Antibodies are proteins with specific binding sites synthesises by B cells.

Antibodies

When the body is infected by a non-self material, a B cell produces a specific antibody. This reacts with an antigen on the surface of the non-self material by binding to them. **Each antibody has two identical binding sites. These are complementary to a specific antigen. The massive variety of antibodies is possible because they are made of proteins.**

Antibodies are made up of four polypeptide chains. The chains of one pair are long = heavy chains, whereas the chains of the other pair are shorter = light chains.

The binding site that is complementary to specific antigens forms the antigen-antibody complex.

The binding site is different on different antibodies—variable region.

Each binding site consists of sequences of amino-acids that form a specific 3D shape that binds directly to a specific antigen. The rest of the antibody is the constant region. This binds to receipts' on cells such as B cells.

How the antibody leads to the destruction of the antigen:

ANTIBODIES DO NOT DESTROY ANTIGENS DIRECTLY, THEY PREPARE IT FOR DESTRUCTION.

They can:

Cause agglutination of the bacterial cells. Clumps of bacterial cells are formed, making it easier for the phagocytes to locate them as they are less spread-out in the body.

They then serve as markers that stimulate phagocytes to engulf the bacterial cells to which they are

Monoclonal antibodies:

Bacteria or other microorganisms entering the body are likely to have hundreds of different antigens on their surface. Each antigen will induce a different B cell to multiply and form a clone of itself. Each of these clones will produce a different antibody. There is medical value on being able to produce antibodies outside the body and **even better if a ingle type can be isolated and cloned = such antibodies are called monoclonal antibodies.**

Targeting medication to specific cell types by attaching a therapeutic drug to an antibody:

As an antibody is very specific to particular antigen, monoclonal antibodies can be used to target specific substances and specific cells. One type of cell they can target are cancer cells. Direct monoclonal therapy:

Monoclonal antibodies are produced that are specific to antigens on cancer cells.

These antibodies are given to a patient and attach themselves to the receptors on their cancer cells

They attach to the surface of their cancer cells and block the chemical signals that stimulate their uncontrollable growth.

An example is Herceptin. (used to treat breast cancer)./ indirect monoclonal therapy involves attaching a radioactive or cytotoxic drug to the monoclonal antibody.

Monoclonal antibodies are important in medical diagnosis.

Pregnancy testing:

Testing kits rely on the fact that **the placenta produces a hormone called human chorionic gonadotrophin (hCG) and this is found in mothers urine.** Monoclonal antibodies present on the test strip of a testing kit and a re linked to coloured particles. **If hCG is present it binds to these antibodies. The hCG-antibody-colour complex moves along the strip until it is trapped by a different type of antibody creating a coloured line.**

Ethical Use of monoclonal antibodies:

- Production involves the use of mice. They produce both antibodies and tumour cells = inducing cancer in mice.
- Some deaths have been associated with their use in treatment of multiple sclerosis. = important that patients have full knowledge of risks.

Society must use the ussies raised here, with current scientific knowledge to make decisions about their use.