Patent Eligibility and Technology Management

Should You Look Outside Your U.S. Comfort Zone for Patenting Diagnostics Inventions?

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Session outline

- The current patent eligibility mess in the U.S.
- Prospects for fixing the mess
- Standard approach to academic patenting
- Alternative approaches for diagnostic inventions

Statutory Basis of Subject Matter Eligibility

35 U.S.C. § 101

- Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

35 U.S.C. § 100(b) Definitions

- The term "process" means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

Statutory Basis of Subject Matter Eligibility

Statutory subject matter "may include anything under the sun that is made by man"

- S.R. REP. NO. 82-1979 (1952), reprinted in 1952 U.S.C.C.A.N. 2394, 2399.
- Diamond v. Chakrabarty, 447 U.S. 303 (1980)

Judicial exceptions to subject matter eligibility

- laws of nature, natural phenomena, and abstract ideas

The Pendulum of Subject Matter Eligibility

1952 - Patent Act – "anything under the sun and made by man"

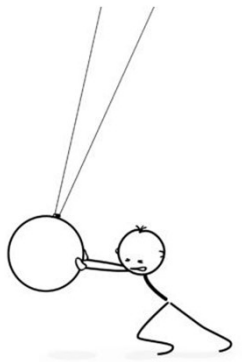
1972 - Machine or Transformation test from Gottschalk v. Benson, 409 U.S. 63 (1972)

1978 - "inventive concept in its application" from Parker v. Flook, 437 U.S. 584 (1978)

1981 - if the invention as a involves "transforming or reducing an article to a different state or thing"—it is patent-eligible, even if it includes a software component. From Diamond v. Diehr, 450 U.S. 175 (1981)

2009 – USPTO Subject Matter Eligibility Guidelines including M. or T. test

2010 – Machine or Transformation Test not only test for processes - Bilski v. Kappos, 561 U.S. 593 (2010).



The Pendulum of Subject Matter Eligibility

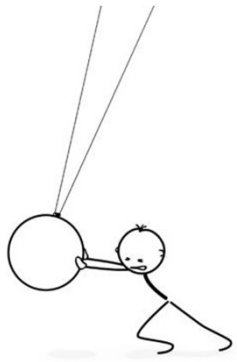
2012 – step of administering was not transformative (all it did was detect a metabolite and then performed the mental step of determining/analysis framework - from Mayo v. Prometheus, 566 U.S. 66 (2012)

2013 – merely isolating genes found in nature does not render them patentable from Association for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576 (2013)

2014 – two-part analysis framework from Alice Corp. v. CLS Bank International, 573 U.S. 208, 134 S. Ct. 2347 (2014)

2014 - In re BRCA1- and BRCA2-based Hereditary Cancer Test Patent Litigation (Myriad III; 2014) (claims only recited conventional methods for detecting a natural product (DNA))

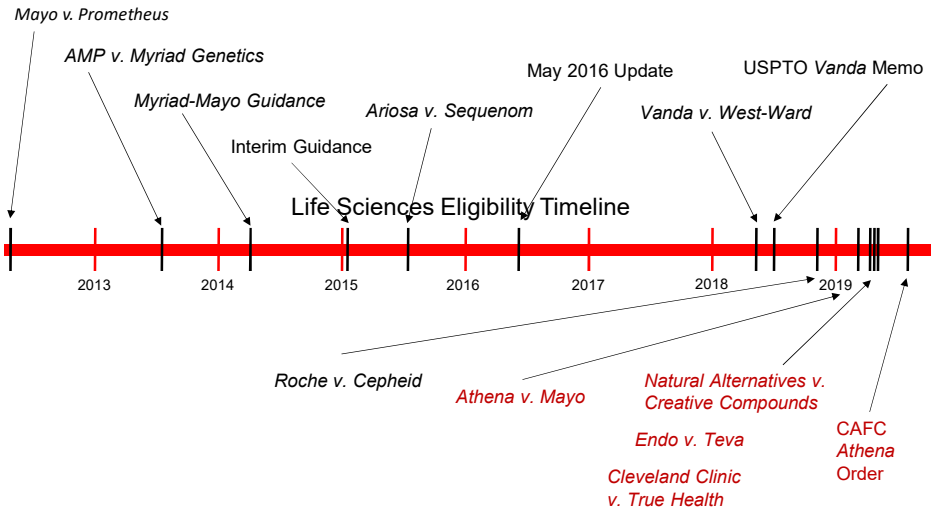
2016 - Genetic Technologies Ltd v. Merial (2016) (case dismissed under 12(b)6 for failure to state a claim-claims were directed to patent ineligible subject matter under 101-detecting variations based on the law of linkage disequilibrlium in sequences of non-coding DNA using well known conventional methods)



Diagnostic methods

- Diagnostic methods particularly vulnerable to being considered an abstract idea
- Product is almost always information (i.e., a diagnosis)
- Canonical format: "detect and infer," wherein one or more steps involve detecting something (e.g., a biomarker) and from that inferring the presence or absence of a disease
- Plus, in medical diagnostics context public policy concerns involving whether permitting patenting will inhibit practice of medicine

Life Sciences Eligibility Timeline



Decision dichotomy

Recent Diagnostic Cases:

- *Roche Molecular Systems, Inc. v. Cepheid* (Fed. Cir. 2018)
- *Athena Diagnostics, Inc. v. Mayo Collaborative Services, LLC* (Fed. Cir. 2019)
- *Cleveland Clinic Foundation v. True Health Diagnostics LLC* (Fed. Cir. 2019)

Recent Treatment Cases:

- *Vanda Pharmaceuticals v. West-Ward Pharmaceuticals* (Fed. Cir. 2018)
- *Natural Alternatives International, Inc. v. Creative Compounds, LLC* (Fed. Cir. 2019)
- *Endo Pharmaceuticals Inc. v. Teva Pharmaceuticals USA, Inc.* (Fed. Cir. 2019)

Athena: Judge O'Malley's dissent

In the wake of *Mayo*, we have painted with a broad brush, suggesting that improved diagnostic techniques are not patent eligible. *Mayo* did not go so far, and given the import of diagnostic techniques, we should reconsider this case and clarify our precedent. Because my colleagues have declined to do so, there are no more options at this court for diagnostic patents. My colleagues' refusal deflates the Amici's hopeful suggestion that our precedent leaves the eligibility of a diagnostic claim in front of the Federal Circuit "uncertain." ***It is no longer uncertain. Since Mayo, every diagnostic claim to come before this court has been held ineligible***. While we believe that such claims should be eligible for patent protection, the majority of this court has definitively concluded that the Supreme Court prevents us from so holding. No need to waste resources with additional *en banc* requests.

Patent eligible method of treatment claims

- Two ways of drafting such claims to protect diagnostic methods
  - Claim a method of treatment that recites performing the diagnostic methods as affirmative steps of the method *or*
  - Claim a method of treatment limited to patients having the diagnostic method outcome as a patient property
- Drawbacks:
  - Affirmatively reciting the diagnostic method steps raises divided infringement issues
  - Reciting the outcome of the diagnostic method step as a patient property raises inherent anticipation issues

Eligible claims: Products of nature

- Products comprising alterations (e.g., mutations, chemical reactions, changes in structure or physical form) not found in nature
- Formulations (particularly with components not found together in nature) that change properties or functional characteristics of product of nature
- Nonconventionality of other aspects of the claimed invention (microneedles used for vaccination)
- *In re Roslin*: are a *flock* of genetically identical sheep patent eligible as not occurring in nature?

*In*eligible claims: Products of nature

- The product of nature *per se* (no change)
- Combination of product of nature with other substances that do not change physical properties or other characteristics
- Relies expressly in *Funk Bros*. as rehabilitated by *Myriad*
- Is not cabined by specific facts in either case
- Glimmer of hope: Judge Moore's concurrence in *Roche v. Cepheid* where she suggests the Federal Circuit in the *BRCA1/BRCA2* case ruled on a question not before the panel

Eligible claims: methods

- ~~A detection method *per se* that does not recite a correlation that can be characterized as a law of nature~~ (contra, *Cleveland Clinic*, CAFC refuses to follow Guidance)
- A method using novel reagents (porcine, monoclonal antibodies) or methods (SNOM or cool Melt PCR)
- *Novel* treatment methods of administration to patients diagnosed using the method
- *Specific* treatment methods of administration to patients diagnosed using the method

*In*eligible claims: methods

- Diagnostic treatment methods broadly reciting a natural law (defined as the correlation between a marker and disease); in practice, ***per se* ineligible**
- Also based on mental steps of drawing the inference regarding the outcome of a diagnostic method and the diagnosis
- Higher the level of generality, the easier it is to make the rejection (alá BRCA diagnostic method claims)

October 2019 PTO Guidelines

- Helpful synthesis of current case law but not the answer
- Why? Because the PTO is constrained by judicial inconsistency
  - Mostly the fault of the Supreme Court and Federal Circuit
  - Office personnel know better but hamstrung by the courts
  - Federal Circuit's unwillingness to challenge of distinguish Supreme Court precedent is a logjam that *may* be breaking a little
  - In Sequenom the CAFC split 8:4 on rehearing panel decision affirming invalidation under Sec. 101; in Athena it was 7:5 and in American Axle it was 6:6
  - District courts have responded by following their tendencies and (to some extent) being influenced by perceived equities and politics

USPTO Subject Matter Eligibility Examples

Example 29: Diagnosing and Treating Julitis

- Claim 2. A method of diagnosing julitis in a patient, said method comprising:
  - **obtaining** a plasma sample from a human patient;
  - **detecting** whether JUL-1 is present in the plasma sample by contacting the plasma sample with an anti-JUL-1 antibody and detecting binding between JUL-1 and the antibody; and
  - **diagnosing** the patient with julitis when the presence of JUL-1 in the plasma sample is detected.

Ineligible: the obtaining and detecting steps involve a "well-understood, routine and conventional" activity and is an insignificant pre-solution activity (mere data gathering)

USPTO Subject Matter Eligibility Examples

Example 29: Diagnosing and Treating Julitis

- Claim 1. A method of diagnosing julitis in a patient, said method comprising:
  - **obtaining** a plasma sample from a human patient; and
  - **detecting** whether JUL-1 is present in the plasma sample by contacting the plasma sample with an anti-JUL-1 antibody and detecting binding between JUL-1 and the antibody.

Eligible: Does not recite an exception because did not include the "diagnosis step."

Types of Infringement

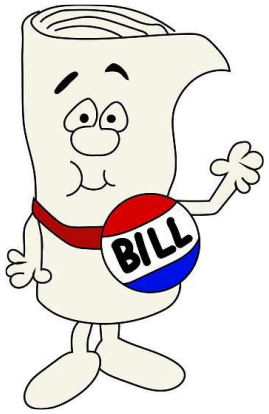
- Direct infringement under 35 U.S.C. § 271(a) requires a single entity infringing all elements/steps of the claim
  - Can have more than one actor if they are part of a joint enterprise, or their actions are attributable to one actor. *Akamai Techs., Inc. v. Limelight Networks, Inc.* (Fed. Cir. 2015)
- Contributory infringement under 35 U.S.C. § 271(c) occurs if a party sells a product for use in practicing a patented process
- Infringement is induced under 35 U.S.C. § 271(b) if a party actively encourages another party to infringe with knowledge that they are inducing patent infringement

Congress to the Rescue?

- Efforts in 2019 in the Senate included hearings with nearly 50 stakeholders (Sens. Tillis and Coons)
- Unfortunately, those efforts have stalled

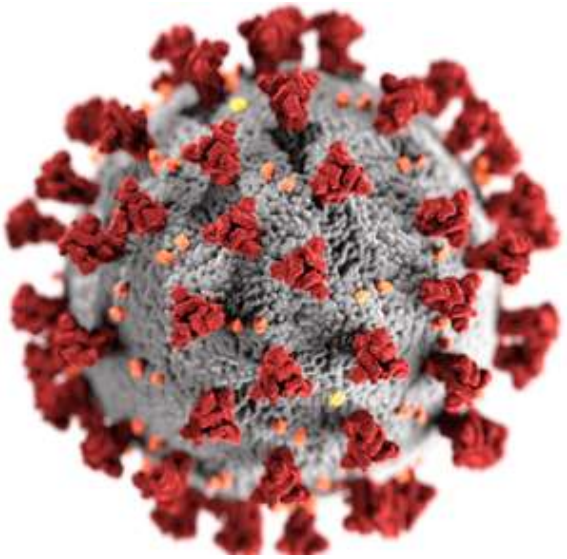
  "Finding a legitimate, politically viable compromise has been difficult [thus] efforts for a larger, comprehensive section 101 reform have stalled [and] it is unlikely we will see comprehensive patent eligibility reform anytime soon" Senator Tillis comments to BIO August 2020

- Unlikely that any bills will be advanced this year
- Unfortunately this may be the only long-term solution that would broaden protection for diagnostics.



Coronaviruses

- Family of related viruses related to virus that causes the common cold and Middle East Respiratory syndrome
- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) cause of the pandemic (COVID-19)
- Zoonotic viruses, infecting several vertebrate species
- Viral SPIKE protein binds to angiotensin I converting enzyme 2 (ACE2) expressed in lung and other tissues
- Arose in bats (most likely)
- Novel human virus, recent transfer



Patenting

- Generally patents available for vaccines
- Patentable components include
  - Virus-derived protein or peptide antigens
  - Delivery agents, including nanoparticles
  - Formulations
  - Adjuvants
- Typically not a ”natural product” because changed from native state
  - Inactivated virus (treated with heat or chemicals)
  - Protein subunits, also including fragments formulated with non-naturally occurring substances
  - Nucleic acid viruses linked to lipid or other nanoparticles

Patenting

- No publicly available patents in U.S. on COVID 19 (not 18 months post-zoonotic transfer)
- USP 10,130,701 patent to Pirbright Institute, with claims to live, attenuated coronavirus comprising a mutant replicase gene; this is a bird virus, NOT COVID
- China recently granted COVID 19 vaccine patent to CanSino Biologics for Ad5-nCoV vaccine
- Many previously conferred patents on vaccine components likely to be adapted to COVID 19 and provide ancillary (i.e., non-specific) patent protection to COVID 19 vaccine embodiments
- But likely that patents have been filed and will continue to be filed

Compulsory licensing

- COVID pandemic has increased tensions between patent holders, governments, and international organizations
- Doha Declaration provides ability for governments to impose compulsory licenses within the GATT/TRIPS and WTO frameworks for diseases like COVID 19
- Some countries, including Canada, Germany, Israel, Chile, and Ecuador have already passed compulsory licensing legislation or resolutions backing compulsory licensing with respect to any COVID-19 vaccines and therapeutics.
- Alternative: voluntary patent pooling, e.g., under UN-backed Medicines Patent Pool (MPP), which was established in 2010 to expand access to tuberculosis, HIV, and hepatitis therapeutics

U.S. Licensing

- "March in" rights under Bayh-Dole Act enable U.S. government to grant licenses based on Federally funded research
- 35 U.S. Code § 203: can require the grantee "to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances" or grant such a license itself
- Never been done and not available for products of privately funded research
- But recent history of industry out-sourcing to universities increases prospects

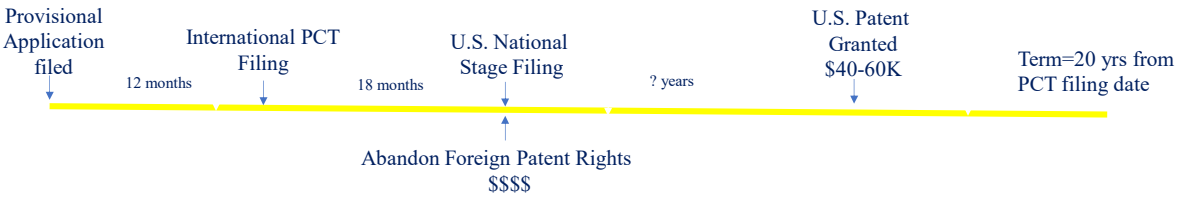
U.S. Licensing

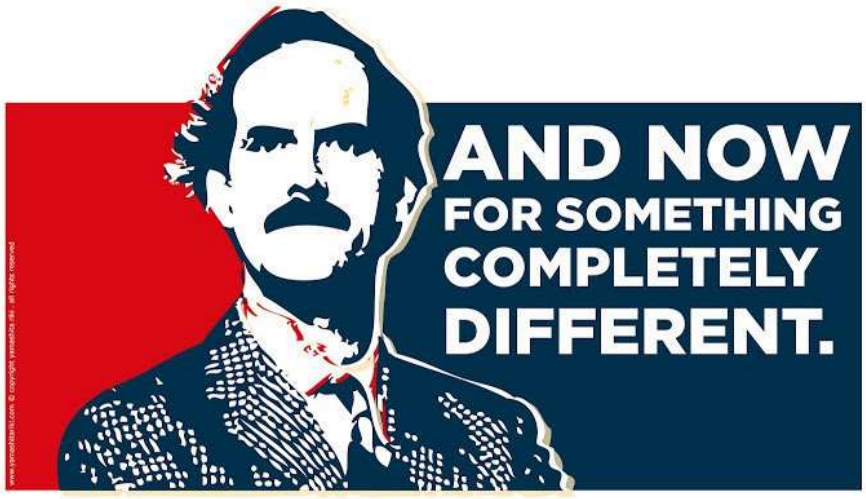
- Also reporting requirements can put patent rights at risk, requires notice of Federal funding on all patents
- Moderna challenged with non-compliance with Bayh-Dole reporting requirements
- 28 U.S. Code § 1498: statute permits the government to grant non-exclusive licenses to industry for any patent
- Compensation to patentee limited to filing in the Federal Court of Claims
- Limited to "reasonable and entire compensation for such use and manufacture"

Politics

- US (and UK) refuse to join WHO declaration that COVID vaccines and medicines should be made available globally as "a public good"
- Will not join global patent pool
- May not matter, in view of WTO and Doha declaration
- USTR Special 301 Report as a way to deter international sanctions and compulsory licensing
- Nature of pandemic may reduce effectiveness of unilateral U.S. actions to protect patents
- In U.S., state attorneys general requesting Federal government to intervene to reduce cost and assure availability and accessibility

Standard Patenting Process-No Licensee

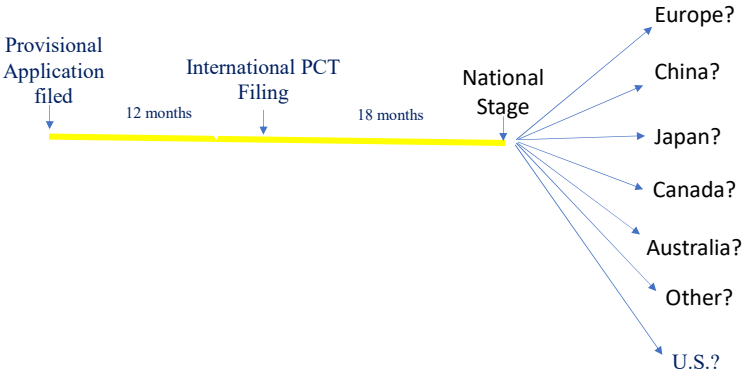




Are there better alternatives?

- Don't file
- File outside the US
- Alternative forms of protection, e.g. trade secrets and knowhow
- Alternative patent claiming, e.g. enabling devices/chemistries, companion diagnostics/treatments, kits and assays

Alternative Patenting Process-Diagnostic



Patenting Diagnostics in CHINA

- Cost: $13.5K (official + legal+translation) + $13.5K annuities= $27K
- Time: 3-5 years
- Enforcement: IPR improving within borders, but difficult without a Chinese partner
- Licensing prospects/market size:
  - China In-Vitro Diagnostics (IVD) market is likely to exceed US$ 15 Billion mark by 2025
  - CAGR ~ 6.9%
- Other factors:
  - (Wholly) Foreign entities cannot receive any human/patient related information of materials.*

Patenting Diagnostics in the EPO

- Cost: ~$18.5K – 25.2K (official + legal/translation) + ~$18K annuities= $43K
  - Variables: Selection of countries from over 40 possible states.
  - Can vary considerably ~$20K-$40K depending on states chosen.
- Time: ~5 years
  - Year 1: Entering PCT application into EP regional phase.
  - Year 2: Reporting and responding to search opinion.
  - Year 3: Reporting and responding to examination report.
  - Year 4: Reporting & responding to notice of allowance rule, filing claims translations & paying grant fees.
  - Year 5: Validation costs – depending on the EP member states selected.

Patenting Diagnostics in the EPO

- Market dynamics:
  - Projected to reach $26.6 billion by 2023. Growing at CAGR of ~4.7%.
  - Demographic trends favorable: Aging populations mean increases in incidence and prevalence of chronic diseases, advances in IVD techniques and rising healthcare expenditures contribute to growth.
    - Young people (0-14 yrs) = 15.6% of population and shrinking.
    - Older people (65 yrs +) = 19.2% of population and growing.
- Diagnostic Patent Claim Eligibility:
  - Much more favorable environment in Europe for patenting diagnostic claims.
    - No USC 101/Prometheus issue.
  - Diagnostic claims directed to the measurement of a naturally occurring metabolite/phenomenon are likely patentable in Europe if other criteria are met: novelty, inventive step, enabling disclosure.
  - Europe: ***Useful applications*** of naturally occurring phenomena are generally patentable.

Patenting Diagnostics in the EPO

- Example of a potentially allowable diagnostics claim:
  - A method of predicting therapeutic efficacy of drug A in a patient with disease B, comprising determining the level of biomarker C, and determining that the patient may respond if biomarker C level is above _____.
    - Source: Pat Campbell (JA Kemp).
- Diagnostic Patent Claim Ineligibility:
  - Two-part test: Diagnostic patent claims can be ruled to be patent ineligible in Europe if:
  - The claimed method includes all steps necessary to reach a diagnosis; and
  - The method must be practiced on a human or animal body (all steps).
    - All of the technical steps require the presence of a human or animal body.
    - If some steps carried out on a sample or *in-vitro*, then method may be eligible.
    - Generally not a significant barrier to diagnostic claim patentability.

Patenting Diagnostics in JAPAN

- Cost: $22K (official + legal+translation) + $14K annuities= $36K
- Time: 3-6 years
- Enforcement: fairly mature patent system conducive to enforcement of rights
- Licensing prospects/market size:
  - The Japanese In Vitro Diagnostics market is expected to surpass US$4.3 Billion by the end of year 2024
  - CAGR ~4.5%
- Other factors:
  - Japan has highest proportion of aging population globally

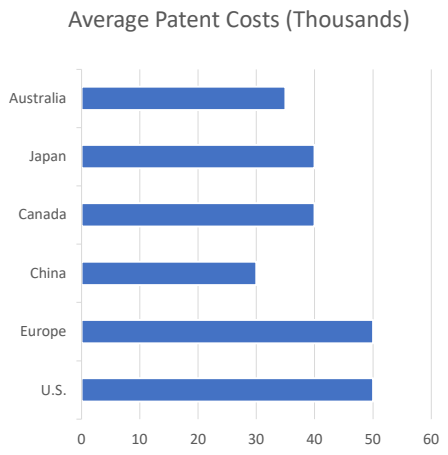
Patenting Diagnostics in AUSTRALIA

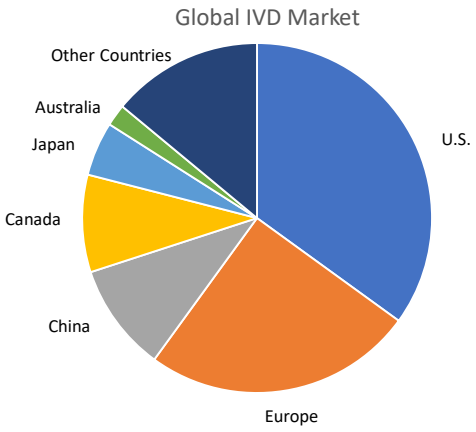
- Cost: $10K (official + legal) + $22K annuities= $32K
- Time: 1-5 years
- Market size: 2% of global IVD market ($2B/yr)
- Other factors:
  - Examination not rigorous
  - Sequenom's patent for detecting fetal DNA in maternal blood samples upheld by Australia's federal court June 27, 2019

Patenting Diagnostics in CANADA

- Cost: $15K (official + legal) + $24K annuities= $39K
- Time: 3 years from examination request (can delay for 5 years)
- Market size: 9% of global IVD market ($9B/yr)
- Other factors:
  - ***Similar to U.S.-likely to be considered non-patentable subject matter***

Country Comparison





What Criteria to use to Determine Commercial Value?

PRODUCT

- Is this a clinical support tool?
- What is the standard of care/ current disease modality?
- How does our diagnostic change clinical practice?
- Who pays for the test? Reimbursement profile?

PLAN

- What is the value proposition for stakeholder?
- Is the diagnostic associated with a 'hot' therapeutic area?
- Deep dive vs broad access, the non-exclusive or exclusive licensing approach?

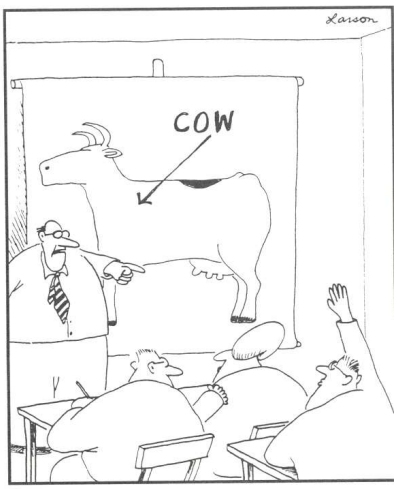
TRADE SECRECY INSTEAD OF PATENT PROTECTION

TRADE SECRECY

- If patent protection is unavailable, inventors sometimes opt to protect aspects of inventions (*e.g.*, data, know how) with trade secrecy
  - Requirements are (1) secrecy, (2) reasonable efforts, (3) value, and (4) misappropriation
  - State laws, which are influenced by the *Uniform Trade Secrets Act* ("UTSA")
  - Federal law, especially the *Defend Trade Secrets Act* ("DTSA")(18 U.S.C. §1836, *et seq.*)
    - Claims usually pursued in parallel with state trade secrecy claims

IN PRACTICE

- State trade secrecy laws vary, rendering protection of trade secrets somewhat unpredictable
- DTSA has introduced uniformity into trade secrecy law
  - *Dalmatia Import Group, Inc. v. FoodMatch Inc. et al.* (E.D. Pa. 2017)
    - Awarded $500 000 for misappropriation of secret fig jam recipe (cf. protein folding, genetic data)
- Despite its loss in the Supreme Court, Myriad Genetics' secret patient data is very valuable



"Yes … I believe there's a question there in the back."