APPENDIX A. EXAMPLES OF STUDENT-AUTHORED QUESTIONS ON PEERWISE & COMMENTS FROM PEERS

Here are two examples of student-authored MCQs and comments from peers on PeerWise. We are grateful to our students for generating these materials, their identities are removed to avoid potential conflicts of interests and ethical issues.

Question 4581939


The above image shows the displacement between the kinetochore and spindle pole and the displacement between opposite spindle poles of HeLa cells during the anaphase stage of mitosis.

Which of the following statements is false?

<table>
<thead>
<tr>
<th>OPTION</th>
<th>ALTERNATIVE ANSWERS</th>
<th>FIRST ANSWERS</th>
<th>CONFIRMED ANSWERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The increase of displacement between opposite spindle poles, is contributed by the polymerization of overlapping polar microtubules.</td>
<td>1 (6.67%)</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>The increase of displacement between opposite spindle poles, is contributed by a driving force from dynein motor proteins that are associated with the spindle poles on aster microtubules.</td>
<td>4 (26.67%)</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>The decrease of distance between the kinetochores and spindle pole is primarily due to the rapid depolymerization of kinetochore microtubules from the plus end.</td>
<td>4 (26.67%)</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>The decrease of distance between the kinetochores and spindle pole is contributed by the sliding of bridging microtubules that pushes kinetochore fibers poleward.</td>
<td>6 (40.00%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Explanation (written by the question’s author, and become available when a participant attempted it)

The following explanation has been provided relating to this question:
A. (True)
For Anaphase B, not only do plus end-directed motor proteins (primarily kinesin motor proteins) push the spindle poles apart by creating a sliding force between overlapping polar microtubules, overlapping polar microtubules do grow longer through polymerization.

B. (False)
For Anaphase B, while it is true that dynein motor proteins (minus end-directed motor proteins) assist with the increasing distance between spindle poles, the dynein motor proteins should be attached to the cell cortex. Only then can the motor proteins pull the spindle poles further apart.

C. (True)
For Anaphase A, the primary force that segregates sister chromatids is the rapid depolymerization of kinetochore microtubules. As such, this is the primary reason the distance between the spindle pole and the kinetochore decreases.

D. (True)
For Anaphase A, recent research suggests that the sliding of bridging microtubules is one of the mechanisms for chromosome movement in human cells (Kruno Vukušić et al., 2017). For more information, one can find the details here: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5637169/

Topics (tagging the question to a particular topic)
The following topics have been indicated as being relevant to this question:
Topic 1

Here are four comments for this question (Three top-level comments and one reply)
Question 4591238

This question has been answered by 20 people and has an average rating of 4.46 (based on 13 ratings)

Below are two E. coli strains with their genotypes shown:

Hfr cells: leu⁺ ton⁻ lac⁺ lys⁺ arg⁺ str⁻
F cell: leu⁻ ton⁺ lac⁻ lys⁻ arg⁻ str⁺

The above image shows the genetic map and direction of transfer of each Hfr donor that were used in the interrupted conjugation experiment between Hfr donors and F recipients.

Which of the following is FALSE?

Notes:
leu⁺, lys⁺, arg⁺ = ability to synthesise leucine, lysine, arginine;
leu⁻, lys⁻, arg⁻ = inability to synthesise leucine, lysine, arginine;
ton⁺ = sensitive to infection by bacterial virus T1;
ton⁻ = resistant to infection by bacterial virus T1;
lac⁺ = ability to metabolise lactose for growth;
lac⁻ = inability to metabolise lactose for growth;
str⁺ = sensitive to antibiotic streptomycin;
str⁻ = resistant to antibiotic streptomycin;
A. (True)
Following the direction of transfer of Hfr 1, we can find that after 40 minutes, there’s a possibility that the lac+ gene has been transferred to the F- cell and replaced the lac- gene. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to metabolise lactose for growth.

B. (True)
Following the direction of transfer of Hfr 2, we can find that after 30 minutes, there’s a possibility that both the lys+ and arg+ genes have been transferred to the F- cell and replaced the lys- and arg- genes. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to self-synthesise lysine and arginine.

C. (False)
The correct statement should be:
"From the sample obtained after 40 minutes of conjugation between Hfr 3 donors and F- recipients, lesser colonies can be seen forming in an agar nutrient plate consisting of streptomycin and bacterial virus T1, compared to the agar nutrient plate of the same conditions containing the sample obtained after 30 minutes of conjugation between Hfr 2 donors and F- recipients."

This is because following the direction of Hfr 3, we can find that after 40 minutes, there’s a possibility that the tons gene has been transferred to the F- cell and replaced the tonr gene. As such, these transconjugants are sensitive to infection by bacterial virus T1, and are killed off; On the other hand, following the direction of Hfr 2, we can find that after 30 minutes, there’s no possibility that the tons gene could be transferred to the F- cell and replace the tonr gene. Thus, these transconjugants are still resistant to infection by bacterial virus T1, and won’t be killed off. Comparing both petri dishes, there would be lesser colonies in the sample obtained from the conjugation of Hfr 3.
D. (True)
Comparing both of the situations, we would find that the lac+ gene is closer to the origin of transfer of Hfr 1 than to the origin of transfer of Hfr 3. The closer the gene is to the origin of transfer, the more efficient the gene is transferred. Thus, more transconjugants obtained from the conjugation of Hfr 1 donors have the lac+ gene compared to the transconjugants obtained from the conjugation of Hfr 3 donors, leading to more colonies.

E. (True)
Following the direction of transfer of Hfr 3, we can find that after 70 minutes, there’s a possibility that the lac+, lys+, and arg+ genes have been transferred to the F- cell and replaced their corresponding genes. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to metabolise lactose for growth, and self-synthesise lysine and arginine.

Topics
The following topics have been indicated as being relevant to this question:

topic 2

Comments
There are six comments for this question (six top-level comments and 0 replies)