



AP Bio FRQ Fridays

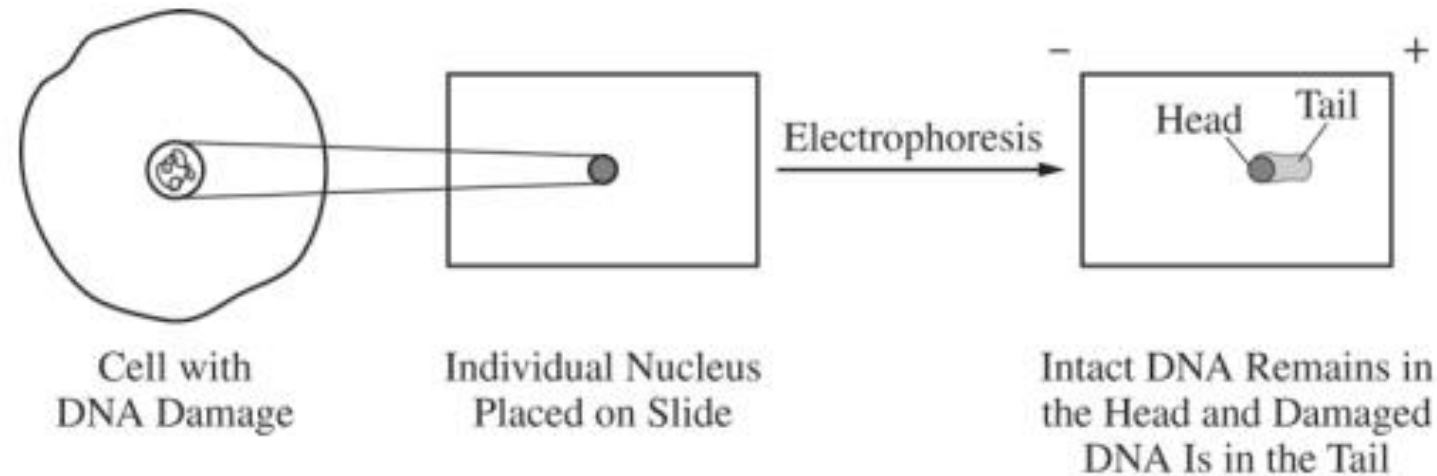
2017 #6
Biotechnology: Gel Electrophoresis



FRQ Friday #16

2017 #16

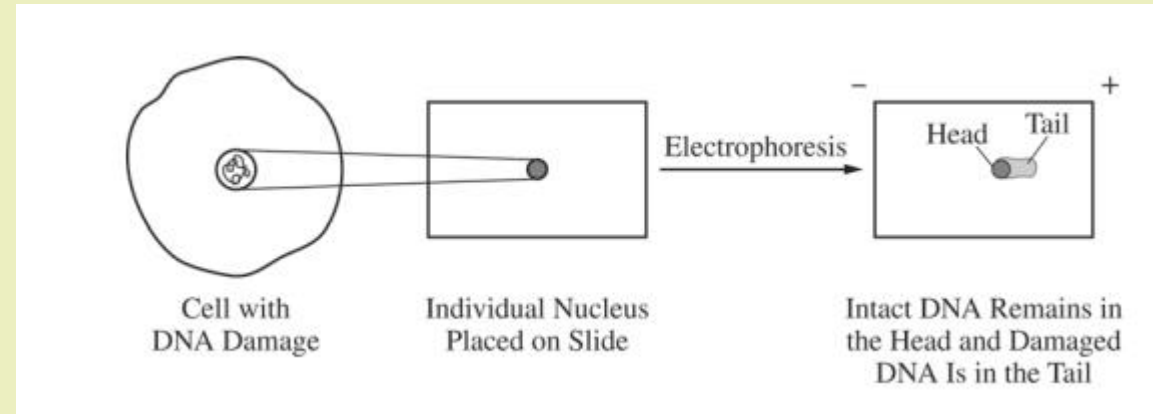
A comet assay is a technique used to determine the amount of double-strand breaks in DNA (DNA damage) in cells. The nucleus of an individual cell is placed on a microscope slide coated with an agarose gel. An electric current is applied to the gel that causes DNA to move (electrophoresis), and the DNA is stained with a fluorescent dye. When viewed using a microscope, undamaged DNA from the nucleus appears as a round shape (the head), and the fragments of damaged DNA extend out from the head (the tail). The length of the tail corresponds to the amount of the damage in the DNA (see Figure 1).



FRQ Friday #16

2017 #16

(a) To explain the movement of DNA fragments in the comet assay, **identify** one property of DNA and **provide reasoning** to support how the property contributes to the movement during the comet assay technique.



Identification (1 point)	Reasoning (1 point)
DNA has a (negative) charge.	DNA moves toward the positive/oppositely charged pole.
DNA can be different sizes.	(Different size DNA fragments) move at different rates.



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2017 #16

- (a) To explain the movement of DNA fragments in the comet assay, **identify** one property of DNA and **provide reasoning** to support how the property contributes to the movement during the comet assay technique.

Identification (1 point)	Reasoning (1 point)
DNA has a (negative) charge.	DNA moves toward the positive/oppositely charged pole.
DNA can be different sizes.	(Different size DNA fragments) move at different rates.

a) DNA is negative, therefore when applying an electric current, DNA will move towards a positive charge. Smaller pieces of DNA move through the agarose gel more ~~easy~~ easily than larger pieces, ~~so~~ which is why the smaller, damaged fragments of DNA are drawn out more towards the positive charge (the tail)



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2017 #6

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(b) In a different experiment, cells are treated with a chemical mutagen that causes only nucleotide substitutions in DNA. **Predict** the likely results of a comet assay for this treatment.

Prediction (1 point)

- Head (only) OR (head with) no tail.
- Tail will be shorter than a cell with double-stranded breaks in DNA.



FRQ Friday #16

2017 #16

(b) In a different experiment, cells are treated with a chemical mutagen that causes only nucleotide substitutions in DNA. Predict the likely results of a comet assay for this treatment.

Prediction (1 point)

- Head (only) OR (head with) no tail.
- Tail will be shorter than a cell with double-stranded breaks in DNA.

b). All of the DNA will remain in the head (nucleus) because with only nucleotide substitutions, there won't be any damaged fragments to travel outside as a tail. The nucleotide substitutions will allow the DNA to remain intact, just mutated.

