

AQA Biology GCSE

3.2 - Monoclonal Antibodies (biology only) (higher only)

Flashcards

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What are monoclonal antibodies (mAbs)?



What are monoclonal antibodies (mAbs)?

- Antibodies that are clones from one parent cell
- Specific to one type of antigen



Describe how monoclonal antibodies are produced



Describe how monoclonal antibodies are produced

1. Specific antigen injected into an animal (e.g. mouse).
2. B-lymphocytes producing complementary antibodies extracted.
3. B-lymphocytes fuse with myeloma cells to form **hybridoma** cells - these cells can divide and produce antibody.
4. Hybridoma cells cultured.
5. Monoclonal antibodies collected and purified.



Outline the uses of monoclonal antibodies



Outline the uses of monoclonal antibodies

- Detection of pathogens
- Location of cancer cells and blood clots
- Treatment of cancer
- Used in pregnancy test kits



What are myeloma cells?



What are myeloma cells?

Type of tumour cell



Outline the uses of monoclonal antibodies



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- Detection of pathogens
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- Used in pregnancy test kits



What do pregnancy kits test for?



What do pregnancy kits test for?

hCG in urine



What does a pregnancy test consist of?



What does a pregnancy test consist of?

A stick containing monoclonal antibodies (mAbs) specific to hCG:

- mAbs attached to a blue bead (free to move)
- mAbs fixed to the test stick

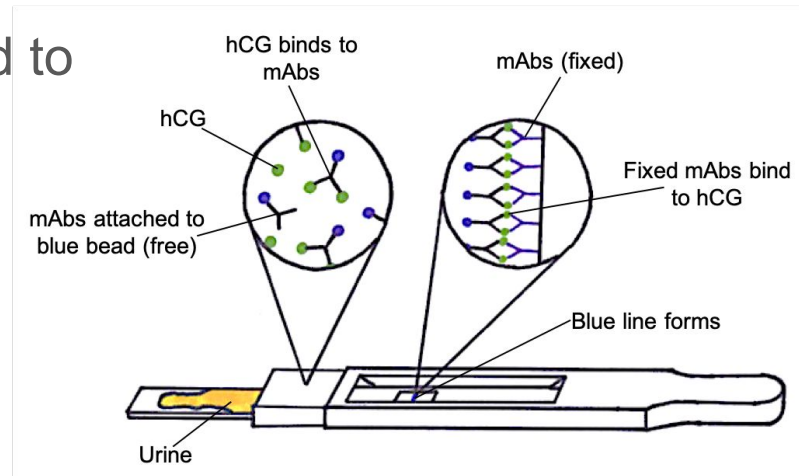


Describe what happens to the test stick if
a woman is pregnant



Describe what happens to the test stick if a woman is pregnant

- hCG in urine binds to mAbs attached to a blue bead.
- mAbs with hCG diffuse up dipstick.
- mAbs fixed to the stick bind to hCG.
- Blue line forms.



Describe what happens to the test stick if
a woman is not pregnant



Describe what happens to the test stick if the pathogen is not present

No hCG in urine so a blue line is not formed.



What is the advantage of using monoclonal antibodies to test for pathogens?



What is the advantage of using monoclonal antibodies to test for pathogens?

- Specific to one particular antigen
- Very accurate
- Quick results



Why can monoclonal antibodies be used to target cancer cells?



Why can monoclonal antibodies be used to target cancer cells?

- Cancer cells have specific antigens called ‘tumour markers’ on their membranes.
- mAbs are specific to one type of antigen so can be targeted to ‘tumour markers’ without damaging other cells.



Describe how monoclonal antibodies can be used to diagnose cancer



Describe how monoclonal antibodies can be used to diagnose cancer

- mAbs tagged to a radioactive substance.
- mAbs injected into the patient's bloodstream.
- mAbs bind to 'tumour markers' on cancer cells.
- Emitted radiation is detected using a specialised scanner enabling doctors to determine the location of cancer cells.



How can monoclonal antibodies be used to target drugs to cancer cells?



How can monoclonal antibodies be used to target drugs to cancer cells?

- mAbs attached to an anti-cancer drug.
- mAbs injected into the patient's bloodstream.
- mAbs bind to 'tumour markers' on cancer cells.
- Anti-cancer drug destroys cancer cells.



Why are cancer treatments that use monoclonal antibodies favoured over traditional treatments?



Why are cancer treatments that use monoclonal antibodies favoured over traditional treatments?

- Radiotherapy and chemotherapy target rapidly dividing cells.
- Healthy cells (e.g. hair follicle cells, bone marrow cells) are damaged as a consequence, producing unpleasant side effects.
- mAbs only target cancer cells, reducing damage to normal cells.



How can monoclonal antibodies be used to locate blood clots?



How can monoclonal antibodies be used to locate blood clots?

- mAbs tagged to a radioactive substance.
- mAbs target and bind to specific proteins in blood clots.
- Radiation emitted by mAbs is detected, enabling the location of blood clots to be identified.

