



Science, Technology, and the Law

Contra Costa County Bar Association

MCLE Webinar

November 18, 2022

Hon. Ming W. Chin (ret.)





Berry v. Chaplin (1946) 74 Cal.App.2d 652

James Watson and Francis Crick



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The background of the slide is a dark blue gradient. On the left side, there is a large, curved white shape that separates a dark blue area from a lighter blue area. In the dark blue area, there is a dense, colorful pattern of vertical lines in shades of green, blue, and purple, resembling a DNA sequence or a gel electrophoresis result. In the lighter blue area, there are several thick, dark blue, wavy lines that flow from the bottom left towards the right.

DNA Sequencing

Impetus: Human Genome Project



3 billion basepairs

1990: Start

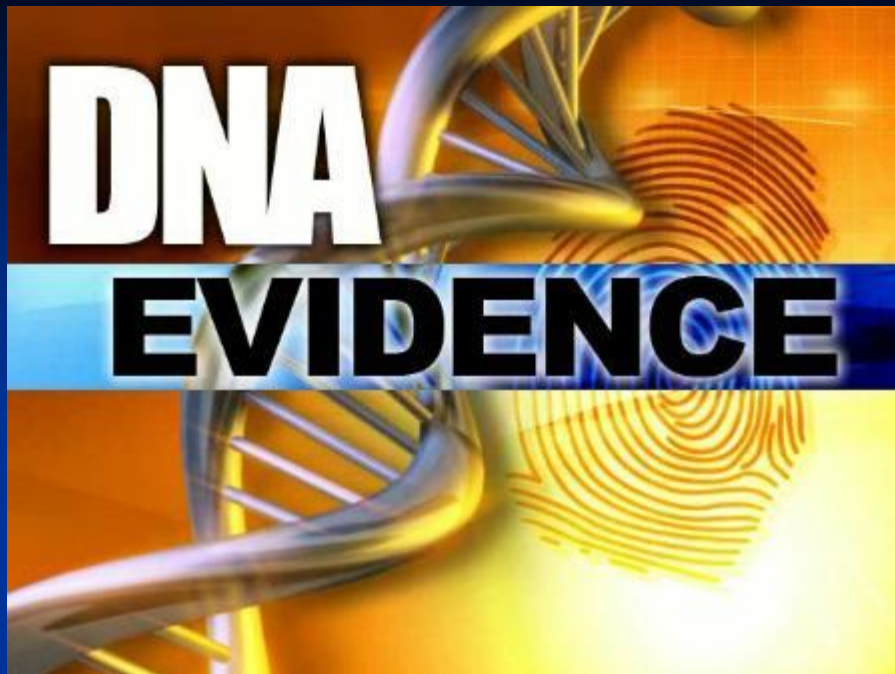
2001: Draft

2003: Finished

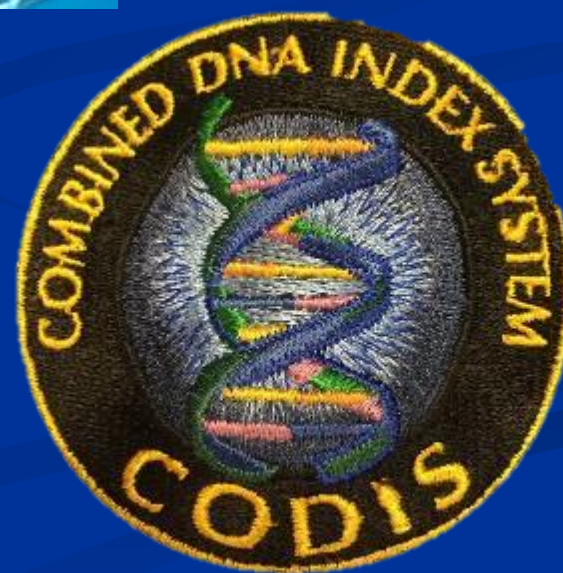
President's Council of Advisors on Science And Technology (PCAST)

The only way to establish the scientific validity and degree of reliability of a subjective forensic feature-comparison method—that is, one involving significant human judgment—is to test it empirically by seeing how often examiners actually get the right answer.

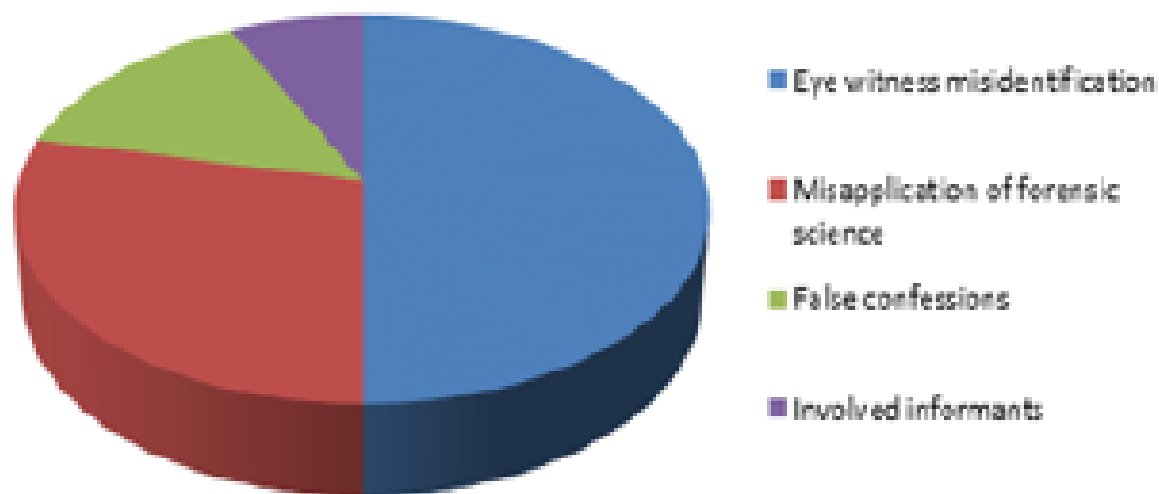




NATIONAL DNA DATABASES



Reasons for conviction of the innocent



[This Photo](#)

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Graph 1: Shows the reasons why innocents were convicted when the case was taken up first (total cases = 358).

Complaint by DNA Profile

STATE OF WISCONSIN,

Plaintiff,

v.

DOE, JOHN,
Unknown Male with Matching
Deoxyribonucleic Acid (DNA)
Profile at Genetic Locations
D3S1358 (15, 18), TH01 (6, 9.3),
D21S11 (29, 31.2), D18S51 (13, 15),
Penta E (12), D5S818 (11, 13),
D13S317 (11, 14), D7S820 (10, 11),
D16S539 (13, 14), CSF1PO (11, 12),
Penta D (9, 12), Amelogenin (X,Y),
vWA (17), D8S1179 (12, 13),
TPOX (9, 11), and FGA (22, 22.2),

Defendant.



Cold Hit *defined*:

“A hit occurs when DNA analysis of a crime scene sample with no suspect matches a profile in a database of previously convicted offenders, a database of samples from those individuals arrested for specified crimes, or a database of other crime scene profiles.”

Scenario

In a rape trial, an expert testifies that DNA from a rape kit matches D. A random sample would show 1 out of a million people would match the DNA. The DA argues that means there is a 1:1,000,000 chance D is innocent.

True or False?

“Prosecutor’s Fallacy”

False. If D is actually innocent, there would be a 1:327,000,000 (approximate population of the U.S.) chance of getting a match.

Scenario

- In a city of 10 million people, any one person has a 1:10 chance of matching DNA characteristics. Defense argues, “There is only a 10% chance of D being guilty and a 90% chance of D being innocent.” The DA objects.
- **Sustain or Overrule?**

“Defense Fallacy”

Sustain. Defense argument does not consider all the other evidence, such as an eyewitness, trace evidence, CCTV footage, an admission, etc.

The Confrontation Clause

- The Confrontation Clause of the Sixth Amendment to the Constitution of the United States guarantees the defendant in a criminal case the right “to be confronted with the witnesses against him.”



Williams
v. Illinois
(2012) 567
U.S. 50

Plurality
Opinion

“Even if the Cellmark report had been introduced for its truth, . . . there was no Confrontation Clause violation. The Confrontation Clause refers to testimony by ‘witnesses against’ an accused. . . . [T]he Cellmark report’s primary purpose was to catch a dangerous rapist who was still at large, not to obtain evidence for use against petitioner, who was neither in custody nor under suspicion at that time. Nor could anyone at Cellmark possibly know that the profile would inculcate petitioner. There was thus no ‘prospect of fabrication’ and no incentive to produce anything other than a scientifically sound and reliable profile.”

Justice Alito (w/ Roberts, Kennedy, Breyer)

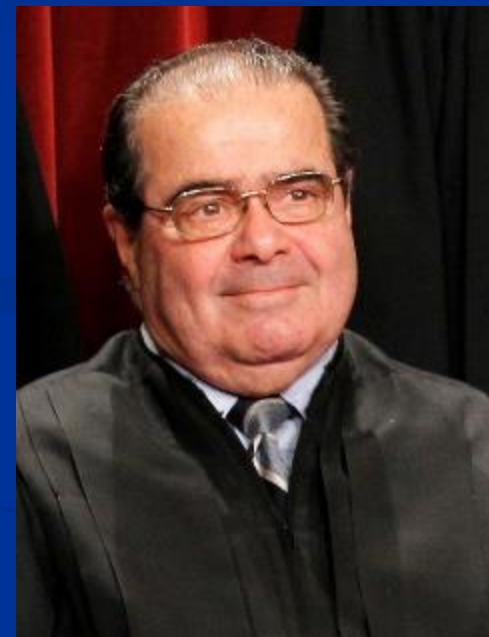
*Williams v.
Illinois*
(2012) 567
U.S. 50

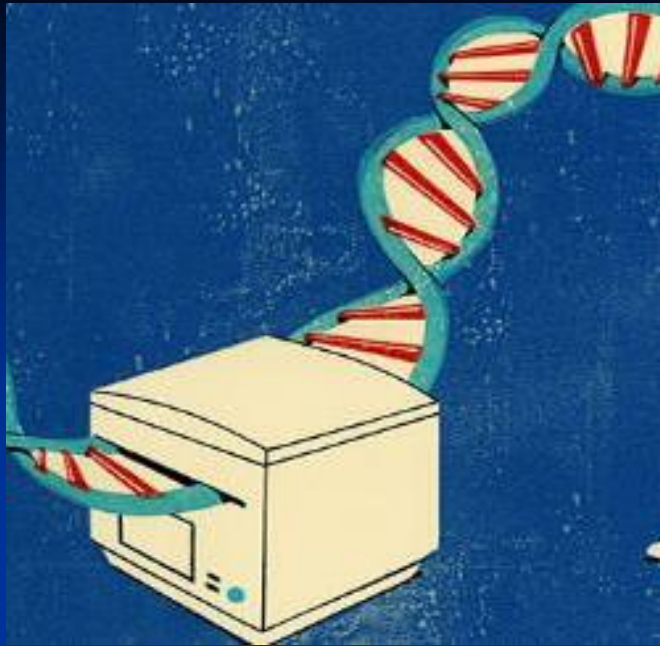
Dissenting
Opinion

“The five Justices who control the outcome of today's case agree on very little. . . . [T]hey have left significant confusion in their wake. What comes out of [the plurality's] desire to limit [our prior decisions] in whatever way possible, combined with one [Justice Thomas's] one-justice view of those holdings, is — to be frank — who knows what. Those decisions apparently no longer mean all that they say. Yet no one can tell in what way or to what extent they are altered because no proposed limitation commands the support of a majority.”

Justice Kagan (with Scalia, Ginsburg,
Sotomayor)

Williams v. Illinois: Dissenters





RAPID DNA TECHNOLOGY
Results In 90 Minutes or Less?

Rapid DNA Act of 2017

- Amends the DNA Identification Act of 1994
- Directs the FBI to establish standards and procedures for Rapid DNA testing
- Allows DNA profiles produced by Rapid DNA machines in compliance with the FBI's standards and procedures to be run through the FBI's DNA database



ABANDONED DNA



FAMILIAL DATABASE SEARCHING



Commercial Ancestry Websites

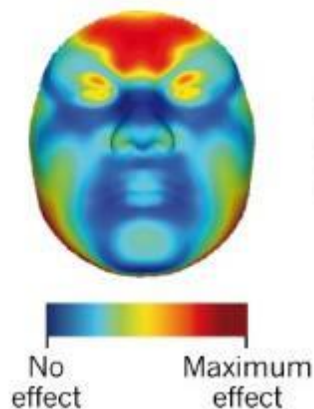


Predicting Appearance

FACE TO FACE

Researchers have shown how 24 gene variants can be used to construct crude models of facial structure. The facial variability (left) associated with one gene variant, *POLR1Da*, is here translated into constructed faces at each end of that spectrum.

Effect of *POLR1Da*

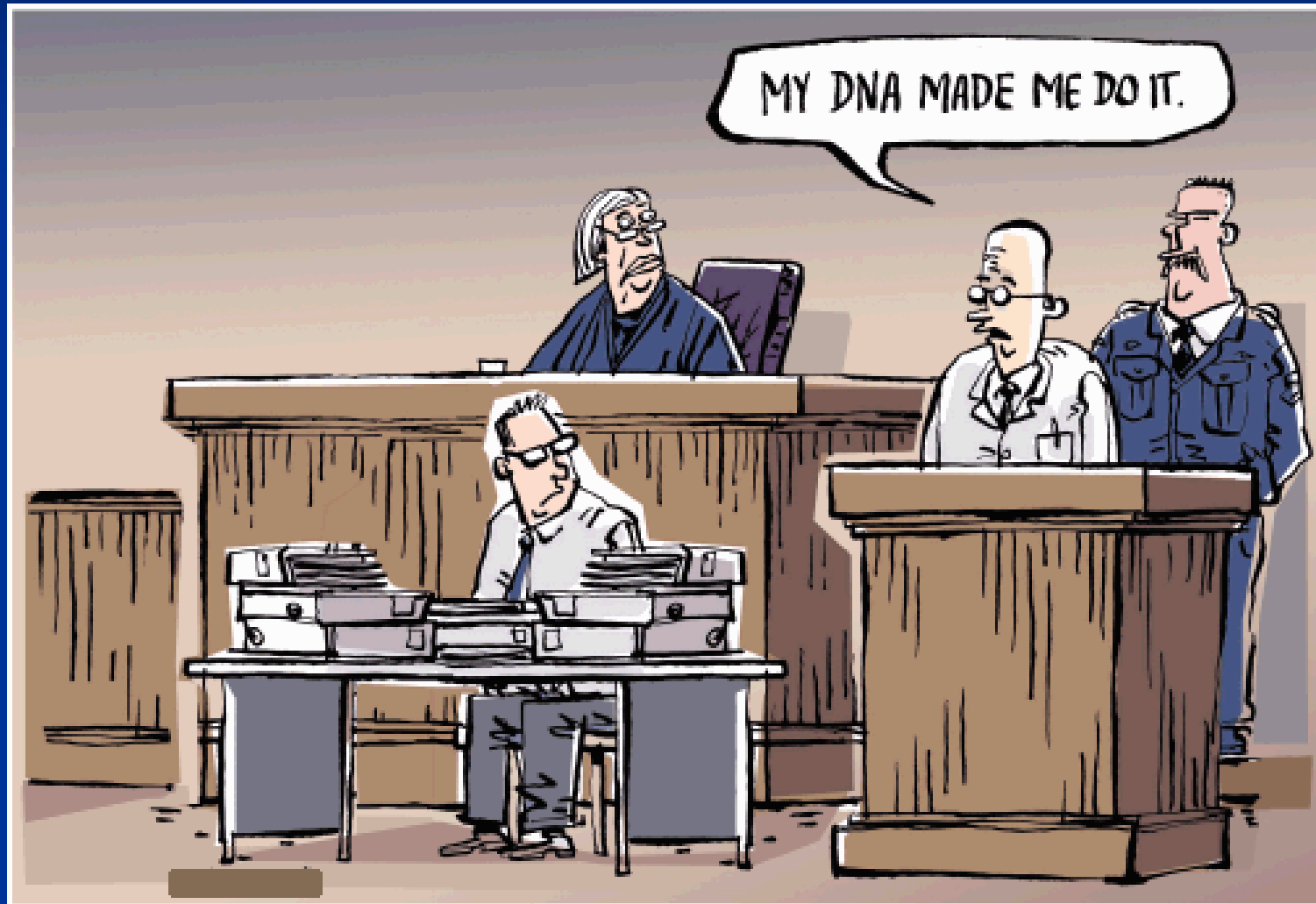




COCKATOO HELPS CATCH A KILLER



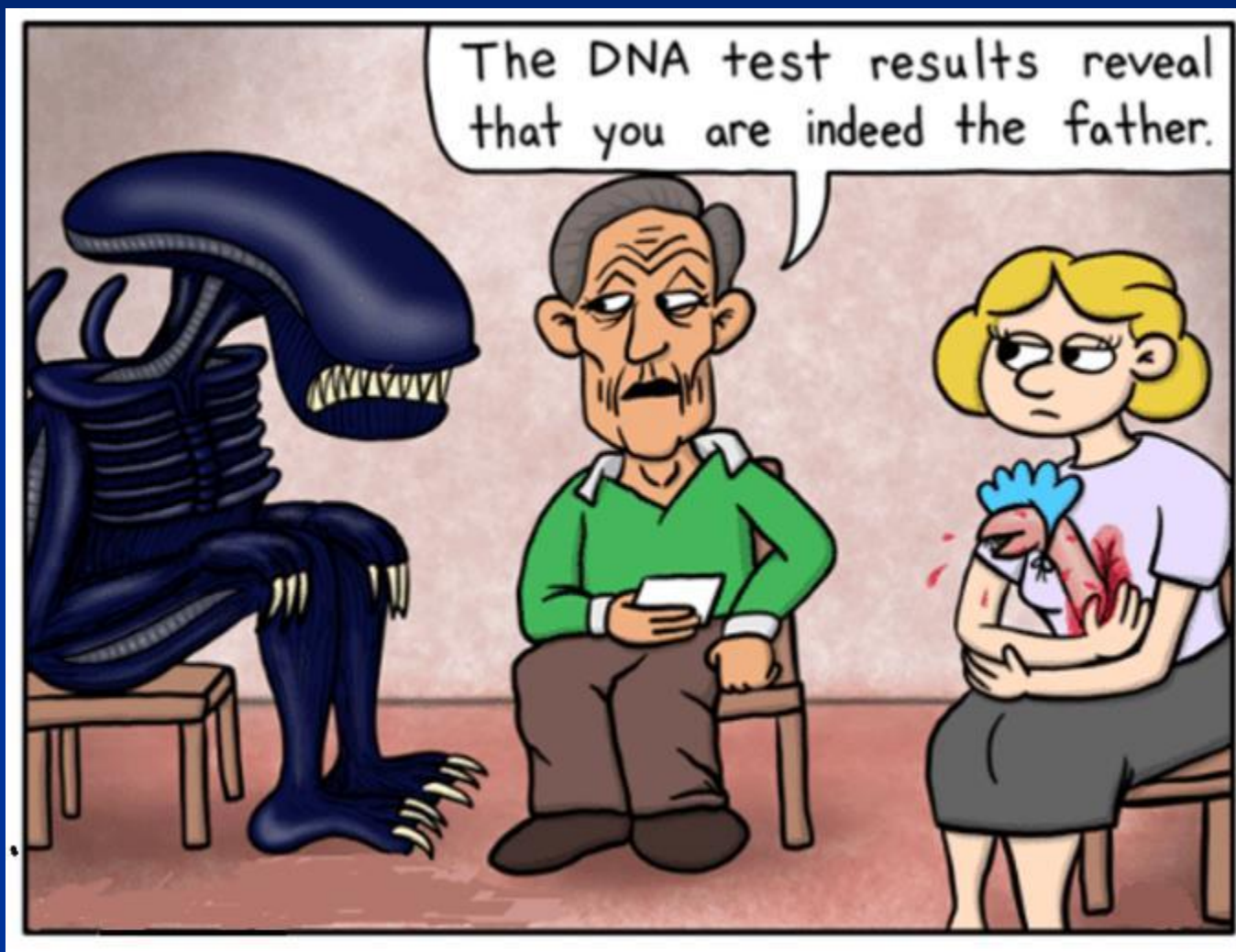
Criminal Responsibility and Genetic Determinism?

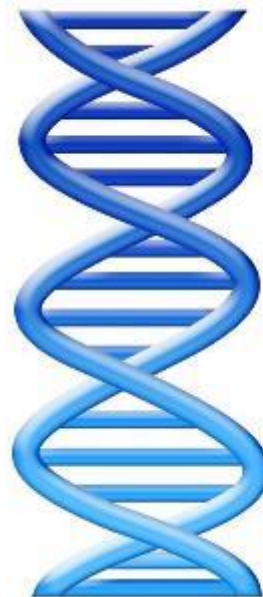


Free Will?



Family Law: Paternity



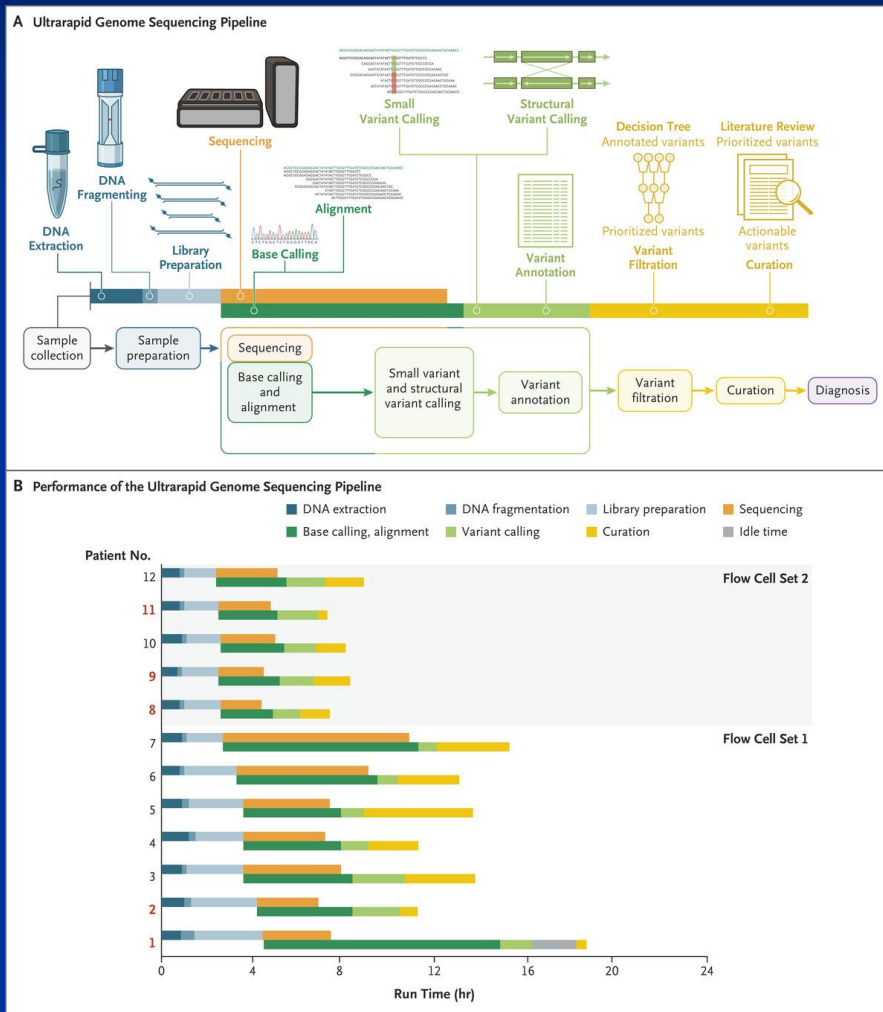


DNA

"The Blueprint of Life"



Workflow and Performance of Ultrarapid Nanopore Genome Sequencing.



HIPAA COMPLIANCE CHECKLIST



TECHNICAL PROTECTIONS

- ENCRYPT & AUTHENTICATE EPHI
- CONTROL/LOG ACCESS & CHANGES TO EPHI
- AUTO-LOGOFF



PHYSICAL PROTECTIONS

- CONTROL/MONITOR PHYSICAL ACCESS
- MANAGE WORKSTATIONS
- PROTECT & TRACK EPHI DEVICES



ADMINISTRATIVE PROTECTIONS

- ASSESS & MANAGE RISK
- TRAIN STAFF
- BUILD/TEST CONTINGENCIES
- BLOCK UNAUTHORIZED ACCESS
- SIGN BAAS
- DOCUMENT SECURITY INCIDENTS



HIPAA PRIVACY RULE TO-DO

- RESPOND TO PATIENT ACCESS REQUESTS
- INFORM PATIENTS WITH NPPS
- TRAIN STAFF
- MAINTAIN EPHI INTEGRITY
- GET PERMISSION TO USE EPHI
- UPDATE FORMS/COPY



HIPAA BREACH NOTIFICATION RULE TO-DO

- PROMPTLY NOTIFY PATIENTS
- HHS & POTENTIALLY THE MEDIA
- ENSURE YOUR NOTIFICATION CONTAINS THE 4 REQUIRED ELEMENTS



HIPAA OMNIBUS RULE TO-DO

- REFRESH YOUR BAA
- SEND NEW COPIES
- UPDATE PRIVACY POLICIES
- MODERNIZE NPPS
- TRAIN STAFF

2008 Genetic Information Nondiscrimination Act (GINA)

GINA and Employment

Under the federal Genetic Information Nondiscrimination Act, employers cannot:



Share
genetic
information
about an
employee



Retaliate against
employees for
asserting their
GINA rights



Classify or
discriminate against
employees based
on genetic
information



Acquire genetic information,
with certain exceptions

Source: American Civil Liberties Union

Genetic Information Privacy Act



Move over HIPAA—Say Hello to GIPA

THE NOBEL PRIZE IN CHEMISTRY 2020



Emmanuelle
Charpentier

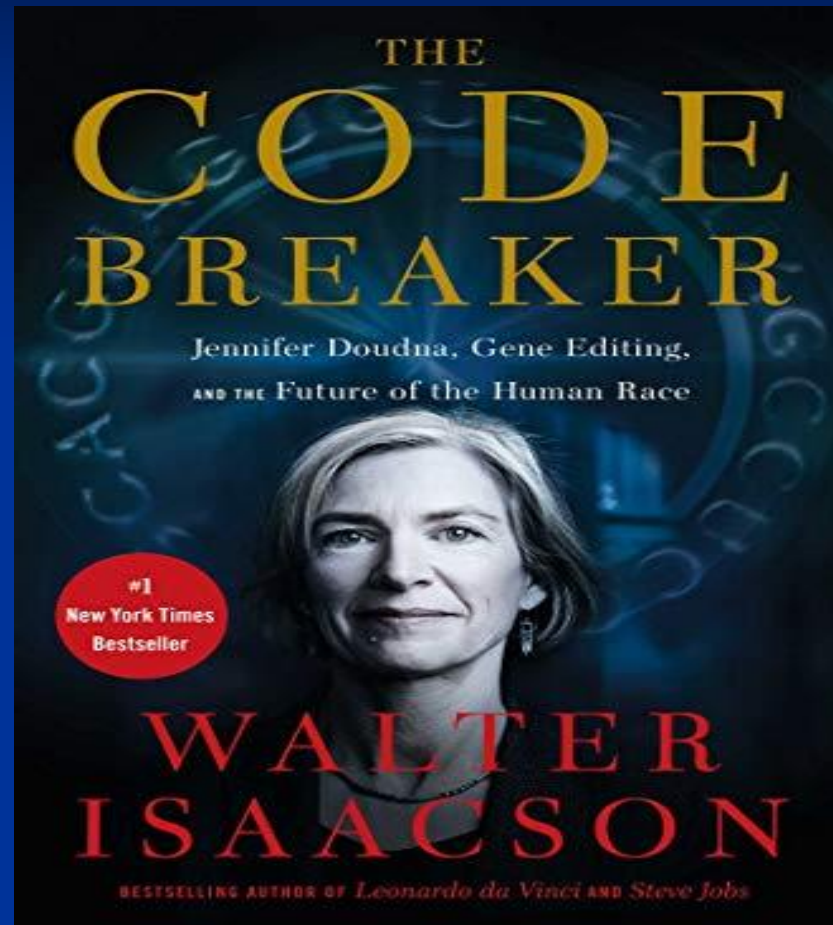
Jennifer A.
Doudna

"for the development of a method
for genome editing"

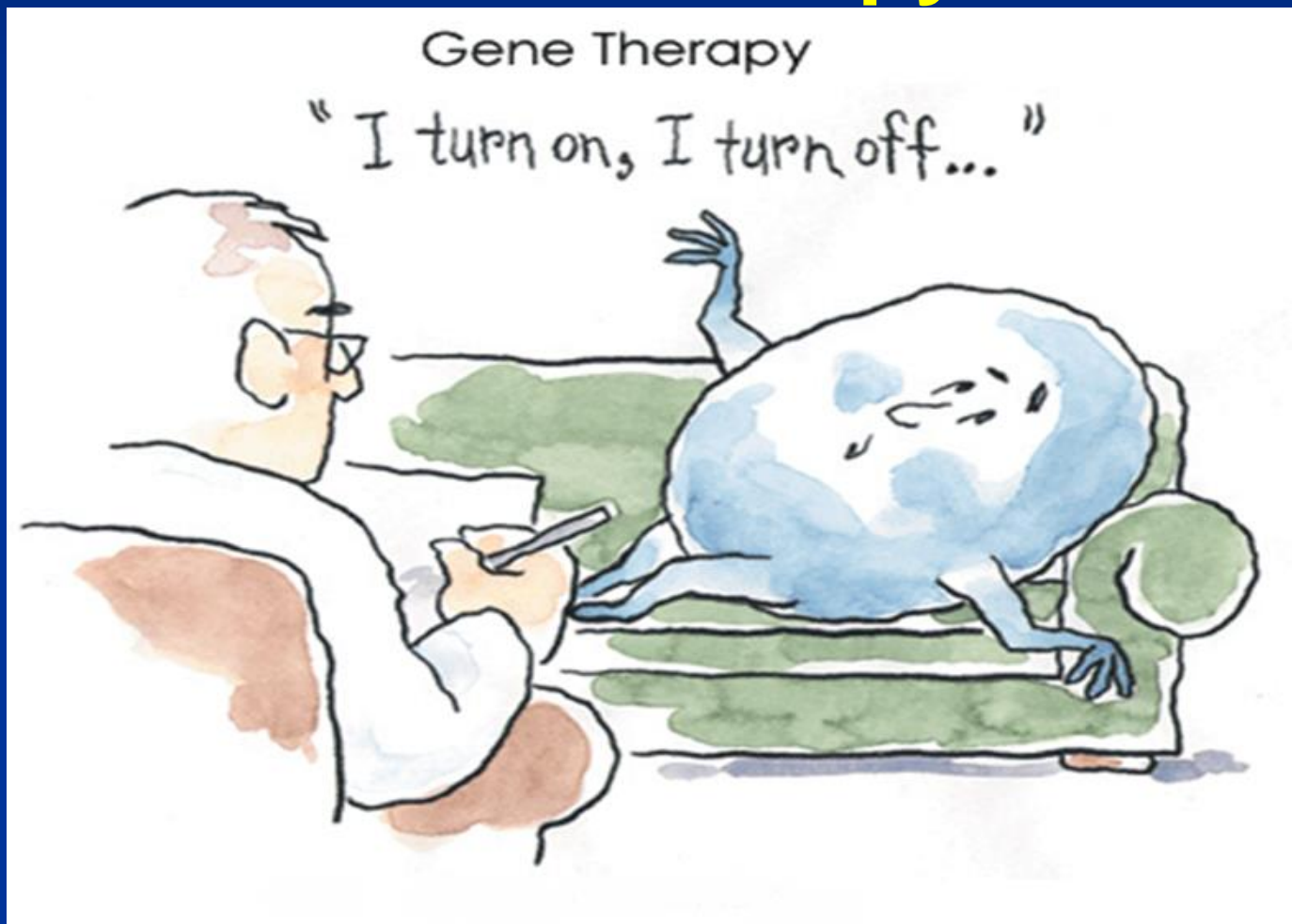
THE ROYAL SWEDISH ACADEMY OF SCIENCES

Doudna and Charpentier galvanized “an entire new field of biotechnology: making CRISPR work in the germline editing of human genes.”

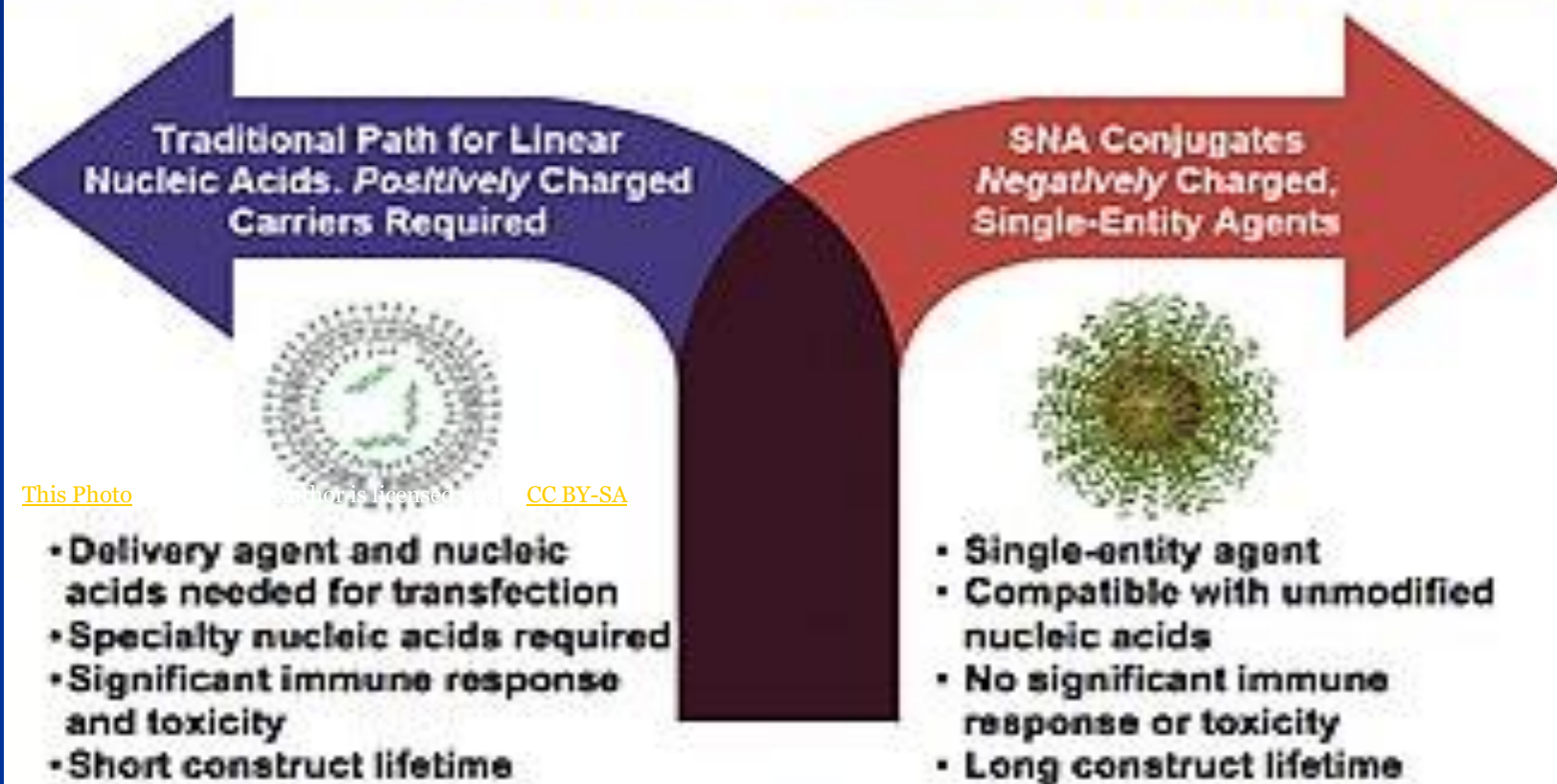
Walter Isaacson, *The Code Breaker*.



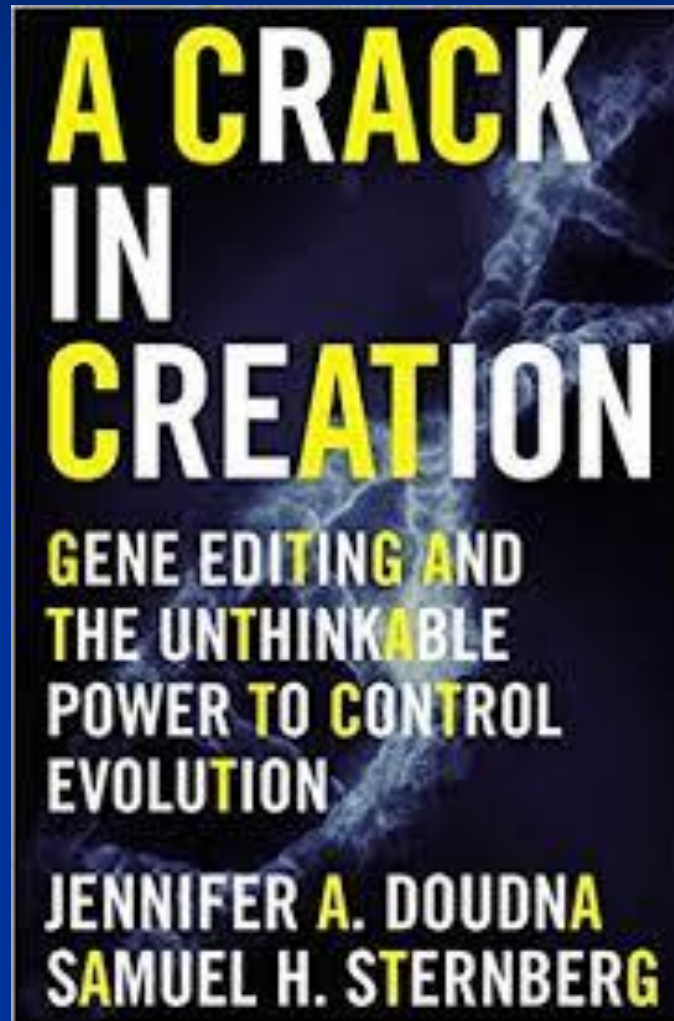
DNA and the Future of Medicine: Gene Therapy



Different Paths to Gene Regulation



“A CRACK IN CREATION”





**COVID-19 VACCINE
BREAKTHROUGH**





A Crack In Creation – Designer Babies



Thank You



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