UV Lab Worksheet

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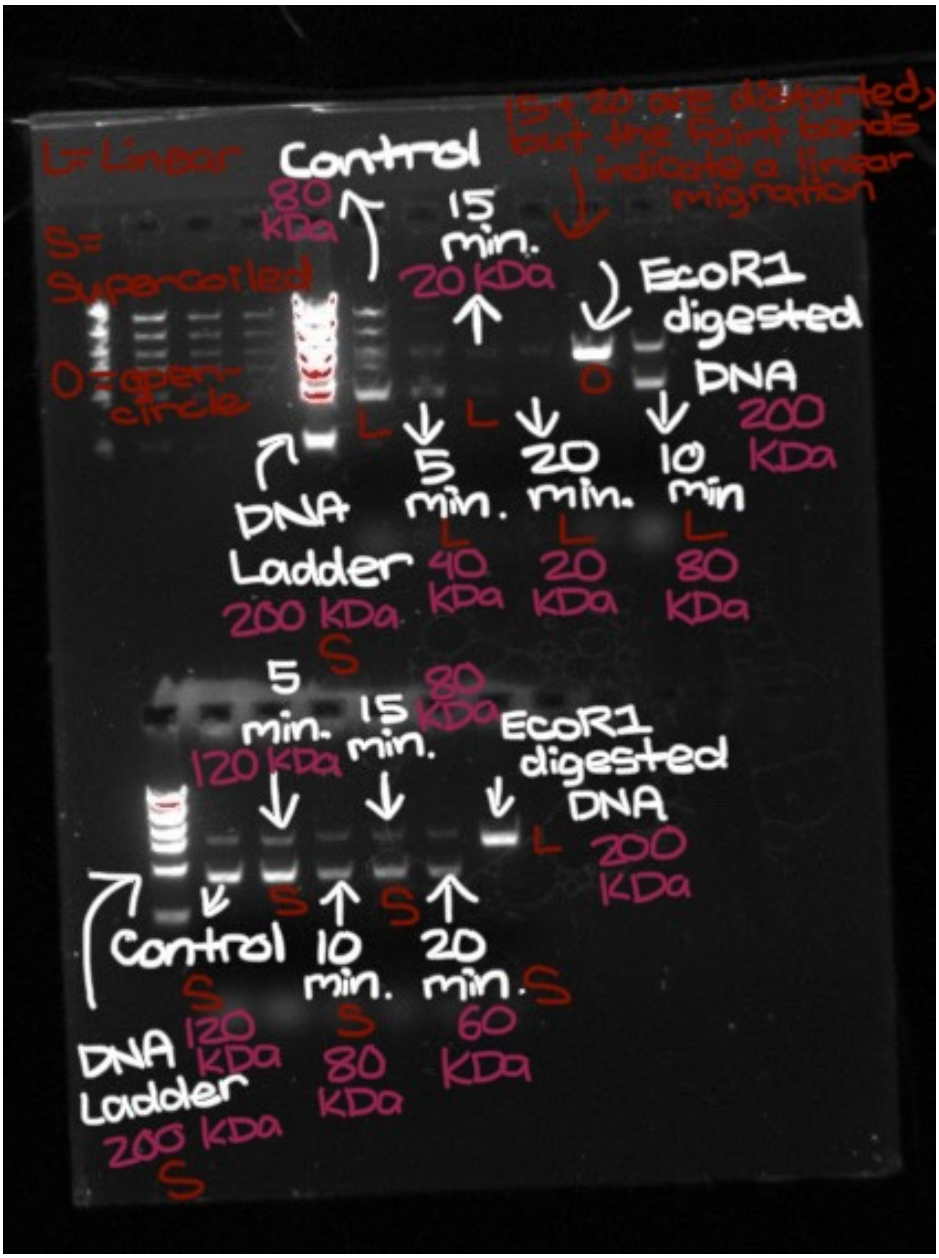
Q1. Restriction digest gel

Include a well-labeled image of your gel containing the control (no sunscreen sample set) and sunscreen treated DNA samples. Clearly annotate the time of exposure for your samples, and label the molecular weights of the ladder if bands are visible on the gel. Also label which bands are the supercoiled DNA, open-circle DNA, linear DNA, EcoR1 digested DNA and the DNA ladder. (Hint: The lab 7 manual might have some useful information on DNA conformations when ran on a gel.) **(8 pts)**

(we didn't get data for 25 and 30 because the drops evaporated)



Q2. Effect of UV on plasmid DNA

What effect did the UV exposure have on the plasmid DNA? Explain what evidence supports this conclusion. **(8 pts)**

UV exposure damaged the plasmid DNA, resulting in the loss of supercoiled forms and an increase in linear and open circular forms. Ideally, undamaged DNA should show up as one clear, bright band. In the top row (no sunscreen), more damage is evident, with multiple dim bands corresponding to each DNA conformation appearing on the gel. In the bottom row, the DNA appears more ordered, suggesting less damage, but most of the bands still separated except for EcoRI, which appeared as a single bright band in both rows.

Q3. Effect of sunscreen on the UV-exposed plasmid DNA

What effect did sunscreen have on the UV exposed plasmid DNA (Compare your results and also other sunscreen SP concentrations)? (Results for other SP concentrations is available on Canvas). Explain what evidence supports this conclusion. **(8 pts)**

Despite the experimental errors that arose when we were unable to pipette DNA sample for the last timestamps of the experiment, we were able to analyze our data in conjunction with the results on Canvas to draw a conclusion. This experiment indicated that sunscreen helps to protect DNA from UV damage, with greater SPFs allowing DNA to maintain the supercoiled form. After using SPF 50 sunscreen and comparing to the other results with SPF 50, it is clear that nearly all of this DNA remained in the supercoiled format, unlike the linear structure that is characteristic of DNA damaged by UV light. This differs greatly from the results gathered from the samples that did not receive sunscreen, nearly all of which had no visible bands on the gel by the later timestamps, with the exception of the control. The lack of visible bands for the no sunscreen samples supports that the DNA was damaged and distorted by the UV light to the point where it didn't migrate properly through the gel matrix. Further, the DNA bands that were visible at earlier timestamps still indicated UV damage as they presented in the linear form. Finally, while observing the results on Canvas for other SPF concentrations, we concluded that with lower SPFs, the bands are still visible and the DNA can still migrate better through the gel matrix than the no sunscreen samples, but more DNA for lower SPFs appeared in the linear format that indicates damage. This shows that, on the whole, a greater SPF can help DNA maintain the supercoiled form and protect itself from UV light damage constantly for 5 to 30 minutes, and likely beyond this benchmark.