

Monoclonal antibodies

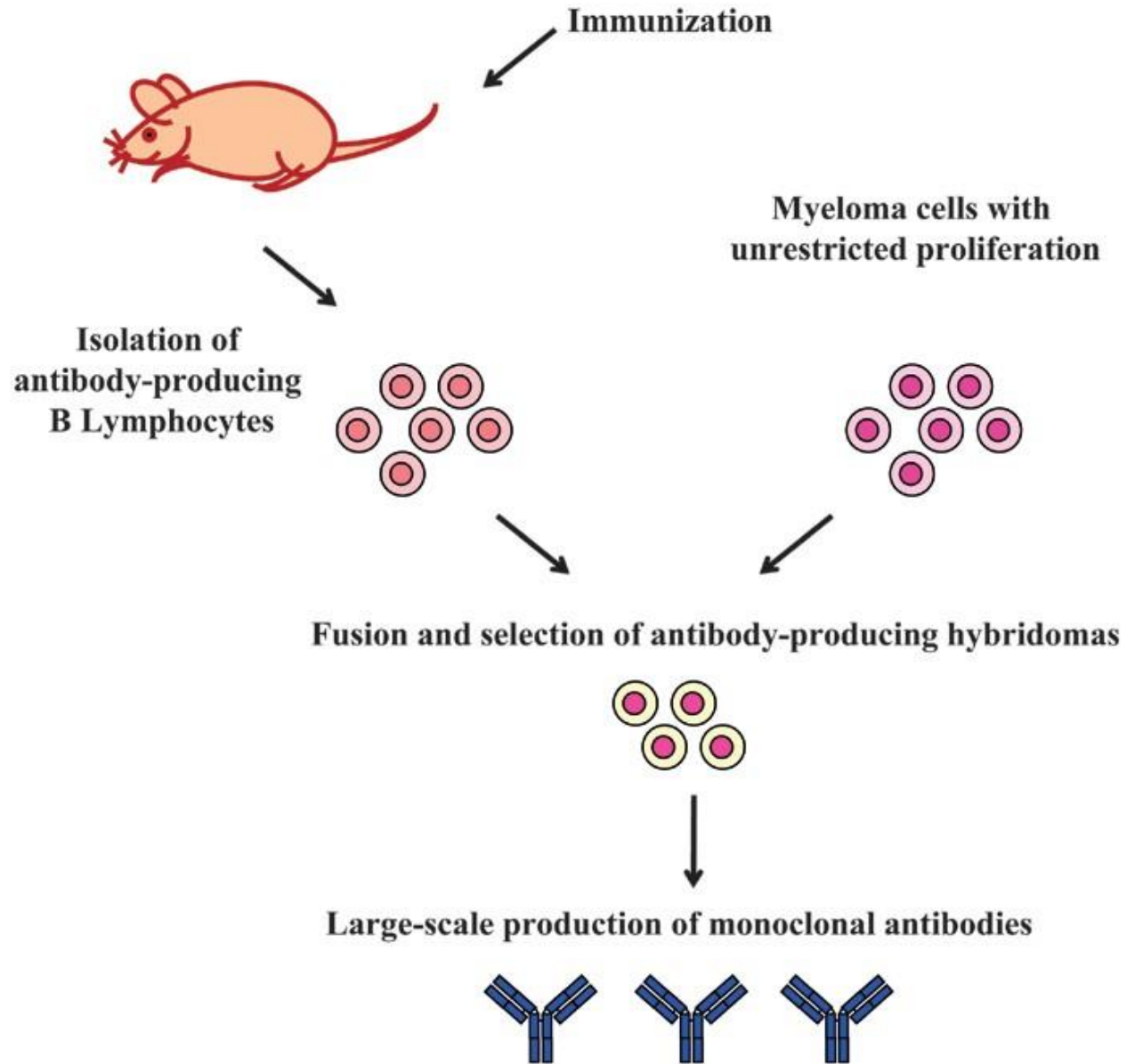
Monoclonal antibodies

- The antibodies produced in the body are polyclonal antibodies.
- With the help of biotechnology and advance techniques, it is now possible to produce monoclonal antibodies.
- Monoclonal antibodies are specific for the antigens and they are specialized to bind with a particular antigen. Thus having the monovalent affinity.
- Monoclonal antibodies possess many advantages over polyclonal antibodies including their high binding affinity, high selectivity for their antigens and the consistency of production.

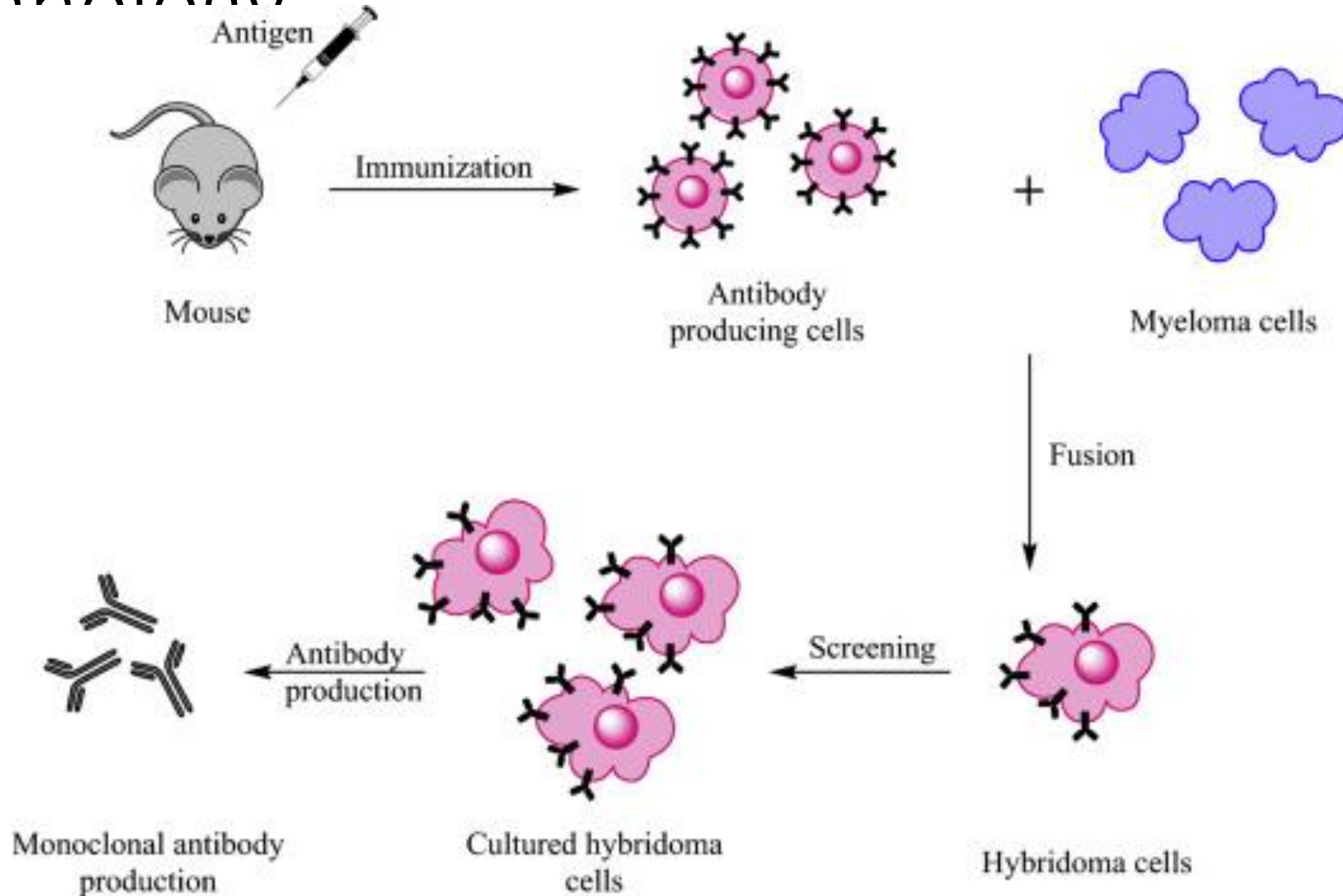
- Antibody-producing cells such as B lymphocytes cannot be cultured for extended periods of time
- Monoclonal antibodies cannot be obtained by this method.
- However, it is possible to produce monoclonal antibodies in a more consistent manner by using the hybridoma technology and the DNA technology.

Hybridoma technology

- The hybridoma technology involves the use of myeloma cells, which are immortal cells, to produce immortal cells that can generate the antibody of interest.
- Fusion of myeloma cells and the antibody-secreting cells is used to produce hybridomas.
- Now this hybridomas has the ability to produce the specific antibody in the same way as it can be produced by the antibody producing cells.
- And the hybridoma cell is immortal because of the myeloma cells, used in fusion.
- So the hybridoma cell can be used to produce a large quantity of specific antibodies and can be cultured for further use.
- An example of a monoclonal antibody drug used in treating cancer is trastuzumab (Herceptin), which is used for the treatment of breast cancer (Molina et al., 2001).



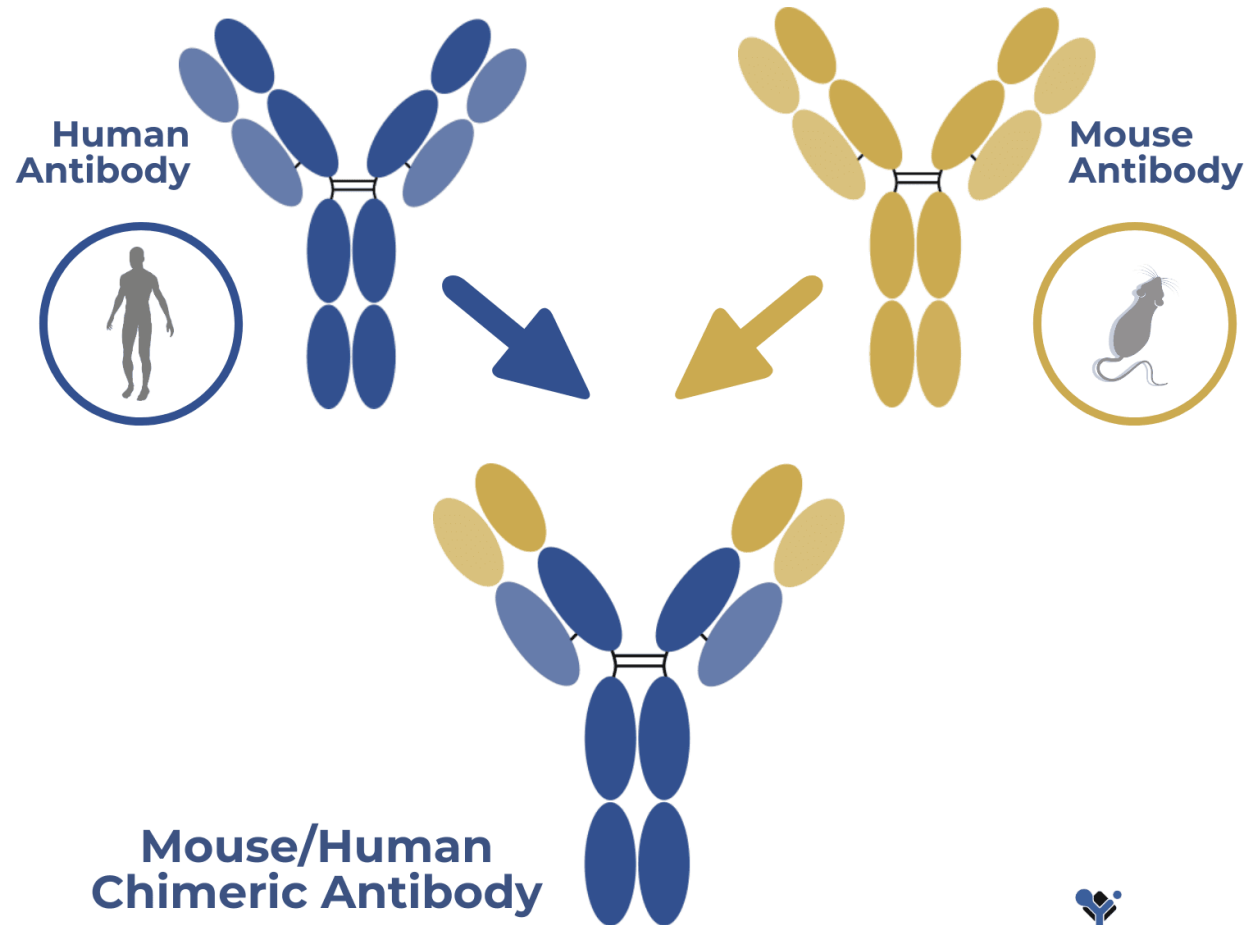
The general principle of hybridoma technology



Chimeric antibodies

- **Chimeric antibodies** are molecules made up of domains from different species.
- For example, the Fc region or all the constant regions of a mouse mAb may be replaced with those of a human or (any other species) antibody.
- Chimeric antibodies are needed because human patients body started reaction to the monoclonal antibodies which is produced in mouse, as foreign proteins,.
- It makes the chronic antibody treatment ineffective and causing complications due to [immune complex](#) formation.
- This is known as the [human anti-mouse antibody](#) (or HAMA) response.
- By replacing as much of the non-antigen binding part of the antibody as possible with human antibody (i.e., **humanization**), this response is reduced without affecting [antigen](#) binding.

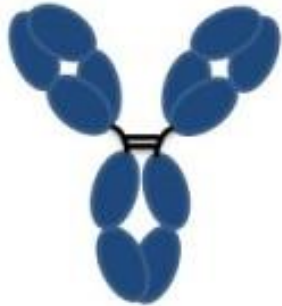
What are chimeric antibodies



IgG



mouse



human

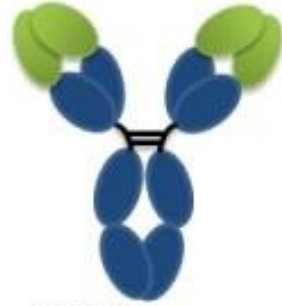


rabbit

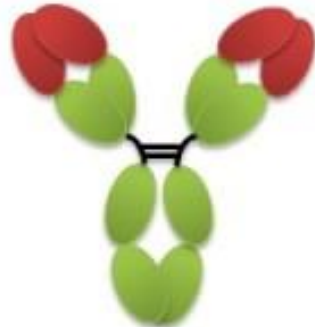
Chimeric Antibody (cAb)



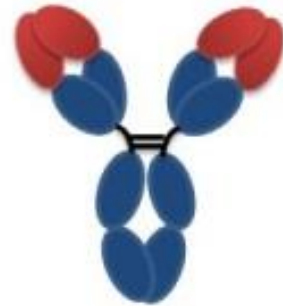
rabbit/mouse cAb



rabbit/human cAb

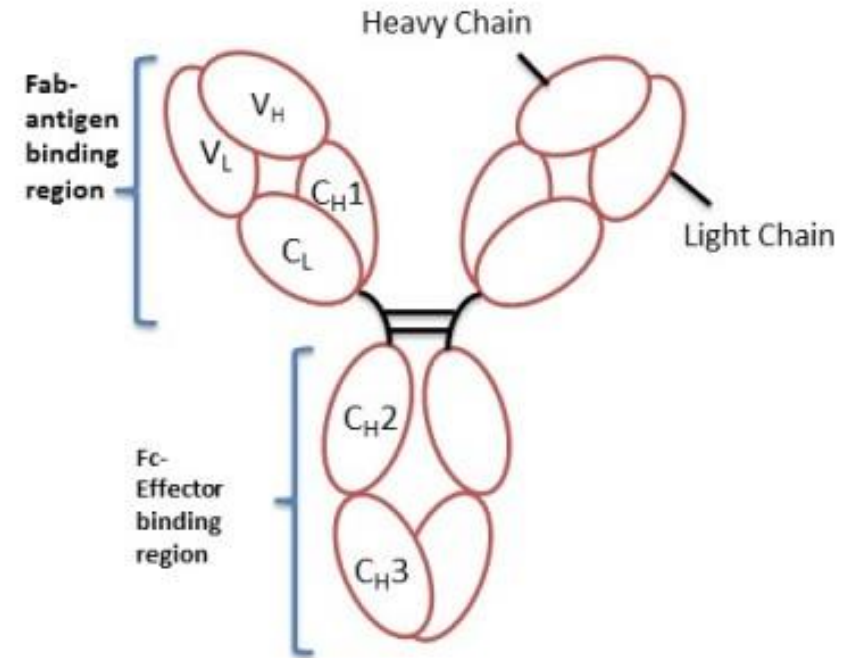


mouse/rabbit cAb



mouse/human cAb

Antibody Structure



- Mouse sequences
- Human sequences
- Rabbit sequences