

# Genetic Testing in Toxic Tort and Personal Injury Litigation

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# Two Important Gaps in Litigating Toxic Injuries

- **Current Approach:**
  - All individuals treated alike (uniform population)
- **Problem:**
  - People differ significantly in their response to toxic substances
- **Genomics Contribution:**
  - Identify genetic polymorphisms affecting susceptibility to toxics (genotype)
- **Current Approach:**
  - Rely on clinical disease to evaluate human toxicity
- **Problem:**
  - Need earlier, more sensitive, and more specific marker of toxicity
- **Genomics Contribution:**
  - Evaluate genetic biomarkers of exposure, toxic responses, and disease in cells (somatic)

# Genetics Can Be Used by Defendants or Plaintiffs

## Examples of Use by Plaintiffs

- Prove/quantify exposure
- Increased risk
- Heightened duty (“Eggshell skull”)
- General causation
- Specific causation
- Duty to warn
- Medical monitoring

## Examples of Use by Defendants

- Demonstrate no exposure
- No increased risk
- Idiosyncratic Response
- No general causation
- No specific causation
- Alternative causation
- Oppose class certification
- Damages (shortened longevity)

### Legend:

**Somatic Genetic Biomarkers**

**Genotype Mutations**

**Either**

# Example: Genetic Biomarkers of Causation--Benzene/Leukemia

- A number of cases where parties argue that specific chromosomal aberration is probative of benzene-caused leukemia
  - e.g., translocations between chromosomes 5 and 7 in acute myleogenous leukemia (AML) from benzene
  - e.g., translocations between chromosome 15 and 17 in acute promyelocytic leukemia (APL) from benzene
- Presence or absence of such translocations can be used by plaintiffs or defendants to argue for/against specific causation

# Benzene Biomarkers: Plaintiff v. Defendant

Proponent	Successful	Unsuccessful	% Success
Plaintiff	4	4	50%
Defendant	5	4	56%
All	9	8	53%

# Accessing Genomic Information in Litigation

- Should a defendant be able to take genetic discovery of a plaintiff (and their family)? With what limitations?
  - Recognizing that plaintiffs will use their genetic info when it is helpful to their case
- FRCP 35(a):
  - “ (1) In General. The court where the action is pending may order a party whose mental or physical condition—including blood group—is in controversy to submit to a physical or mental examination by a suitably licensed or certified examiner. The court has the same authority to order a party to produce for examination a person who is in its custody or under its legal control.
  - (2) Motion and Notice; Contents of the Order. The order:
    - (A) may be made only on motion for good cause and on notice to all parties and the person to be examined; and
    - (B) must specify the time, place, manner, conditions, and scope of the examination, as well as the person or persons who will perform it.”

# Different Types of Genetic Information

- Chromosomal aberrations
- Mutation profiling
- Gene expression
- Cancer susceptibility genes
- Gene Panels
- Whole exome sequencing
- Whole genome sequencing
- Epigenetic changes

**Somatic Genetic Biomarkers**

**Genotype Mutations**

# Genetic Testing of Plaintiffs

- Defendant successfully sought genetic testing of BAP-1 mutation in mesothelioma plaintiff.
  - *Bergstrom v. 84 Lumber, et al*, Circuit Court for the City of St. Louis, State of Missouri (22 Circ.), Case No. 1322-CC09325 (2014)
- U.S. successfully sought Rule 35 right to draw blood from minor plaintiff to conduct 19 genetic tests; but court denied defendant permission to genetically test plaintiff's mother
  - *Cutting v. United States*, 2008 WL 5064267 (D. Colo., Nov. 24, 2008)
- Court denies defendant's request to conduct whole exome sequencing of plaintiff as too expansive and intrusive
  - *Fisher for XSF v. Winding Waters Clinic, PC*, 2017 WL 574383 (D. Or.)
- Court overturns contrary magistrate judge decision and orders WES of plaintiff over plaintiff's objection
  - *Burt v. Winona Health*, 2018 WL 3647230 (D. Minn).

**ACMG STATEMENT**

# ACMG SF v3.0 list for reporting of secondary findings in clinical exome and genome sequencing: a policy statement of the American College of Medical Genetics and Genomics (ACMG)

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*Genetics in Medicine* \_#####\_; <https://doi.org/10.1038/s41436-021-01172-3>  
D.T. Miller et al.

**Table 1.** ACMG SF v3.0 gene and associated phenotypes recommended for return as secondary findings from clinical exome and genome sequencing.

Phenotype	ACMG SF list version	MIM disorder	Gene	Inheritance	Variants to report <sup>a</sup>
<b>Genes related to cancer phenotypes</b>					
Familial adenomatous polyposis	1.0	175100	<i>APC</i>	AD	All P and LP
Familial medullary thyroid cancer	1.0	155240	<i>RET</i> <sup>b</sup>	AD	All P and LP
Hereditary breast and/or ovarian cancer	1.0	604370	<i>BRCA1</i>	AD	All P and LP
	1.0	612555	<i>BRCA2</i>		
	3.0	114480	<i>PALB2</i>		
Hereditary paraganglioma–pheochromocytoma syndrome	1.0	168000	<i>SDHD</i>	AD	All P and LP
	1.0	601650	<i>SDHAF2</i>		
	1.0	605373	<i>SDHC</i>		
	1.0	115310	<i>SDHB</i>		
	3.0	171300	<i>MAX</i>		
	3.0	171300	<i>TMEM127</i>		
Juvenile polyposis syndrome	2.0	174900	<i>BMPR1A</i>	AD	All P and LP
	2.0	175050	<i>SMAD4</i> <sup>c</sup>		
Li–Fraumeni syndrome	1.0	151623	<i>TP53</i>	AD	All P and LP
Lynch syndrome	1.0	609310	<i>MLH1</i>	AD	All P and LP
	1.0	120435	<i>MSH2</i>		
	1.0	614350	<i>MSH6</i>		
	1.0	614337	<i>PMS2</i>		

# Secondary Findings in Litigation-Related WGS/WES

- Are ACMG list of gene variants examined?
- Are these results reported to plaintiff?  
Parties?
- Who explains results to plaintiff?
  - No physician-patient relationship in litigation context
  - Anecdotal reports:
    - Judge performs genetic counseling
    - Lab director flies to plaintiff on own dime

# Additional Questions re Compelled Genetic Testing of Plaintiffs

- Plaintiffs' right not to know?
- Does plaintiffs counsel have duty to warn plaintiff of possibility of genetic testing before filing case?
- Can protective orders adequately protect privacy of genetic information?
- What constitutes "good cause" for genetic testing or sequencing?
- What happens when plaintiff has already obtained genetic testing (23andme; WGS/WES)?

# Backup Slides – some examples

# Susceptibility Genes: Alternative Causation

- Defendants allege that genetics is alternative cause of plaintiff's illness
- *E.g., Severson v. KTI Chemical*
  - Pregnant mother occupationally exposed to solvent (MEK) had severely retarded child
  - Defendant chemical supplier argued that child suffered from Fragile X syndrome
  - Court ordered genetic testing of child

# *BAP1* in Litigation

- At least 5 cases currently pending where defendant seeking to test mesothelioma plaintiff for *BAP1* mutation
- Arguments by defendant:
  - *BAP1* was alternative cause of mesothelioma
  - *BAP1* plaintiff was unusually susceptible – “idiosyncratic response” doctrine
- Potential argument by plaintiffs:
  - *BAP-1* plaintiff unusually susceptible – may still be causation even if no doubling of risk in general population

# Susceptibility Genes: Damages

- Tammy Adacsi injured in house fire in Canada in 2009, sued landlord for negligence
- Defense claimed Adacsi at risk for HD, may affect calculation of damages
- In 2013 opinion, Alberta Court of Appeals orders her to get genetic test for HD or drop lawsuit
  - “If the blood test shows [HD] to be a live possibility, it may indeed be relevant to assessing damages. Since the appellant has chosen to sue for damages, she cannot deprive the respondents from acquiring evidence that may assist in their defense.”

# Biomarkers of Effect: Specific Causation

- *Tompkin v. American Tobacco*, 2001 WL 36113663 (N.D. Ohio 2001)
  - Plaintiff smoker had adenocarcinoma; claimed smoking caused his tumor
  - Court upholds key evidence – plaintiff's expert testified that deletions in 3 specific chromosome regions involving tumor suppressor genes
    - Data suggested that each of these deletions is more common in smokers with than non-smokers with adenocarcinoma

# Biomarkers of Effect: Alternative Causation

- Plaintiff claimed her thyroid cancer was caused by exposure to naturally occurring radioactive material (NORM) disrupted by defendant's operations
- Defense expert used gene expression profiling to demonstrate that tumor was sporadic rather than radiation-induced
  - *Guzman v. Exxon* (LA. 2015)