INTO A PRACTICAL APPLICATION

- Additional element reflects an **improvement** in the functioning of a computer or other **technology**.
  - Analogous to an improved assay or detection technique?

- Additional element applies or uses a judicial exception to effect a particular **treatment or prophylaxis** for a disease or medical condition.
  - An administering step. Treatment decisions?

- Additional element implements a judicial exception with, or uses a judicial exception in conjunction with, **a particular machine or manufacture** that is integral to the claim.
  - Analogous to detection using a mass spec or ELISA?

- Additional element effects **a transformation** or reduction of a particular article to a different state or thing.
  - Analogous to formation of a primary immunoreactive complex or hybridization product?

REVISED 2019 USPTO GUIDANCE: LIFE SCIENCE EXAMPLES?

- What is meant by "integrated into a practical application" in life sciences, diagnostics?

- How does an applicant show that the claimed life science invention had practical utility?

- Would this standard be satisfied if the claimed invention solves a problem in the prior art or offers some benefit to patients?
  - For example, the applicant could show that the claimed invention had practical utility (e.g., identification or stratification of a group of patients that would benefit or not benefit from a particular treatment).

- Is formulating an isolated naturally-occurring protein in a solution for injection a "practical application" of the discovery of the natural product and its therapeutic usefulness, or do only method claims "practically apply" that invention?

- Is diagnosing a specific subject as having a specific disease a "practical application" of the discovery of the underlying natural phenomenon?

CHALLENGES AND COMMERCIAL VALUE IMPLICATIONS

KNOWN STRATEGIES TO OVERCOME 101 REJECTIONS IN LIFE SCIENCES:

- Unconventional, non-routine element(s)/step(s), especially if diagnosing
- A treatment step (Vanda, Julitis Example 29, practical application)
- Use of a particular machine
- A non-natural element
- Detection of a combination of biomarkers not found in the art
- A tangible result (Cellz Direct) (mult. freeze thaw cycle for producing cryopreserved hepatocytes)
- Avoid elements that read on mental steps (e.g., compare to a control)
- Concrete physical steps (or series of steps)

WHY THESE STRATEGIES DON'T TYPICALLY WORK FOR US:

- Academics use **conventional methods** in the discovery of new inventions to ensure their experiments are reproducible or can be validated (required by peer reviewed pubs/grants)
- Academics typically rely on **industry** to move research/commercialize (e.g., optimization of methods/assay techniques, discovery of antibodies with improved binding, etc.)
- Unnecessarily adding unconventional steps or treatment steps to satisfy an eligibility requirement (e.g., "significantly more") render claims **commercially less valuable**
- Additional steps reciting elements (e.g., comparing, diagnosing, etc.) often **necessary to satisfy 102 and 103, trigger a 101 rejection**

COMMERCIAL VALUE IMPLICATIONS

THESE STRATEGIES CAN RENDER THE CLAIMS INVALUABLE/UNENFORCEABLE

Narrow scope

Easily designed around

Difficult to prove divided infringement

Copyists benefit from new discoveries

- No infringement risk
- No research $

RISKY FOR COMMERCIAL PARTNERS AND UNIVERSITY

High patent preparation and prosecution cost

Diagnostics challenged in courts

Questionable enforceability

Uncertain patentability/validity

JUSTIFYING PATENT PROTECTION

Early commercial interest

Clear “something more” element that doesn’t render claims invaluable

CHALLENGES: COURT DECISIONS

- Recent series of court decisions have made it impossible to obtain reliable and effective patents for diagnostic tests

- Diagnostic claims are being dissected and overgeneralized into individual foundational laws of nature or natural phenomenon and being restated at such a high level of generalization to be regarded as conventionally-known techniques in the art
  - NOT because such diagnostics comprise laws of nature or natural phenomena themselves, but because all diagnostics seek to discover information about a subject—including seeking to diagnose conditions in humans

- Need congressional fix to get U.S. innovation policy back on track

DETERS INNOVATION

Limited patent budget does not allow for pursuing patentably risky technologies without a commercial partner to offset patent costs

Proactive patentability analyses including subject matter eligibility to stem patent costs

Counsel inventors on 101 (especially those focusing on discovering pathways, biomarkers, targets)

- deters patenting of innovations
- deters underlying research

An unconventional step may be useful or valuable for the commercial embodiment

- BUT inventors typically do not have a commercial embodiment at the time of filing
- Once our inventors make an academic discovery, rely on industry partners (e.g., licensees) to further develop the invention into a commercial product
- Commercial engagement typically occurs after patent filing or patenting

Future is uncertain. Examiners not using new guidance for diagnostic-like claims.

POTENTIALLY IMPACTFUL DIAGNOSTICS

Bacterial Vaginosis Diagnostic

Discovered new enzyme to predict adverse pregnancy outcomes, preterm birth, infertility

Impact fetal mortality

Impact women's healthcare (1/3 women)

Alzheimer's Disease Diagnostic - Significant commercial interest, challenged by diagnostic company posing as a potential industry partner to WU

- detecting biomarkers for AD
- mathematical modeling of Ab burden
- metabolism based blood tests

Other Potentially Impactful Diagnostics

- Diagnostics for autism, diabetes, lysosomal storage diseases, autoimmune, allergy, infection, arthritis, inflammatory disease, kidney disease, skin disease, heart disease, mortality, cancer, neurodegenerative disease, etc.

Obvious Need and Competition

- We have been issued intimidating letters from competitors to stop prosecution on diagnostics still under 101 rejections
- Commercial interest until due diligence

IMPACT ON HEALTH CARE OF AMERICANS

- Diagnostics inform treatment and drive personalized medicine
- Diagnostics improve clinical outcomes and decision making
- These innovations are the result of millions in R&D
- They represent cutting-edge applications in science and biotech—the 'useful Arts' the patent system is supposed to be promoting and securing for public use and benefit

QUESTIONS?