
David Raczkowski, Ken Jenkins, and Allison Dobson

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35 U.S. Code § 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.
101 exceptions

Natural Principle

Equation, Product of Nature, Abstract idea

Neilson (1841) Morse (1853),

Practical Application

Benson (1972), Diehr (1981), Alice (2013-?)

Pre-emption

Funk (1948), Flook (1978)

Bilski (2010), Mayo (2012), Myriad (2013)

Inventive Application

More Restrictive
Practical Application

• **Test:** Is the invention a product or process that uses the natural principle?
  – Neilson: Uses a heater to heat air for blast furnace.

• **Policy:** Do not want to provide exclusive right over subject matter for which the public obtains no benefit.
  – Morse (telegraph): Does not describe every way of using electricity for communication.

• **Solution:** Have claim scope commensurate with practical use of natural principle.
Pre-emption

- **Test**: Does the claim preclude all useful applications of the natural principle?
  - Field of Use (Not all but still viewed as pre-emption – Diehr)
  - Use of Computer (only practical application is on computer – Benson)

- **Policy**: Otherwise would allow patent on Natural Principle (Benson) and do not want to foreclose further innovation (Mayo).
  - If only one useful application, then would not seem to foreclose further innovation

- **Solution**: Describe novel alternatives and put into different claim sets, and describe prior art alternatives
• **Test:** Is the application of the natural principle inventive?
  – Assume natural principle is Prior Art and then analyze claim under novelty/obviousness. (Funk and Flook)
  – Does this conflate 101 with 102/103?

• **Policy:** Discovery should not result in patent protection, only invention.
  – Is this in plain contradiction with statute (“*invents or discovers*”) and constitution (“*exclusive right to their respective writings and discoveries*”)?
  – Does this discourage innovation?

• **Solution:** None, or narrow claims to make routine steps specific to particular natural principle.
**Natural Principle:** Correlation of concentration of drug in blood to amount of dose of drug.
- Two active steps: Administering drug and determining level
- Suitable range in “wherein” clause for increase/decrease dosage

**Test:** After removing suitable range, active steps are “well-understood, routine, conventional activity.”
- Pre-emption: “Routine” should be interpreted as necessary, so coextensive with natural principle
- Inventive Application: Additional limitations must be inventive

**Solution:** Depends on test being used
- Pre-emption – add steps of using range, as other ranges are alternatives
- Inventive Application – Add inventive limitations
Citing to Neilson: “The English court concluded that the claimed process did more than simply instruct users to use the principle that hot air promotes ignition better than cold air, since it explained how the principle could be implemented in an inventive way.”

Neilson:
- Practical application is heating air before furnace
- Techniques to heat the air were well known, and thus is enabled.

Nowhere in Neilson (or Morse) was there any analysis that assumed the principle would be considered prior art and that additional limitation needed to be inventive.
Abstract Idea: An escrow service that prevents a transaction from being conducted if a party does not have sufficient funds for the transaction.

Rejected Inventive Test

Preemption Test: Are the additional limitations necessary?

- Method claim: Yes, because any method for performing escrow would need to use a “shadow credit record” and a “shadow debit record.”

- System Claim:
  - Rader: Can do method on paper/pen, and computer is not required (Strict pre-emption)
  - Lourie: Computer is required. (Fuzzy pre-emption)
Natural Phenomenon used: The presence of paternally inherited nucleic acid of fetal origin in a serum or plasma sample from a pregnant female.

   ➢ Alternative: The presence of fetal DNA in maternal blood (not specifically paternally inherited DNA).

Analysis: Alluded to pre-emption and Inventive Application

   ➢ (1) Preemption: Alternatives to amplification are not commercially viable (is commercial viability a proper requirement?).
   ➢ (2) Inventive Application: Amplification step is well-known

Ruling: (Inventive Application) “Therefore, looking at the claimed processes as a whole, the only inventive component of the processes in the '540 patent is to apply those well-understood, routine processes to paternally inherited cffDNA, a natural phenomenon.”

   ➢ Clear violation with Alice Corp. interpretation of Mayo
Software Approaches

- **Add Computer:** For now, this works in most art units, with potential problems in bioinformatics art units.

- **Draft multiple independent claims:** Highlights that there are different ways to perform method, so as to avoid pre-emption
  - Invites restriction, but better than nothing

- **Greater detail/clarity:** If invention is in steps by computer then these steps are distinguishable over prior art, and thus also satisfy 101 under pre-emption or inventive application.
ACLU challenged Myriad’s patents covering the BRCA1 and BRCA2 technology, arguing:

- patents gave Myriad an improper monopoly over the genes, which stifled research that could lead to cures and limited women’s option to obtain a second opinion and control their medical care
- the subject matter of the claims (isolated genes, synthetic “man-made” genes, gene fragments and methods of using them) should not be patented because they do not claim patentable subject matter under §101

Myriad argued:

- isolated DNA is not the same as DNA as it exists in the body
  - The difference in the structural and functional properties of isolated DNA rendered its claims patent-eligible
- basic research has not been impeded by its patents
- the USPTO has been issuing patents on isolated DNA for almost 30 years
- the patented technology has improved individualized patient care
The Southern District Court of New York (Judge Sweet)
- ruled that all the challenged claims were not patent eligible under §101

Myriad appealed to the Court of Appeals for the Federal Circuit
- overturned the previous decision in part, ruling that isolated DNA which does not exist alone in nature can be patented and that the drug screening claims were valid
- confirmed the previous decision in part, finding the diagnostic claims unpatentable for reciting mental steps only

The plaintiffs appealed to the Supreme Court (product claims only)
- granted certiorari and remanded the case to the Federal Circuit to review in light of Mayo v. Prometheus

The Federal Circuit did not change its opinion

June 13, 2013, the Supreme Court decided the case
The Court held that the isolated genomic DNA was not patent-eligible, but that the cDNA was patent-eligible.

- Isolated genomic DNA: finding the location of the genes and isolating the DNA from the human genome does not make the isolated DNA a new composition.
  - Even if isolating DNA severs chemical bonds and creates a non-naturally occurring molecule, the claims focus on the genetic information encoded in the genetic sequence, which is naturally occurring.

- cDNA: not naturally occurring.
  - Even if the nucleotide sequence of cDNA is dictated by nature, a lab technician creates something new when removing introns.
  - However, if a DNA sequence is short enough to lack introns, the resulting cDNA sequence might not be patent-eligible.
Association for Molecular Pathology v. Myriad Genetics – Aftermath (Round 2)

- On July 9 and 10, 2013, Myriad sued Ambry Genetics Corporation and Gene-by-Gene Ltd., alleging the BRCA testing offered by each infringed BRCA patents held by Myriad
- Myriad filed suit against four more defendants
- Three Declaratory Judgment Actions have been filed, alleging non-infringement and asking for invalidation of Myriad’s BRCA patents
- Summary of Cases:

<table>
<thead>
<tr>
<th>Company</th>
<th>Infringement Action Filed by Myriad</th>
<th>Declaratory Judgment Action Filed</th>
<th>Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambry</td>
<td>July 9, 2013 - Utah</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Gene-by-Gene*</td>
<td>July 10, 2013 - Utah</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Cousyly</td>
<td></td>
<td>September 20, 2013 – N.D. Calif.</td>
<td>8</td>
</tr>
<tr>
<td>GeneDX</td>
<td>October 16, 2013 - Utah</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Quest</td>
<td>October 22, 2013 - Utah</td>
<td>October 10, 2013 – C.D. Calif.</td>
<td>14</td>
</tr>
<tr>
<td>Invitae</td>
<td>November 25, 2013 - Utah</td>
<td>November 26, 2013 – N.D. Calif.</td>
<td>11</td>
</tr>
<tr>
<td>LabCorp</td>
<td>December 3, 2013 - Utah</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>
Allegations by Myriad focused on primer claims and diagnostic method claims

Exemplary claims

From asserted U.S. Patent No. 5,747,282:

- 16. A pair of single-stranded DNA primers for determination of a nucleotide sequence of a BRCA1 gene by a polymerase chain reaction, the sequence of said primers being derived from human chromosome 17q, wherein the use of said primers in a polymerase chain reaction results in the synthesis of DNA having all or part of the sequence of the BRCA1 gene.

  However, in Myriad, the Supreme Court noted:
  “cDNA is not a ‘product of nature’ and is patent eligible under §101, except insofar as very short series of DNA may have no intervening introns to remove when creating cDNA. In that situation, a short strand of DNA may be indistinguishable from natural DNA.”

From asserted U.S. Patent No. 5,753,441:

- 6. A method for detecting a germline alteration in a BRCA1 gene, said alteration selected from the group consisting of the alterations set forth in Tables 12A, 14, 18 or 19 …wherein a germline alteration is detected by amplifying all or part of a BRCA1 gene in said sample using a set of primers specific for a wild-type BRCA1 gene to produce amplified BRCA1 nucleic acids and sequencing the amplified BRCA1 nucleic acids.

  The asserted method claims rely on “amplifying” and/or “sequencing” – more than abstract mental activity required, in contrast to the Mayo claims and the Myriad method claims invalidated by the Federal Circuit.
Multi-District Litigation Panel ordered consolidation February 25, 2014

Judge Shelby (District of Utah) denied Myriad’s 8 month-old motion for preliminary injunction on March 10, 2014

106-page order says “Defendant has raised a substantial question concerning whether Plaintiffs’ Primer and Method Claims are directed toward patent eligible products of nature and abstract ideas under 35 U.S.C. § 101.” (Myriad was unable to establish likelihood of success on the merits)

Appealed to Federal Circuit on March 13, 2014

Myriad moved to expedite appeal; Federal Circuit denied

Myriad filed 612-page Appeal Brief on April 18, 2014
Mayo-Myriad USPTO Guidance Slides

1. Is the claim directed to one of the four statutory categories, i.e., a process, machine, manufacture, or composition of matter?

   YES

   2. Does the claim recite or involve judicial exception(s)?

      Judicial exceptions include: abstract ideas*, laws of nature/natural principles, natural phenomena, and natural products.

      MAYBE (or YES)

      *If the claim recites or involves an abstract idea (either alone or in combination with other judicial exceptions), use MPEP 2106(I) to analyze the claim for eligibility.

      YES

      3. Does the claim as a whole recite something significantly different than the judicial exception(s)?

         CLAIM QUALIFIES AS ELIGIBLE SUBJECT MATTER

         NO

         REJECT CLAIM UNDER 35 U.S.C. 101 AS DRAWN TO INELIGIBLE SUBJECT MATTER
• Eligibility requires more than the “hand of man”.
  – To be eligible, claimed product must be both non-naturally occurring and markedly different from naturally occurring products.

• Do not make conclusory judgments based on the mere recitation of particular words in the claim.
  - E.g., words such as “cDNA”, “composition”, “isolated”, “primer”, “purified”, “recombinant”, “synthetic”, and “vector”.
  - These words may reflect “hand of man” but are not necessarily determinative of eligibility.
Focus is on whether the claim as a whole recites something **significantly different** than a judicial exception (e.g., natural product or law of nature).

“Significantly Different” addresses two pathways to eligibility:

1. Product claim involving or reciting a natural product includes features or steps demonstrating a **marked difference** from what exists in nature; or
2. Claim involving or reciting a judicial exception must also recite meaningful limitations that **add something of significance** to the judicial exception.
Factors that weigh toward eligibility (significantly different)

a) Product claim recites something that initially appears to be a natural product, but after analysis is determined to be non-naturally occurring and markedly different in structure from naturally occurring products.

Claim recites elements/steps in addition to the judicial exception(s) that:

b) Impose meaningful limits on the claim scope.
c) Relate to the judicial exception(s) in a significant way, e.g., they are more than insignificant extra-solution activity.
d) Do more than describe the judicial exception(s) with general instructions to apply/use it.
e) Include a particular machine or particular transformation, which implements or integrates the judicial exception(s).
f) Add a feature that is more than well-understood, purely conventional or routine.

Factors that weigh against eligibility (not significantly different)

g) Product claim recites something that appears to be a natural product that is not markedly different in structure from naturally occurring products.

Claim recites elements/steps in addition to the judicial exception(s) that:

h) Are recited at a high level of generality.
i) Must be used/taken by others to apply the judicial exception(s).
j) Are well-understood, purely conventional or routine.
k) Are insignificant extra-solution activity, e.g., are merely appended to the judicial exception(s).
l) Amount to nothing more than a mere field of use.
• Diagnostic Claim:

1. A method of determining whether a human subject has or is at risk of developing Disease X comprising:

   detecting a level/presence of Biomarker Y in a biological sample from said human subject,

   wherein an increase/decrease/presence of Biomarker Y indicates said human subject has or is at risk of developing Disease X.

• Claim 1 Rejected under 35 USC §101:

  – Claim 1 merely informs the relevant audience about a certain law of nature; the relationship between Disease X and Biomarker Y.
  – The additional step of detecting is well-understood, routine and conventional, particularly where Biomarker Y is already known.
  – To overcome *Prometheus*, one must do more that state the law of nature and add the words “apply it.”
Amendment in Response to Rejection

1. A method of [[determining whether]] detecting a level/presence of Biomarker Y in a human subject [[has or is at risk of developing]] with Disease X comprising:

   detecting a level/presence of Biomarker Y in a biological sample from said human subject [[,]] with Disease X

   [[wherein an increase/decrease/presence of Biomarker Y indicates said human subject has or is at risk of developing Disease X]].

Claim 1 Rejected under 35 USC §101 withdrawn.

Claim 1 Rejected under 35 USC §103:

- Biomarker Y is generally known in the art.
- Obvious to detect level/presence of Biomarker Y in any subject, including a human subject with Disease X
Response to Obviousness Rejection

- Prior art fails to teach that Biomarker Y is associated with Disease X.
- Therefore, a person having ordinary skill in the art could not reasonably expect to successfully detect a level/presence of Biomarker Y in a biological sample from a human subject with Disease X.

Uncertainty in Law

- Validity of Allowed Claim
- Breadth/Interpretation of Allowed Claim
- Applications should be drafted with a variety of drafting strategies
(1) A kit comprising:
   (a) a Biomarker Y binding agent [e.g. a PCR primer or Antibody] capable of binding to a substance within a biological sample from a human subject with Disease Y, said substance selected from:
      (i) a genetic variant Biomarker Y gene;
      (ii) a Biomarker Y RNA expressed from said Biomarker Y gene; or
      (iii) a Biomarker Y protein expressed from said Biomarker Y gene,
   and
   (b) a detecting reagent or a detecting apparatus capable of indicating binding of said Biomarker Y binding agent to said substance.
Alternative Claiming Strategies

(2) A complex \textit{in vitro} comprising a nucleic acid probe hybridized to a genetic variant Biomarker Y gene sequence, wherein said genetic variant Biomarker Y gene sequence is extracted from a human subject with Disease X or is an amplification product of a nucleic acid extracted from a human subject with Disease X.

(3) A complex \textit{in vitro} comprising a thermally stable polymerase [e.g. a Taq polymerase] bound to a nucleic acid, said nucleic acid comprising a genetic variant Biomarker Y gene sequence, wherein said nucleic acid is extracted from a human subject with Disease X or is an amplification product of a nucleic acid extracted from a human subject with Disease X.

(4) A complex \textit{in vitro} comprising a Biomarker Y binding agent bound to a Biomarker Y protein, wherein said Biomarker Y protein is extracted from a human subject with Disease X.
Alternative Claiming Strategies

• Addition of a specific, non-routine detection step or machine (e.g. *in vivo* magnetic resonance spectroscopy, immunoassay with specific antibody)

• Addition of a Method of Treatment Step
  – Unlikely to succeed by merely adding a generic treatment step.
  – More likely to succeed if the treatment step is specific and not routine.

• Method of Screening for Small Molecule Modulators
  – Difficult to Enforce and Collect Damages.
Advice for Protecting Inventions in a Patent Applications Hostile World

• Consider alternative, creative claiming strategies (specific patient populations, kits, in vitro complexes, post-solution therapeutic treatments)

• Openly, patiently explore ideas with Examiner, SPE and §101 Specialist

• Law and policy is in flux, continue to assess risk of non-patentability or invalidity and apply resources accordingly
Thank you!