From Arms to Answers

Weigh the promise and limits of sea star regeneration research

ZOO.6.6 "Research, analyze, and communicate implications of applying the regeneration of starfish to human medicine."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one observation about sea star regeneration, circle one limit on applying it to humans, and number two research tests in the order they would occur, from sea stars to human tissue.

What Can a Sea Star Teach Medicine?

1. On a rocky shore, a sea star may lose an arm to a predator and later replace it. Regeneration begins with wound closure, then cells grow and organize into missing structures, including tube feet. The process can take months, and it differs among sea star species. Some species can even form a new body from a detached arm, but only when that arm contains enough of the central disc. These observations matter to medicine because they show that a complex body part can be rebuilt. They do not show that human limbs can regrow.

2. To investigate how regrowth works, scientists can compare gene activity in tissue from an injured sea star at several stages of repair. A gene becoming active during repair is a clue, not proof that it causes regeneration. Researchers could then change that gene's activity in a controlled experiment and compare the results with injured sea stars whose gene activity was not changed. They can also check whether humans have related genes and whether those genes behave similarly in human cells. Such comparisons might suggest ways to improve wound healing, but a match in gene names alone cannot establish a safe human treatment.

3. Suppose a team hopes to improve healing after severe skin injuries. Before testing any idea in patients, researchers would examine whether a proposed method helps human cells repair tissue in a laboratory model. They would compare treated and untreated samples, measuring both the amount of repaired tissue and whether its structure works properly. They would also watch for harmful effects, such as excessive cell growth. Sea stars and humans have different bodies and immune responses. A responsible medical claim must therefore name the possible benefit, the missing evidence, and the risk, rather than promise that regeneration will transfer directly.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the condition involving the central disc matter when considering whether people could regrow a limb?

2. A gene becomes active while a sea star regrows an arm. What can researchers conclude, and what test would give stronger evidence that the gene helps cause regrowth?

3. In a human tissue model, a treatment produces more repaired tissue, but that tissue does not work properly. How should this result affect a claim about medical benefit?

4. What two cautions from the passage should researchers include when reporting a possible treatment inspired by sea stars?

3 YOUR TURN

Your own words

Write four sentences proposing how sea star research might guide a study of human tendon repair. Include a possible benefit, a test comparing treated and untreated human tissue models, a measure of function and a risk to check, and a limit on what the results could prove.

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PART 1 · READ AND MARK

Underline one observation about sea star regeneration, circle one limit on applying it to humans, and number two research tests in the order they would occur, from sea stars to human tissue. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the condition involving the central disc matter when considering whether people could regrow a limb?	**Even among sea stars, forming a new body from an arm requires enough of the central disc. The observation does not mean a detached human limb could regrow.**
2	A gene becomes active while a sea star regrows an arm. What can researchers conclude, and what test would give stronger evidence that the gene helps cause regrowth?	**The activity is a clue, not proof of a cause. Researchers could change the gene's activity and compare regrowth with injured sea stars whose gene activity was not changed.**
3	In a human tissue model, a treatment produces more repaired tissue, but that tissue does not work properly. How should this result affect a claim about medical benefit?	**Researchers should not claim the treatment improves healing based on tissue amount alone. They also need evidence that the repaired tissue functions properly.**
4	What two cautions from the passage should researchers include when reporting a possible treatment inspired by sea stars?	**They should state that sea stars and humans differ and that the treatment still needs evidence of benefit and safety, including checks for excessive cell growth.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sea star arm regeneration suggests that studying how cells rebuild organized tissue might offer ideas for repairing injured human tendons. After identifying a candidate repair signal in sea stars, I would compare treated and untreated human tendon tissue models. I would measure tissue strength and check for excessive cell growth, because more tissue alone may not mean a working tendon. Even if the treated model improves, different immune responses and the lack of patient evidence would prevent a claim that this approach already works in people.

Accept other accurate observations, limits, and tests supported by the passage. For the open task, the proposed treatment may be hypothetical, but the response must distinguish a promising model result from evidence that a treatment works safely in patients.