Reading SAT Practice Test 26

Q1. This is the full text of an article published on eScience News website. This article describes the recent work of scientists studying the surface of Mars. The researchers studied how wind shapes specific landscape features found on the surface of a planet.

Mile-high Mars mounds built by wind and climate change

(1) New research has found that wind carved massive mounds of more than a mile high on Mars over billions of years. Their location helps pin down when water on the Red Planet dried up during a global climate change event. The research was published in the journal Geophysical Research Letters, a journal of the American Geophysical Union, on March 31.
(2) The findings show the importance of wind in shaping the Martian landscape, a force that, on Earth, is overpowered by other processes, said lead author Mackenzie Day, a graduate student at The University of Texas at Austin Jackson School of Geosciences.
(3) “On Mars there are no plate-tectonics, and there’s no liquid water, so you don’t have anything to overprint that signature and over billions of years you get these mounds, which speaks to how much geomorphic change you can really instigate with just wind,” Day said. “Wind could never do this on Earth because water acts so much faster, and tectonics act so much faster.”
(4) Day conducted the research with Jackson School researchers Gary Kocurek and David Mohrig of the Department of Geological Sciences and University of Texas at Dallas researcher William Anderson.
(5) First spotted during NASA’s Viking program in the 1970s, the mounds are at the bottom of craters. Recent analysis by the Mars rover Curiosity of Mount Sharp, a mound over three miles high inside Gale Crater, has revealed that the thickest ones are made of sedimentary rock, with bottoms made of sediments carried by water that used to flow into the crater and tops made of sediments deposited by wind. However, how the mounds formed inside craters that were once full of sediments was an open question.
(6) “There’s been a theory out there that these mounds formed from billions of years of wind erosion, but no one had ever tested that before,” Day said. “So the cool thing about our paper is we figured out the dynamics of how wind could actually do that.”
(7) To test whether wind could create a mound, the researchers built a miniature crater 30 centimeters wide and 4 centimeters deep, filled it with damp sand, and placed it in a wind tunnel. They tracked the elevation and the distribution of sand in the crater until all of it had blown away. The model’s sediment was eroded into forms similar to those observed in Martian craters, forming a crescent-shaped moat that deepened and widened around the edges of the crater. Eventually all that was left of the sediment was a mound – which, in time, also eroded away.
(8) “We went from a filled crater layer cake to this mounded shape that we see today,” Day said.
(9) To understand the wind dynamics, researchers also built a computer model that simulated how the wind flowed through the crater at different stages of erosion.
(10) The mounds’ structure helps link their formation to climate change on Mars, Kocurek said, with the bottom being built during a wet time, and the top built and mound shaped in a dry time.

(11) “This sequence signals the change from a dominance of depositional processes by water during a wetter time, to wind reworking of these water-laid sediments with the onset of aridity, followed by wind erosion once these sediment supplies have been exhausted,” he said. “Overall, we are seeing the complete remaking of the sedimentary cycle on Mars to the one that characterizes the planet today.”
(12) The research helped scientists home in on Mars’ Noachian period, a geologic era that began about 3.7 billion years ago, as the period when Mars started to change from a wet world to a dry one. Scientists were able to link the climate change to the Noachian by studying the location of more than 30 mounds and finding that sedimentary mounds were only present on terrain that was exposed during that period.

1. According to the attached passage, which of these statements best describes the phenomena that the scientists are studying?

- where the sediment mounds on Mars were formed
- how the sediment mounds on Earth were formed
- how the sediment mounds on Mars were formed
- when the sediment mounds on Earth were formed

2. Based on the scientist’s hypothesis in the attached passage, what is the most important factor that shapes the mounds on Mars?

- The wind is the most important factor.
- Liquid water is the most important factor.
- A combination of erosion and tectonic shifts is the most important factor.
- Tectonic shifts are the most important factor.

3. In which paragraph of the attached passage does the author explain how studying the formation of mounds on Mars allowed scientists to estimate when a major climate change occurred on Mars?

- the tenth paragraph
- the fourth paragraph
- the first paragraph
- the twelfth paragraph

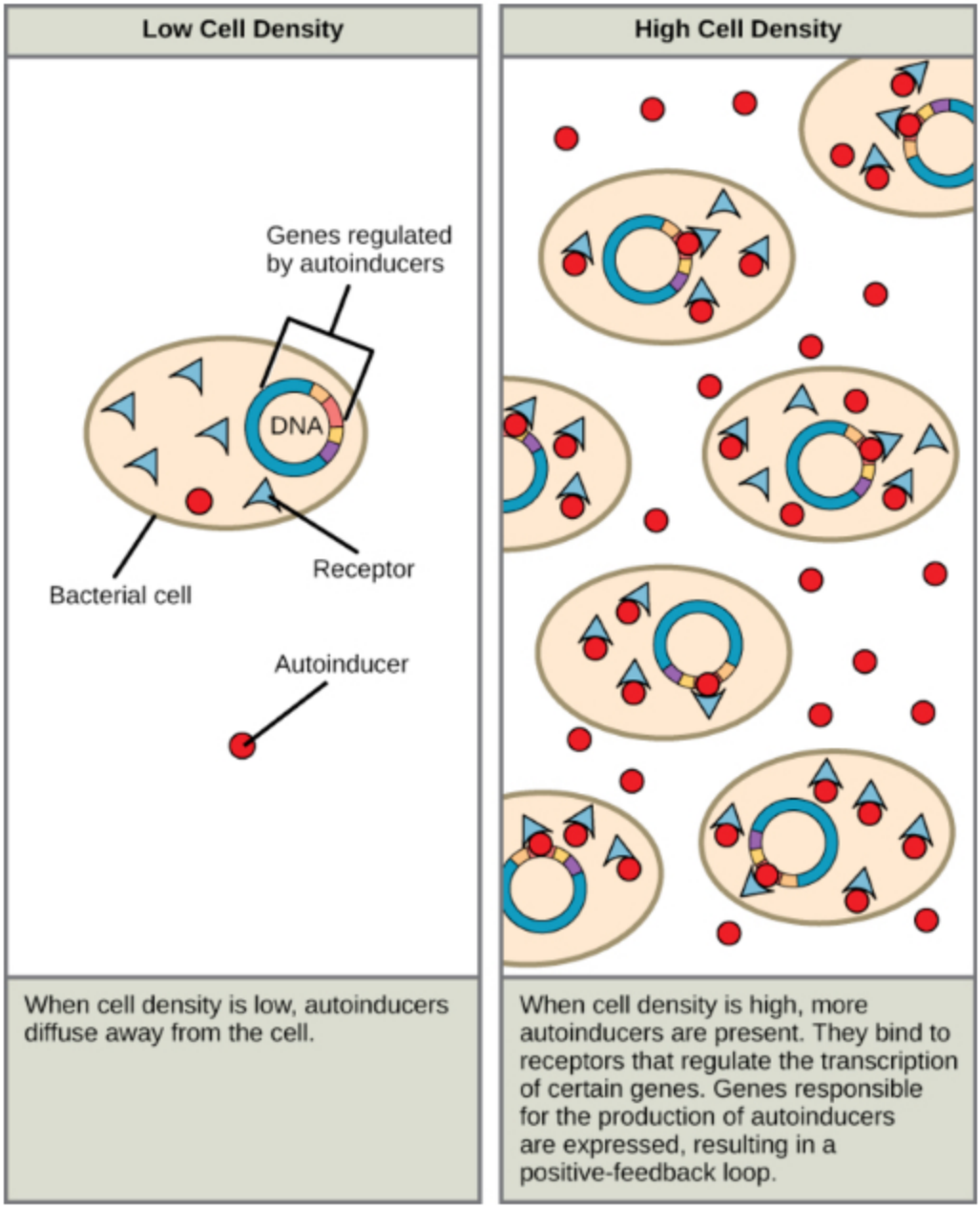
4. In the attached passage, how did the scientists test their hypothesis?

- They created both physical and computer models to test the hypothesized conditions.
- They created a computer model to test the hypothesized conditions.
- They compared photos taken by the Viking in the 1970s with today’s satellite images.
- They created a physical model to test the hypothesized conditions.

5. Based on the attached passage, which of these statements best describes Mars?

- In the past, Mars had liquid water. Today, there is no liquid water present on Mars.
- There has never been liquid water on Mars.
- In the past, Mars did not have liquid water. Today, there is liquid water on Mars.
- There is still liquid water on Mars today.

6. Which of these best describes how the attached passages 1 and 2 are similar?

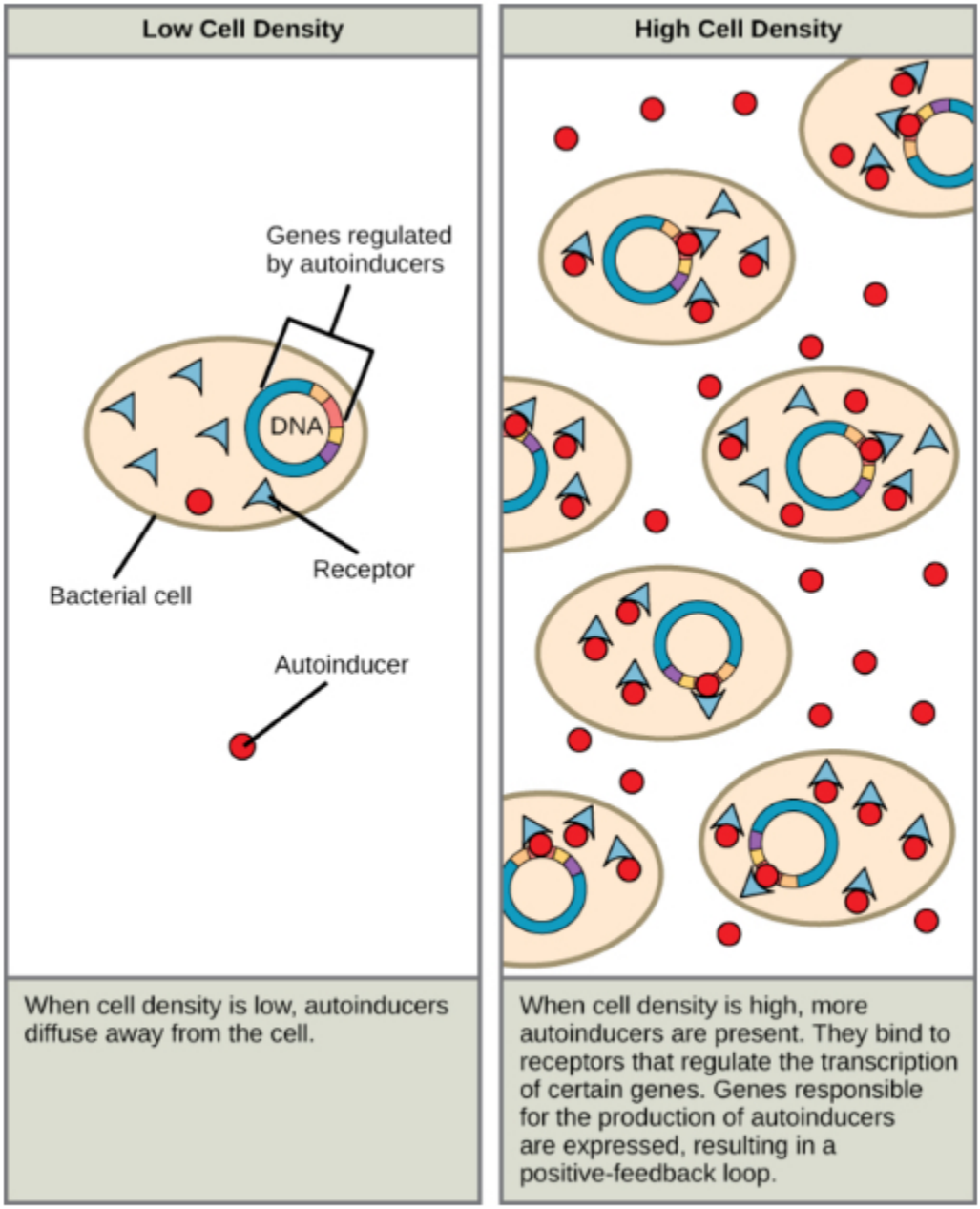


Autoinducers

Autoinducers are small molecules or proteins produced by bacteria that regulate gene expression.

- Passages 1 and 2 describe cellular signaling mechanisms used by different types of organisms.
- Passages 1 and 2 describe complex behaviors by multicellular organisms.
- Passages 1 and 2 describe simple, single-celled organisms.
- Passages 1 and 2 describe protein kinases.

7. According to the attached passage, what type of molecules do bacteria use to communicate?



Autoinducers

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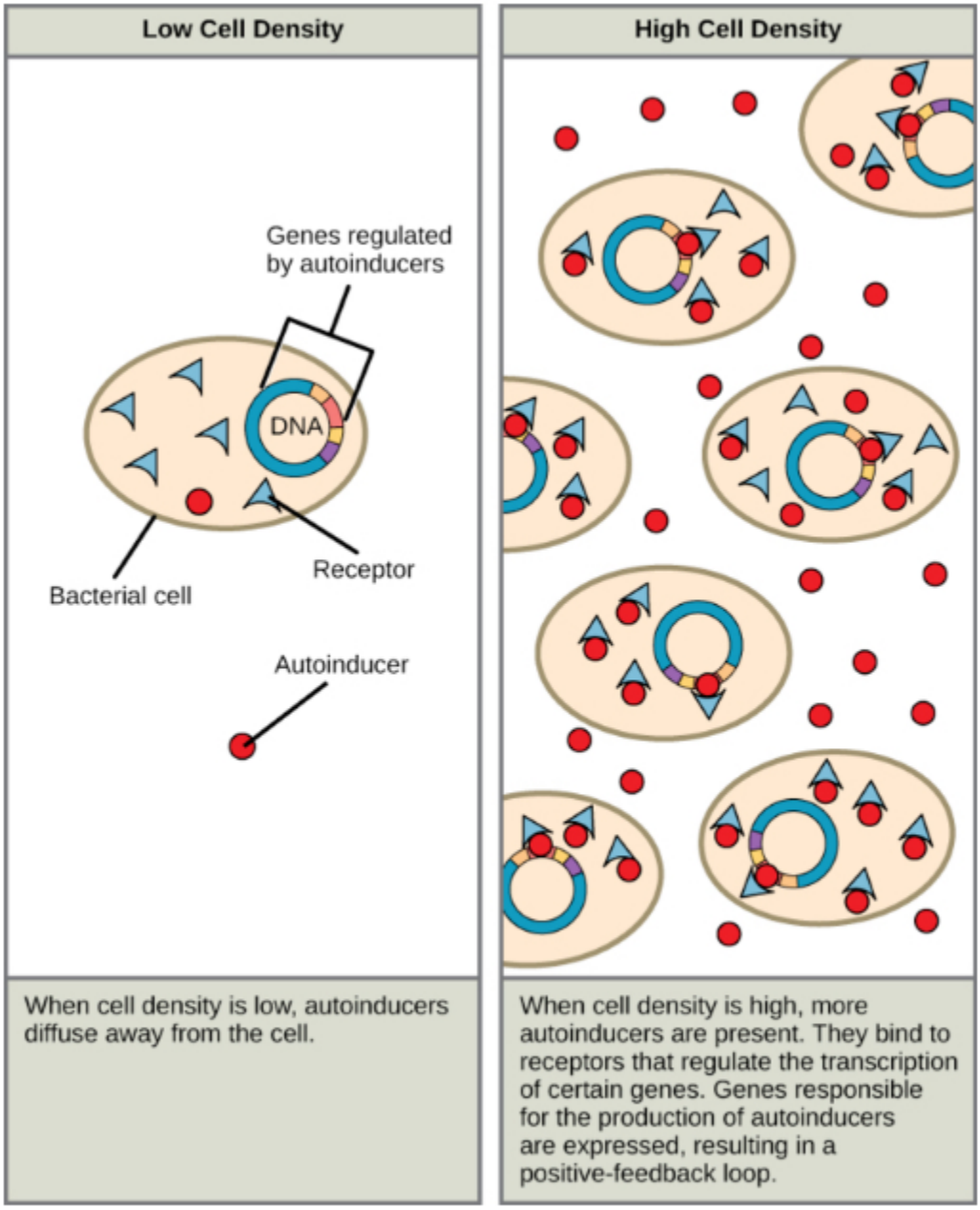
- kinase molecules
- acyl-homoserine lactone molecules

- bioluminescent molecules
- small hydrophobic and peptide-based molecules

8. Referring to the attached figure, when bacteria are present in large numbers in a test tube, which of these statements describes the expression of autoinducers?



Autoinducers

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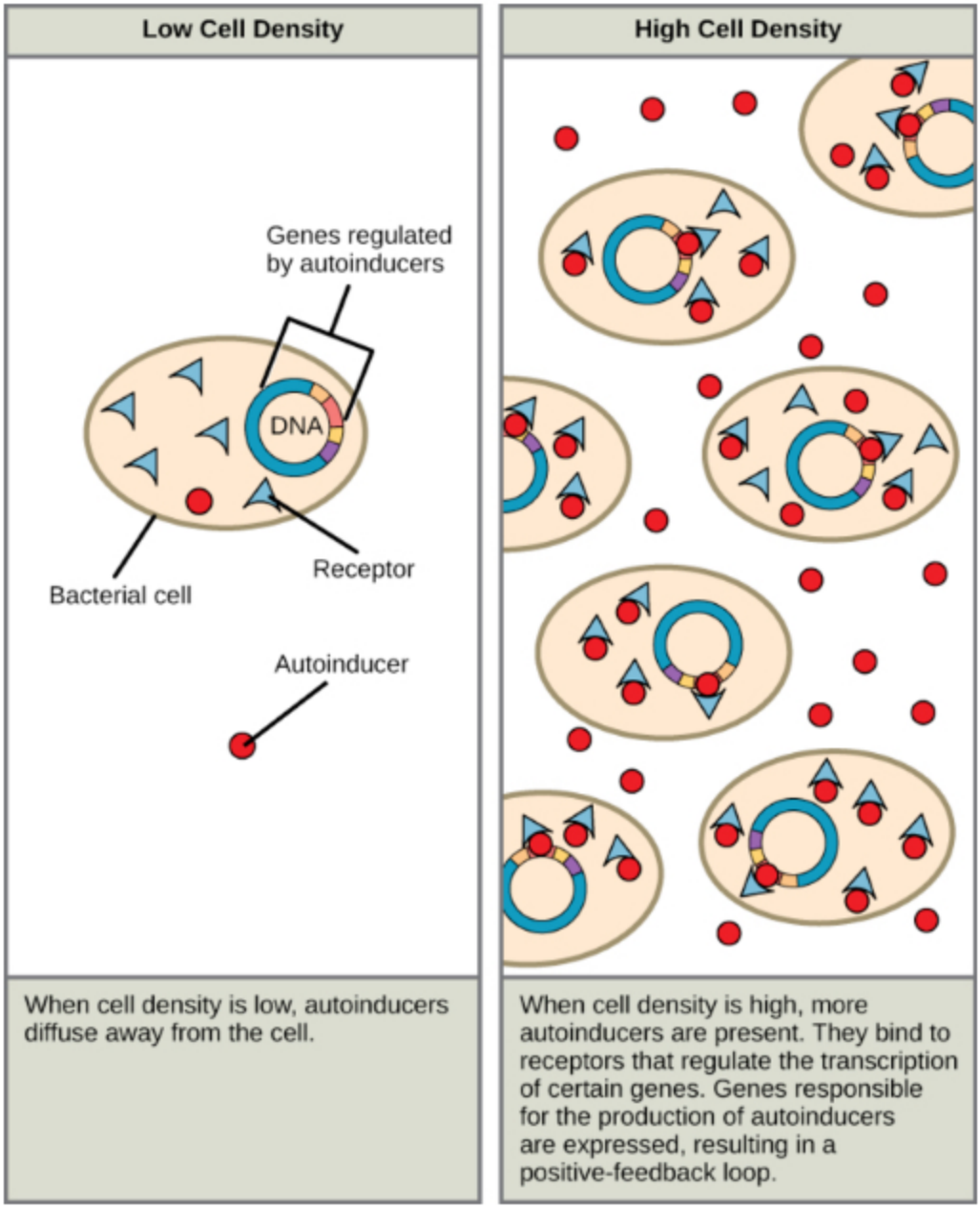
- The expression of autoinducers is decreased.
- The expression of autoinducers is increased.
- The expression of autoinducers is unaltered.
- The expression of autoinducers is decreased outside of the cell, but increased inside of the cell.

9. According to the attached passages, which of these is not regulated by quorum sensing?

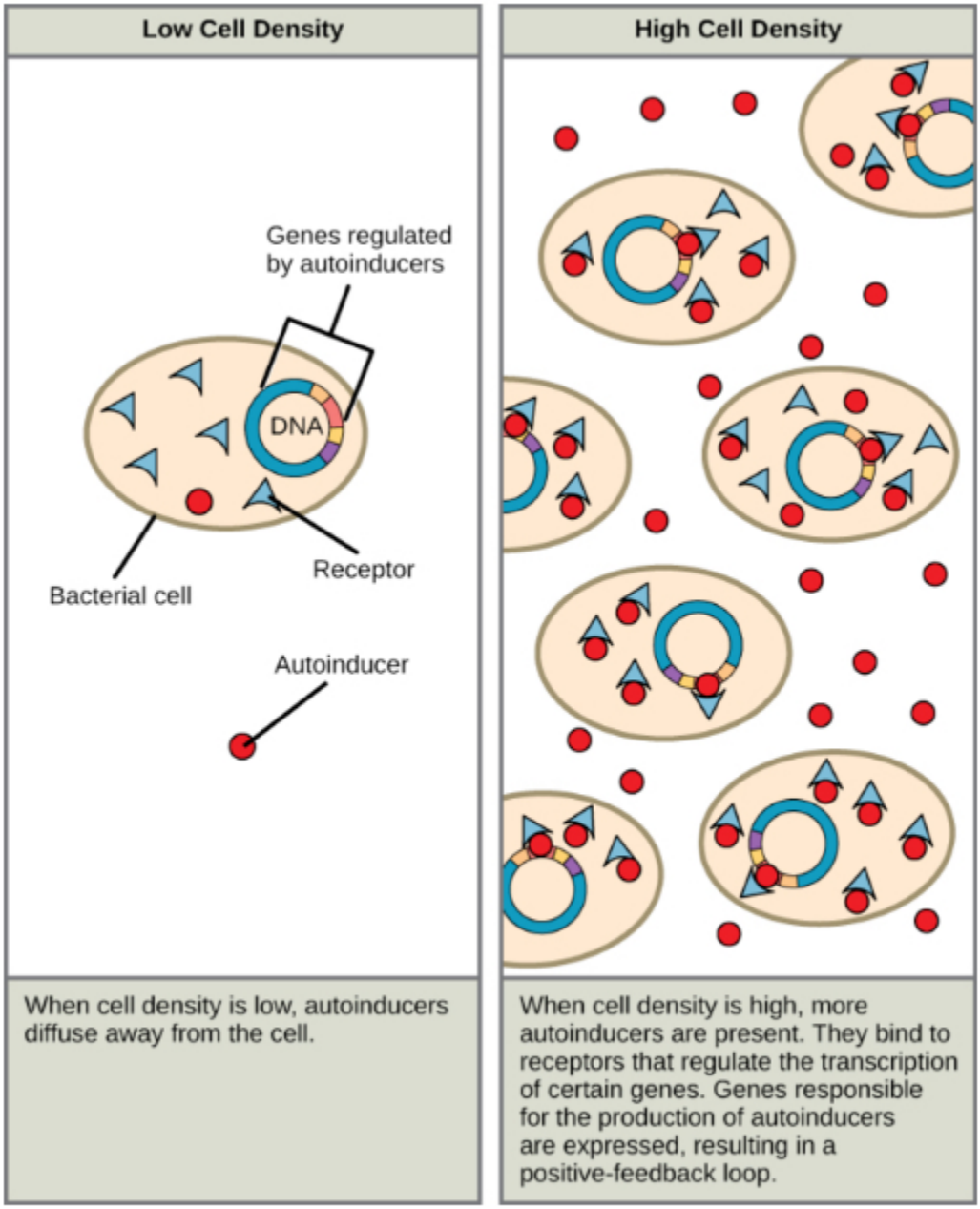


Autoinducers

Autoinducers are small molecules or proteins produced by bacteria that regulate gene expression.

- biofilms
- sensing intracellular changes
- sensing nutrients
- sensing toxins

10. Which of these statements is true, based on the information provided in passage 1 (attached)?



Autoinducers

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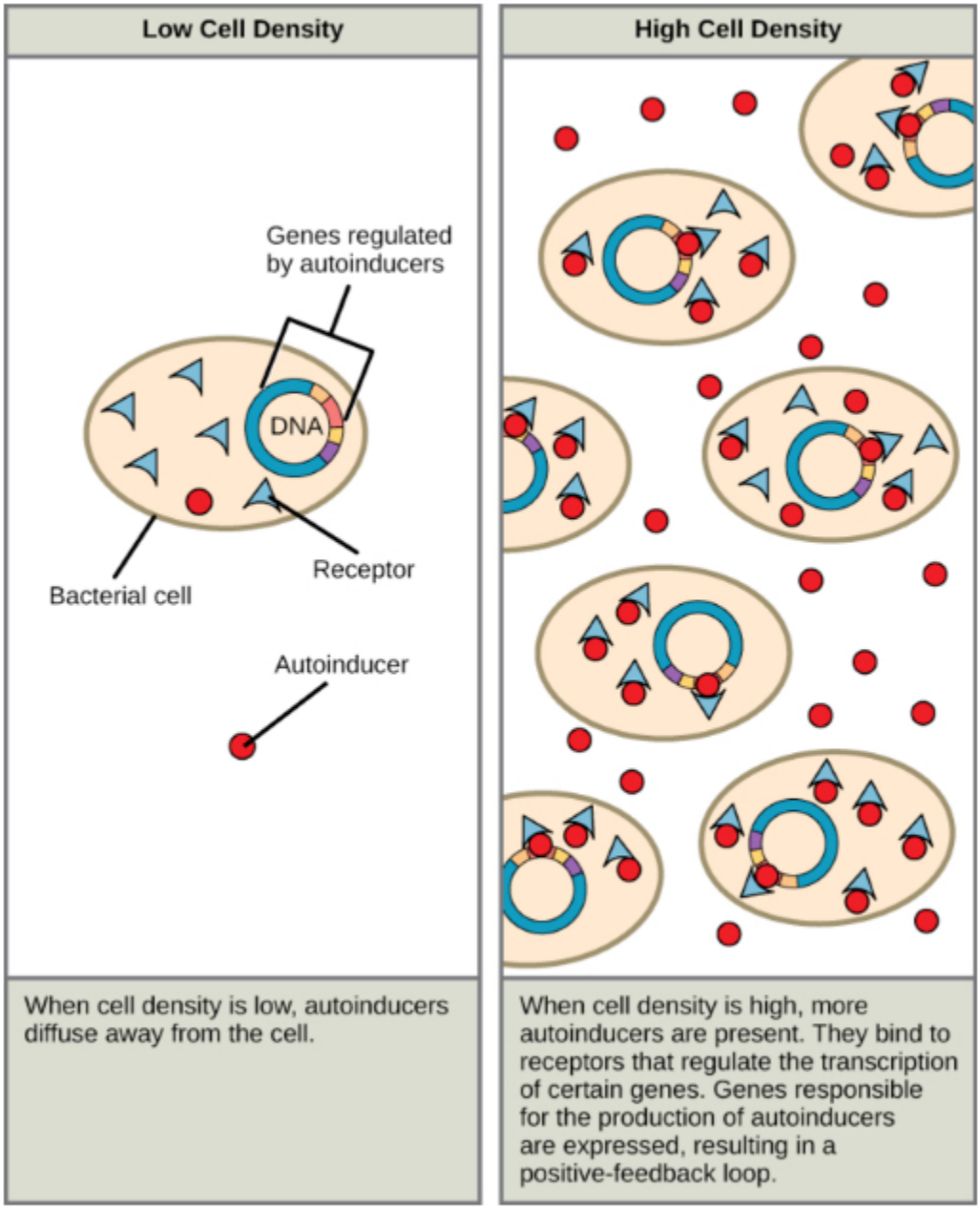
- Bacteria do not alter their behavior based on nearby bacteria.
- Bacteria alter their behavior when lots of other bacteria are nearby.
- Bacteria exist in isolation and do live near other bacteria.

- Bacteria change their behavior only when a few other bacteria are nearby.

11. In attached passages 1 and 2, the “mating factors of yeast” and “quorum sensing molecules of bacteria” are described. Which of these statements does not apply to both yeast and bacteria?



Autoinducers

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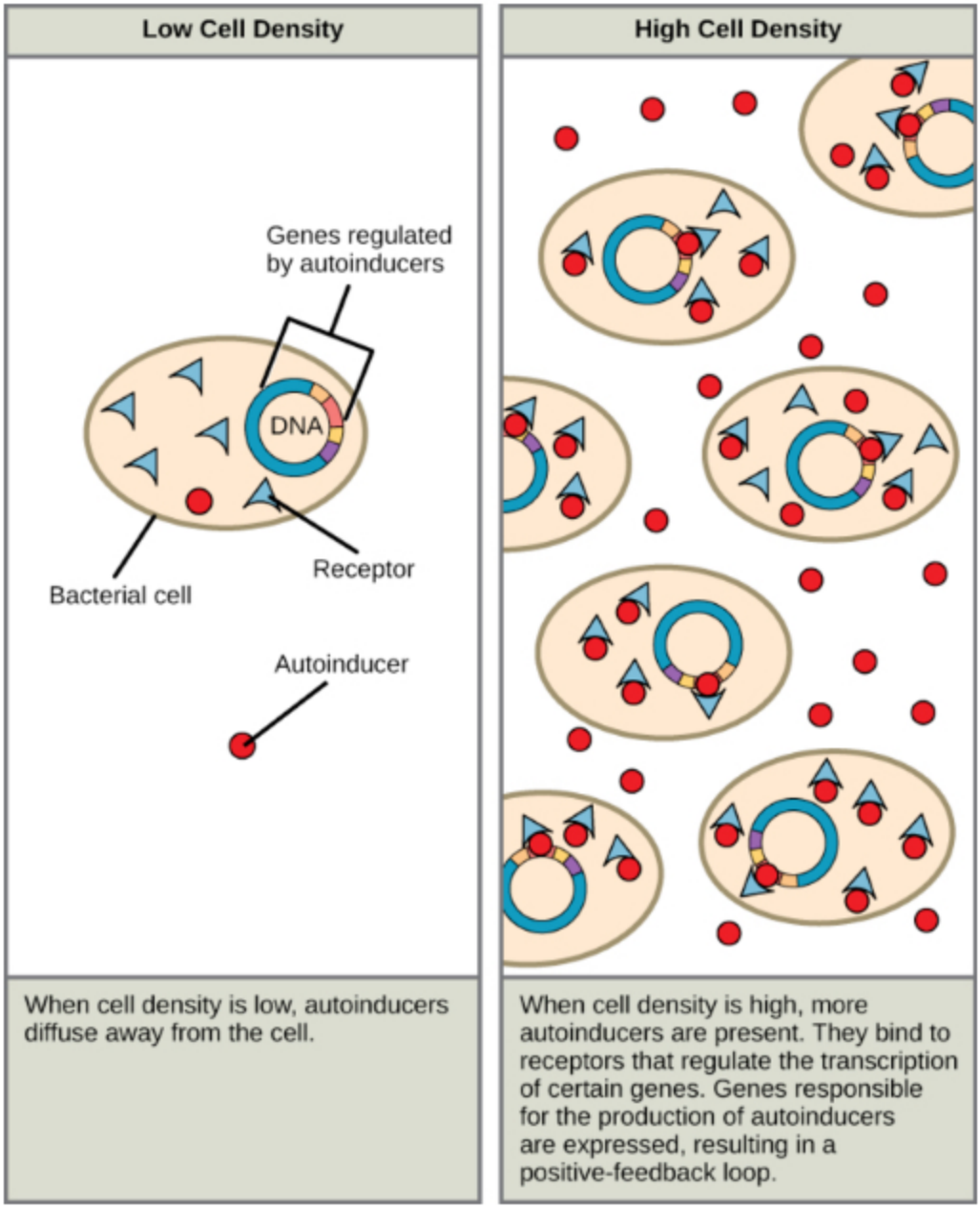
- They both are secreted.
- They both allow for communication with different species.
- They both can activate kinases.
- They both are signaling molecules.

12. Yeast are used to study signaling pathways that are present in other organisms such as humans. Referring to the attached passages, which of these signaling cascades can not be studied in yeast?

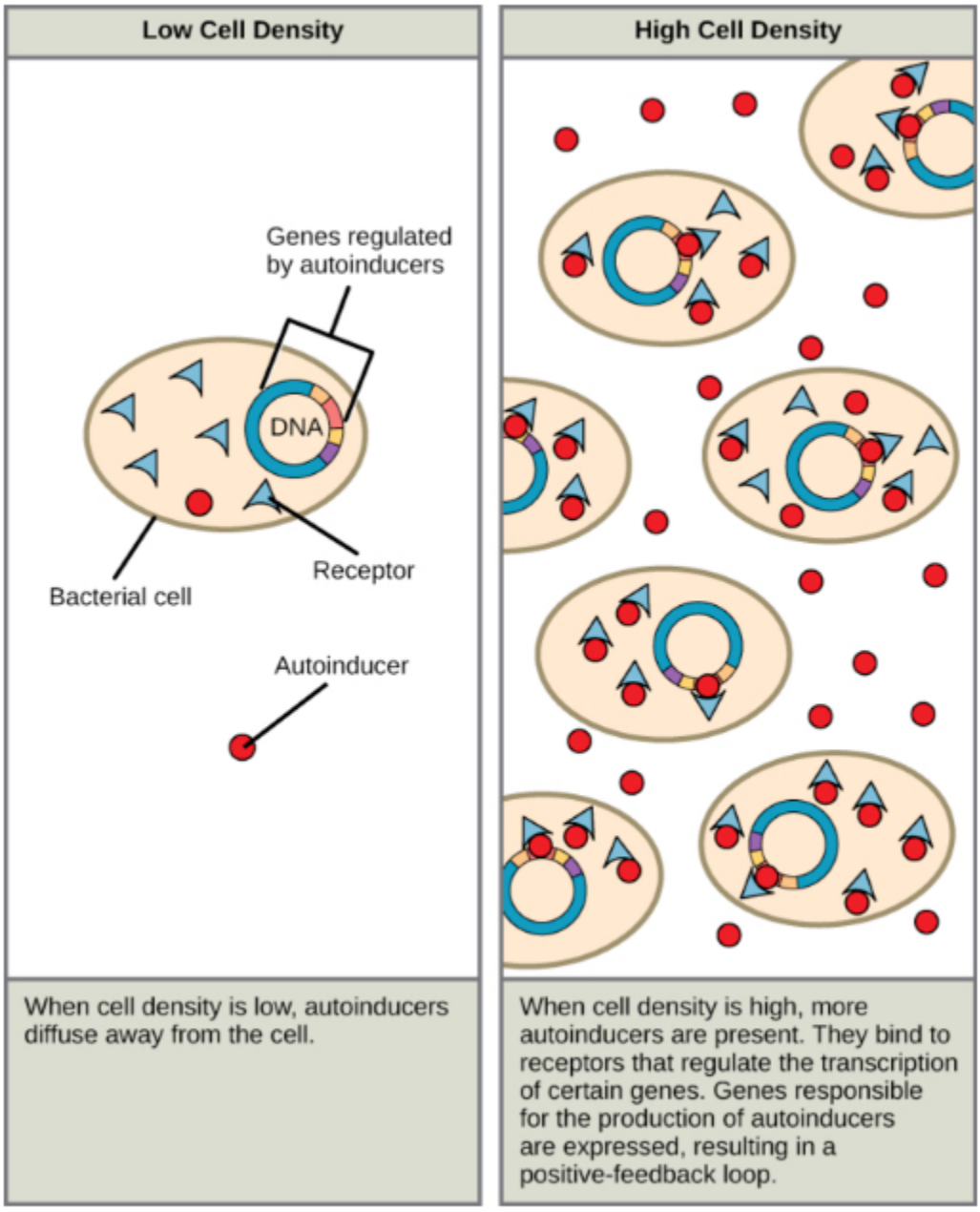


Autoinducers

Autoinducers are small molecules or proteins produced by bacteria that regulate gene expression.

- tyrosine kinases
- G proteins
- cell surface receptors
- GTP-binding proteins

13. What are hallmark features of eukaryotic cells, according to the attached passages?

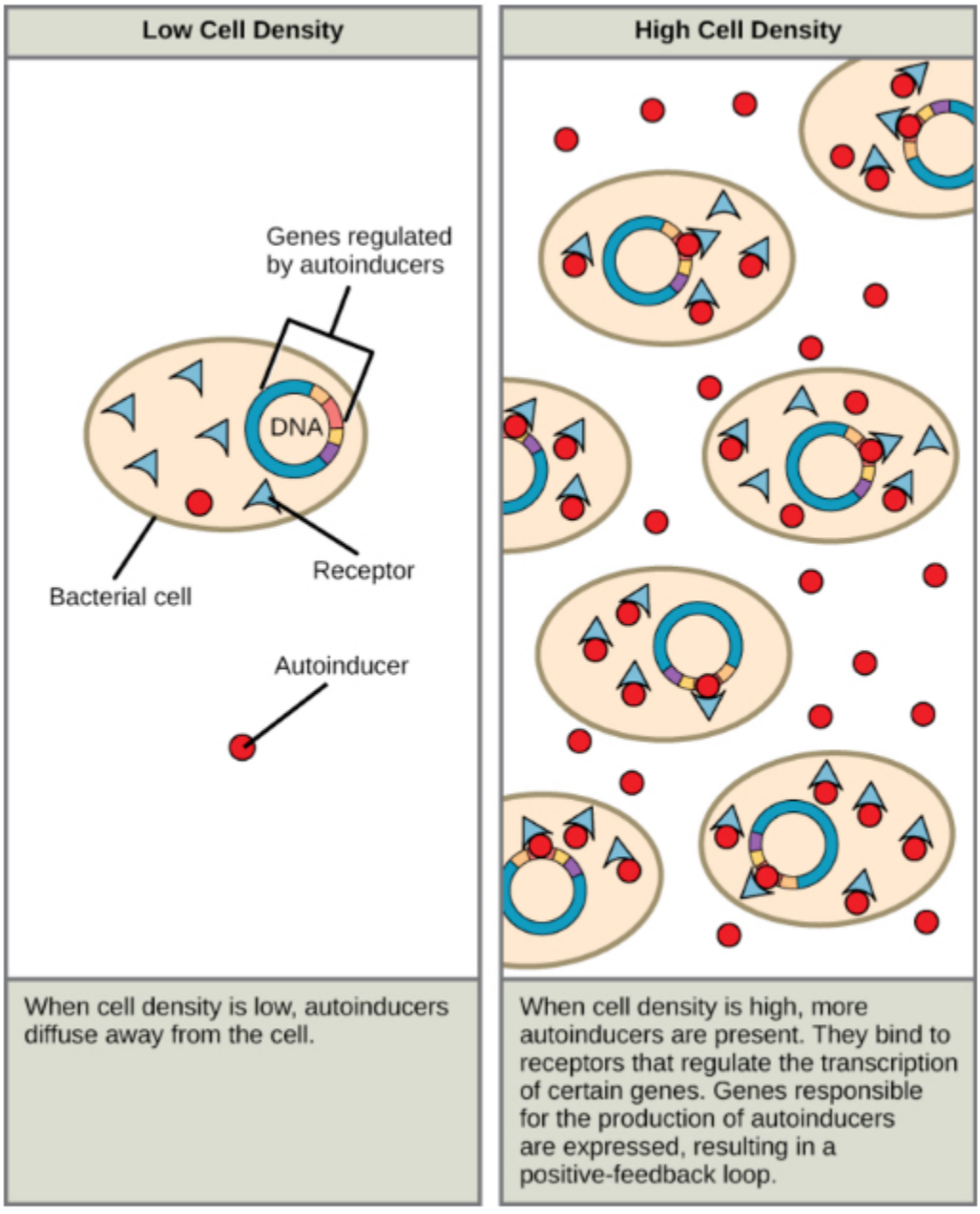


Autoinducers

Autoinducers are small molecules or proteins produced by bacteria that regulate gene expression.

- They are single-celled organisms.
- They have a nucleus and organelles.
- They produce mating factor.
- They have kinases.

14. As discussed in the attached passages, bacteria and yeast both use extracellular signaling molecules to communicate between different cells. Which of these statements best describes additional processes controlled by signaling?



Autoinducers

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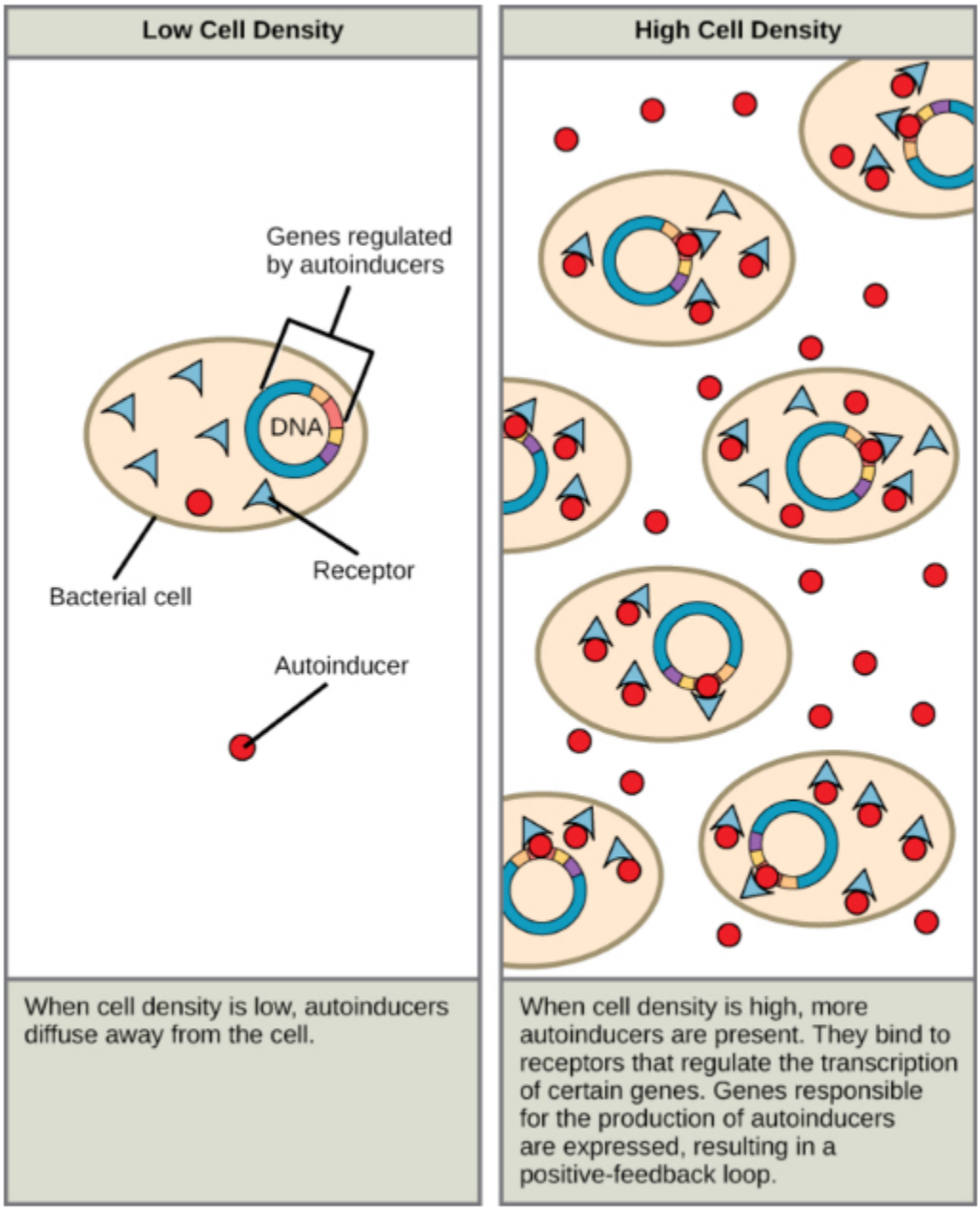
- Extracellular signaling also regulates development and differentiation of bacterial cells.
- Extracellular signaling also regulates development and differentiation of eukaryotic cells.

- Extracellular signaling also regulates light and toxin production by eukaryotic cells.
- Extracellular signaling also regulates development and differentiation of eukaryotic cells as well as light and toxin production.

15. Using the attached passages for reference, how is yeast different from other eukaryotes such as humans, nematodes, and fruit flies?



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- Signaling cascades in yeast are more complex than the other eukaryotes listed.
- Yeast is a multicellular organism, while the other listed eukaryotes are single-celled organisms.
- The listed eukaryotes produce the mating factor, while yeast do not.
- Yeast is a single-celled organism, while the other listed eukaryotes are multicellular organisms.

16. Which of these statements describes the main topic of the attached article?

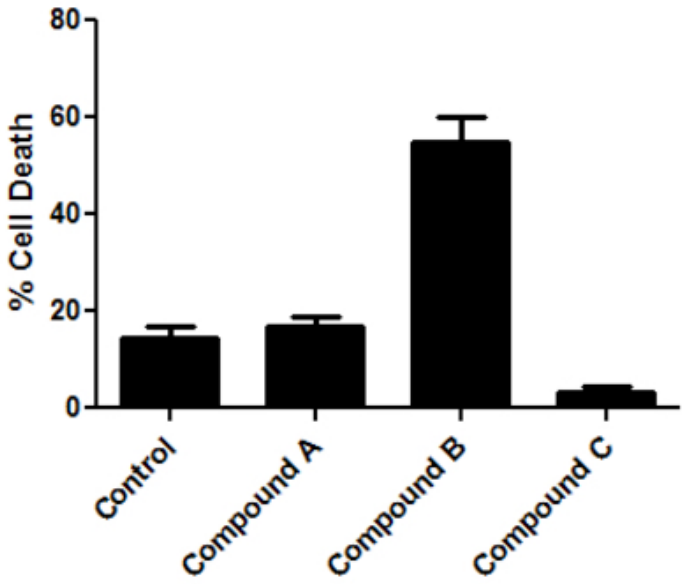


Figure 1: Scientists are testing new compounds for their ability to protect cells from death. They expose the cells to high temperatures for 1 hour and then count the dead and viable cells. The control sample contains just heat-treated cells without any additional compounds.

- The article describes how C. elegans are used to study neurodegenerative diseases.
- The article describes the novel way in which linker cells die.
- The article describes the novel way in which neurons die.
- The article describes the novel way in which HSF-1 controls apoptosis.

17. According to the attached passage, where are linker cells found?

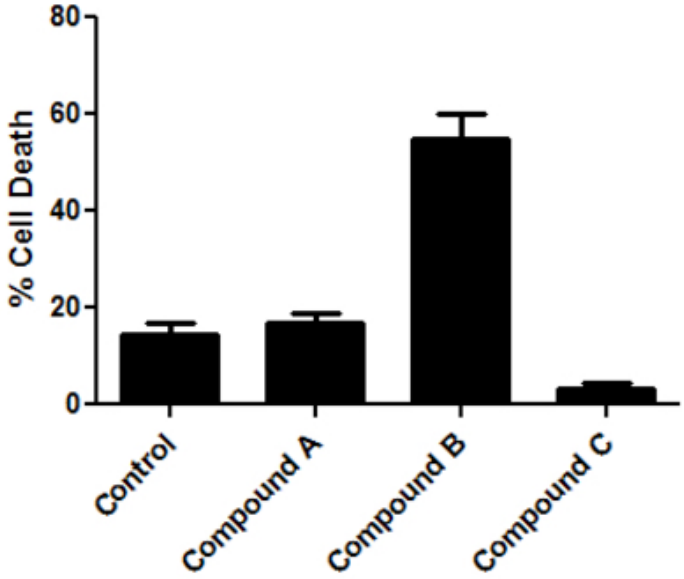
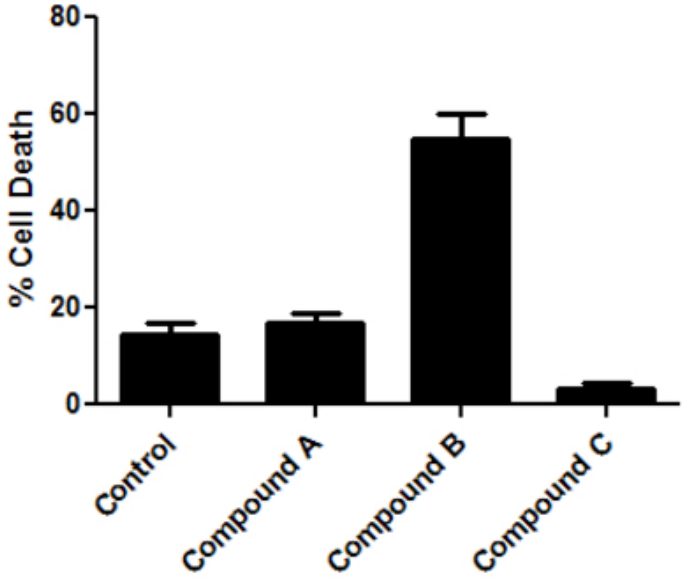


Figure 1: Scientists are testing new compounds for their ability to protect cells from death. They expose the cells to high temperatures for 1 hour and then count the dead and viable cells. The control sample contains just heat-treated cells without any additional compounds.

- Linker cells are found in young male C. elegans.
- Linker cells are found in young female C. elegans.
- Linker cells are found in adult male C. elegans.
- Linker cells are found in all C. elegans, but not in mice or fruit flies.

18. Scientists are testing new compounds for their ability to prevent cell death. Referring to the attached image, which of the tested compounds has the potential to help patients with neurodegenerative diseases?



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- Compound C
- Control
- Compound A
- Compound B

19. Originally, HSF-1 was found to be involved in which cellular process, according to the attached passage?

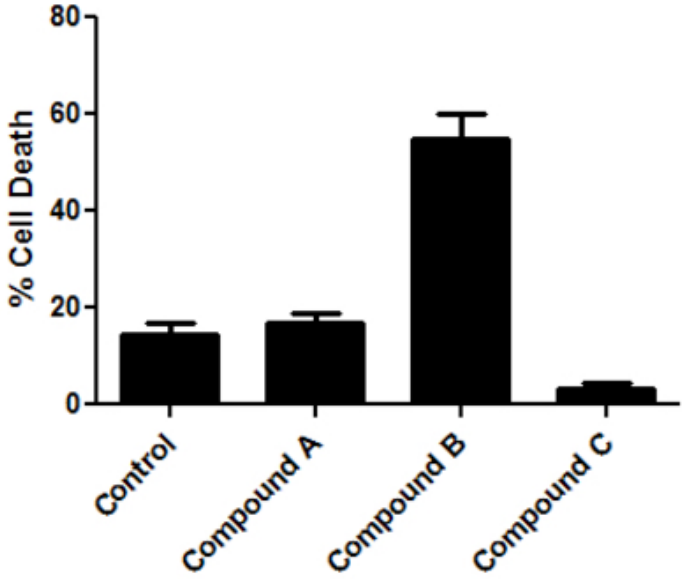

Figure 1: Scientists are testing new compounds for their ability to protect cells from death. They expose the cells to high temperatures for 1 hour and then count the dead and viable cells. The control sample contains just heat-treated cells without any additional compounds.

- HSF-1 was originally identified as a protein important for surviving high temperatures.
- HSF-1 was originally identified as a protein important for the survival of neurons in worms, fruit flies, and mice.
- HSF-1 was originally identified as a protein that controlled how some cells such as linker cells die.
- HSF-1 was originally identified as a protein mutated in patients with Huntington's disease.

20. According to the attached passage, Dr. Shaham thinks that modulating HSF-1 activity in patients with neurodegenerative disease could help these patients. Specifically, he thinks that stressing neurons in these patients will switch HSF-1 to a protective, rather than killing, role. Which of these observations would support his hypothesis?

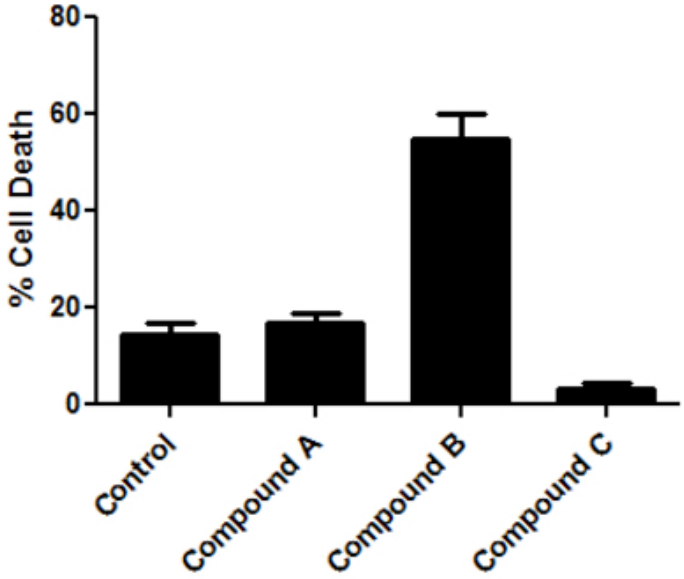

Figure 1: Scientists are testing new compounds for their ability to protect cells from death. They expose the cells to high temperatures for 1 hour and then count the dead and viable cells. The control sample contains just heat-treated cells without any additional compounds.

- A higher percentage of people have neurodegenerative diseases in countries with high temperatures (>90F).
- A lower percentage of young males have neurodegenerative diseases.
- A lower percentage of young females have neurodegenerative diseases.
- A lower percentage of people have neurodegenerative diseases in countries with high temperatures (>90F).