Fertility Case Study Packet

You are a doctor working in a fertility clinic. A married couple, Jailyn and Carlos Jenkins, visit you because they have been trying to get pregnant for about two years but have had no success. It is your responsibility to diagnose the cause of their infertility.

First label the following on the drawings below: a) testes, b) ovaries, c) fallopian tubes, d) uterus, e) male gamete or sex cell (sperm), f) female gamete or sex cell (egg), g) zygote, and h) embryo.

Next, think about some potential causes of infertility?

Use the figures below to identify four things that must happen for a successful pregnancy to occur:

1) _________________________________ 2) _________________________________
3) _________________________________ 4) _________________________________

When page 1 is completed, ask your teacher for Clue #1.
Using the information about Carlos and Jaily’s medical history, answer the following questions:

1. **Is there any indication that the cause of infertility is due to environmental factors in Carlos or Jaily’s life?**
   If yes, explain what environmental factor might be affecting their fertility.
   If no, explain why you do not believe environmental factors may be affecting their fertility or what other information you would need to determine if environmental factors are affecting their fertility.

2. **Is there any indication that the cause of infertility is due to genetic factors?**
   If yes, explain what genetic factor might be affecting their fertility.
   If no, explain why you do not believe genetic factors may be affecting their fertility or what other information you would need to determine if genetic factors are affecting their fertility.

3. **Is there any indication that the cause of infertility is due to their medical histories?**
   If yes, explain what about their medical history might be affecting their fertility.
   If no, explain why you do not believe their medical histories are affecting their fertility or what other information you would need to determine if their medical histories are affecting their fertility.

After reviewing your patients’ medical history, you decide that you need some additional information about Jaily’s hormone levels. You order a blood test to assess whether or not her hormone levels are normal.
4. State the two main female reproductive hormones.

_________________________ and ___________________________

5. Using your textbook and/or online resources, label each line in the graph below with the correct hormones you identified above:

![Graph showing hormone levels over the cycle]

6. List two principal roles of the female reproductive hormones?

1) _______________________________________________________

2) _______________________________________________________

7. Name the organ in the female reproductive system that produces hormones.

__________________________________________________________________

8. Describe one possible way that hormone levels could be the cause of infertility.

__________________________________________________________________

__________________________________________________________________

After completing this page, ask your teacher for **Clue #2**, your patient’s hormone test results!
Use the graph of a typical menstrual cycle to help you answer questions 9-13 below:

9. What is ovulation? ______________________________________________________

10. What causes ovulation? (Hint: What are the hormones levels just before ovulation?)

________________________________________________________________________

11. On what day does ovulation occur? ______________________________________

12. Does Jailyn have the normal hormone levels to cause her to ovulate?

________________________________________________________________________

13. Do you think that Jailyn’s hormone levels are the cause of infertility? Why? Why not?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

After looking into Jailyn’s hormone levels, you decide to check if her anatomy (body parts) are normal. You order a pelvic ultrasound. Obtain Clue #3 from your teacher and move on to the next page.
Using the results from Jailyn’s ultrasound in Clue #3, answer questions 14-17.

14. Do you have any concerns about the structure of Jailyn’s uterus? Why? Why not?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

15. Do you have any concerns about the appearance of Jailyn’s fallopian tubes? Why? Why not?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

16. Do you have any concerns about the positions of Jailyn’s ovaries? Why? Why not?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

17. Based on Jailyn’s ultrasound, is there anything about her reproductive anatomy that may be causing her infertility? Explain why you believe her anatomy may or may not be contributing to her infertility.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

While you were explaining Jailyn’s hormone lab results to the couple, Carlos mentions that 10 years ago he was a bodybuilder. Carlos tells you he knows all about the male reproductive hormone, testosterone, because that is the main ingredient in steroids. He confesses to using steroids briefly when he participated in bodybuilding competitions 10 years ago. Do you think Carlos prior incidents of taking steroids could affect his fertility?

Reflect on Carlos’s situation and record your answer below.
________________________________________________________________________

Then get Clue #4 from your teacher.

18. Where is testosterone normally produced in the male? ______________________

19. Testosterone is required for the production of what key part of the male reproductive system? ______________________
20. You decide to test Carlos’s hormone levels to determine if his anabolic steroid use from 10 years ago is still affecting his testosterone levels today. Given what you know about anabolic steroids, would you expect Carlos to have higher-than-normal or lower-than-normal testosterone production? Why? Or why not?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

After completing the questions 18-20, see your teacher to obtain Clue #5 showing information on the effect of steroids.

21. Using the information from Clue #5, draw on the diagram to show why Carlos’s hormone levels are not normal. Explain your answer below.
Before deciding on a treatment plan for Carlos and Jailyn, you decide to run one more test. You want to know if there are any genetic factors that may be affecting Jailyn’s fertility. You obtain a sample of Jailyn’s DNA and use gel electrophoresis to evaluate a specific gene involved in infertility.

22. Describe how gel electrophoresis work. Your answer should include the terms “DNA fragments”, “size”, and “speed”.

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Below are the gel electrophoresis results from Jailyn compared to nine other patients.

<table>
<thead>
<tr>
<th>Patient:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
</table>

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**Gel Electrophoresis Analysis**

- Patient 1, 3, and 10 were originally unable to get pregnant because of problems with their partner’s sperm.
- Patients 2 and 8 had a hormonal imbalance and needed to take hormone supplements in order to get pregnant.
- Patients 7 and 9 had abnormal menstrual cycles and had to take hormonal supplements in order to get pregnant.
- Patient 6 was diagnosed with a condition called Premature Ovarian Failure. Patient 6 was able to get pregnant using in-vitro fertilization (IVF).
- Jailyn is Patient 4

23. Which patient would you expect to have a similar diagnosis to Patient 4? Why?

____________________________________________________________________________________
____________________________________________________________________________________
Use the gel electrophoresis results and **Clue #6** to answer the following questions:

24. What gene(s) may be altered in Patient 4 and Patient 6? _________________

25. Do you think that any of the other patients besides Patient 4 and Patient 6 have an altered version of this gene? Why or why not?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

26. Based on Jailyn’s gel electrophoresis results, do you think there is a genetic component to her infertility? If yes, what is it? If no, why not?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Now consider all of the information you’ve learned about Carlos and Jailyn from this case study and make an official diagnosis. You must state whether you think their infertility is primarily due to:

- Carlos’s testosterone levels,
- Jailyn’s endometriosis, or
- Jailyn’s genetic condition.

Once you’ve made your decision, fill out the official Doctor’s Notes and Diagnosis form on the next page.
Doctor’s Notes and Diagnosis

Patient name(s): ______________________________________________________

Primary cause of infertility: ____________________________________________

Treatment Plan

List three things that Jailyn and Carlos can do to improve their chances of getting pregnant:

1) ________________________________________________________________

2) ________________________________________________________________

3) ________________________________________________________________

Doctor’s signature

______________________________________________________________