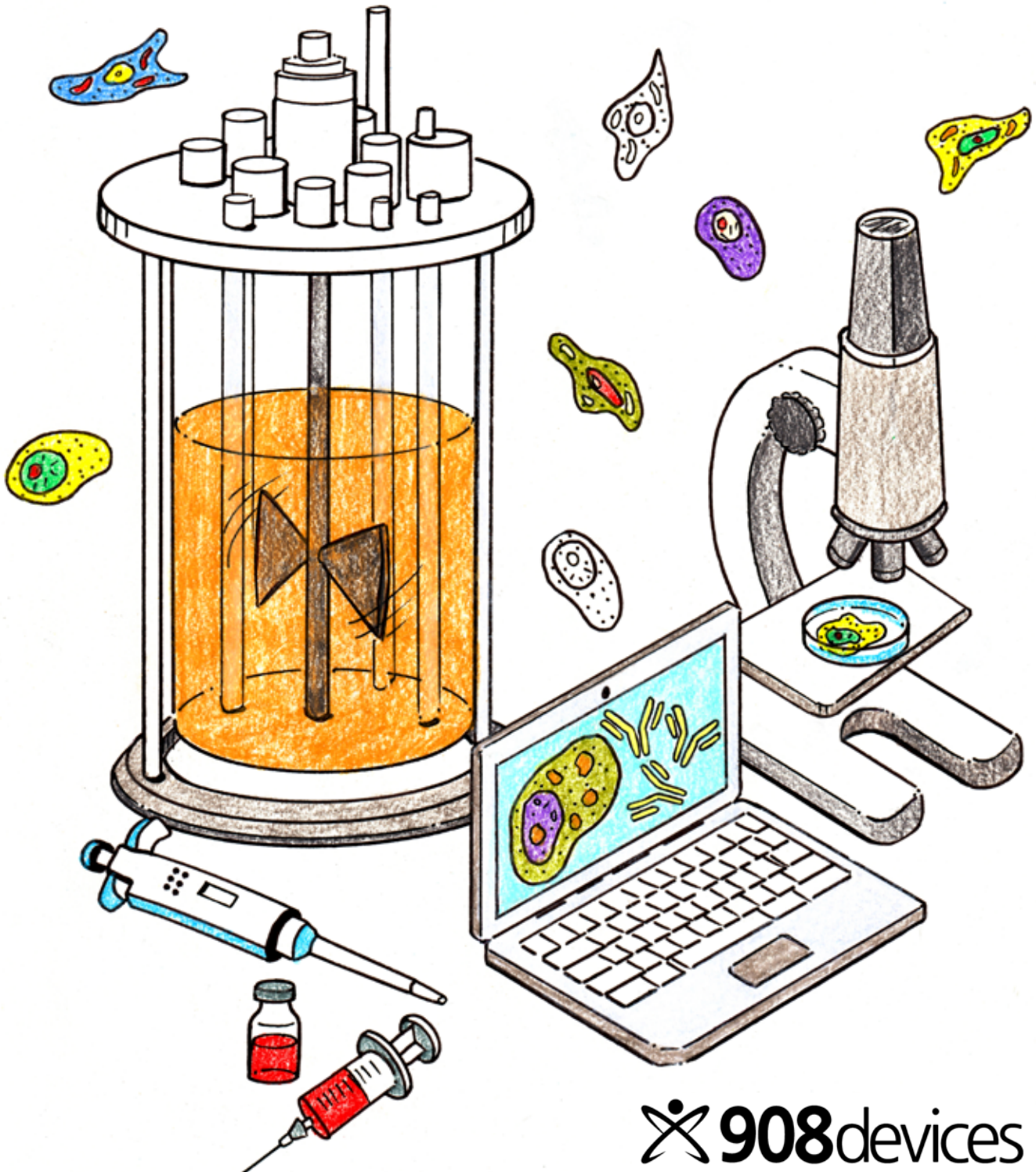


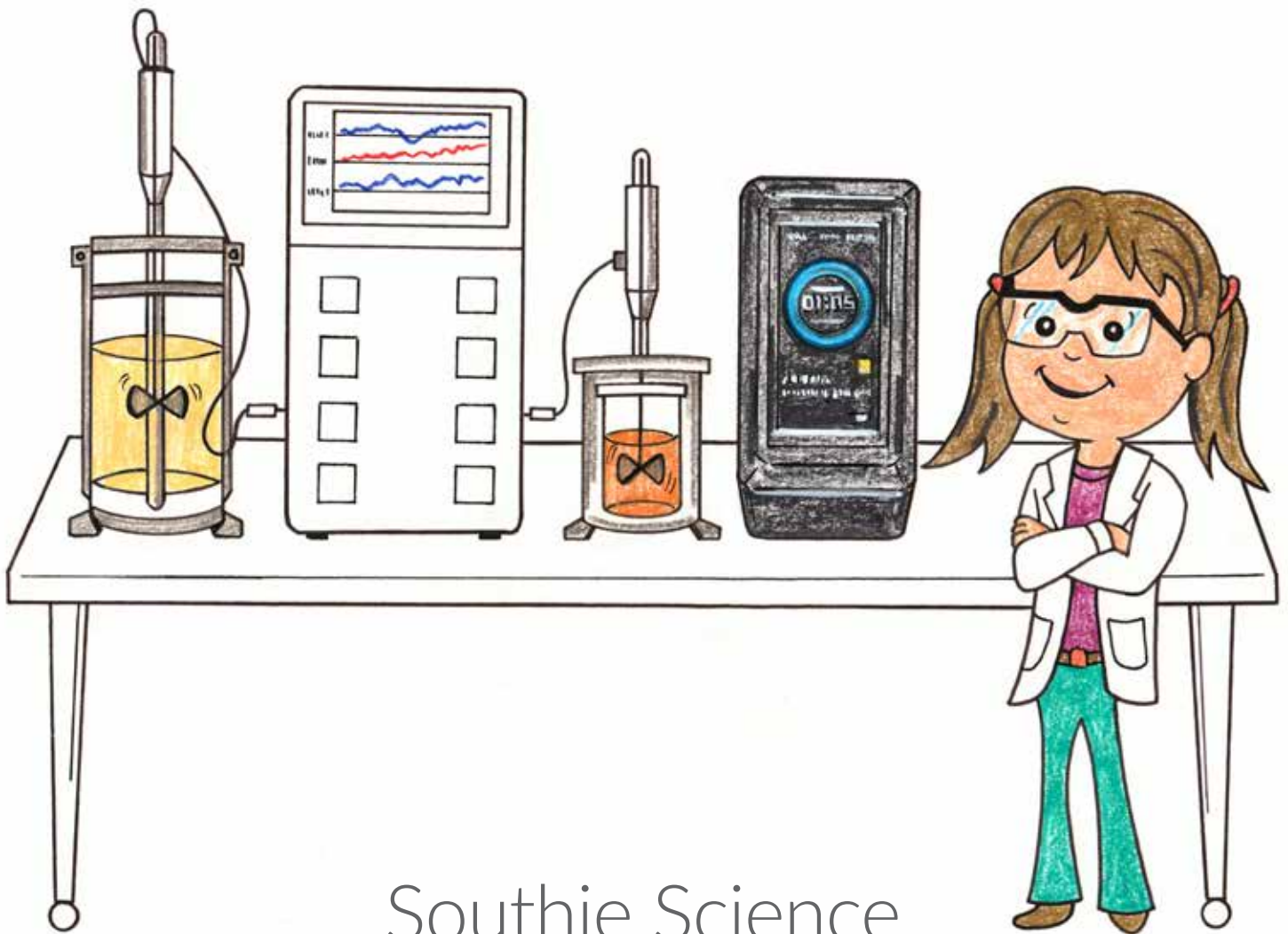
Southie Science

presents

# Bioprocessing



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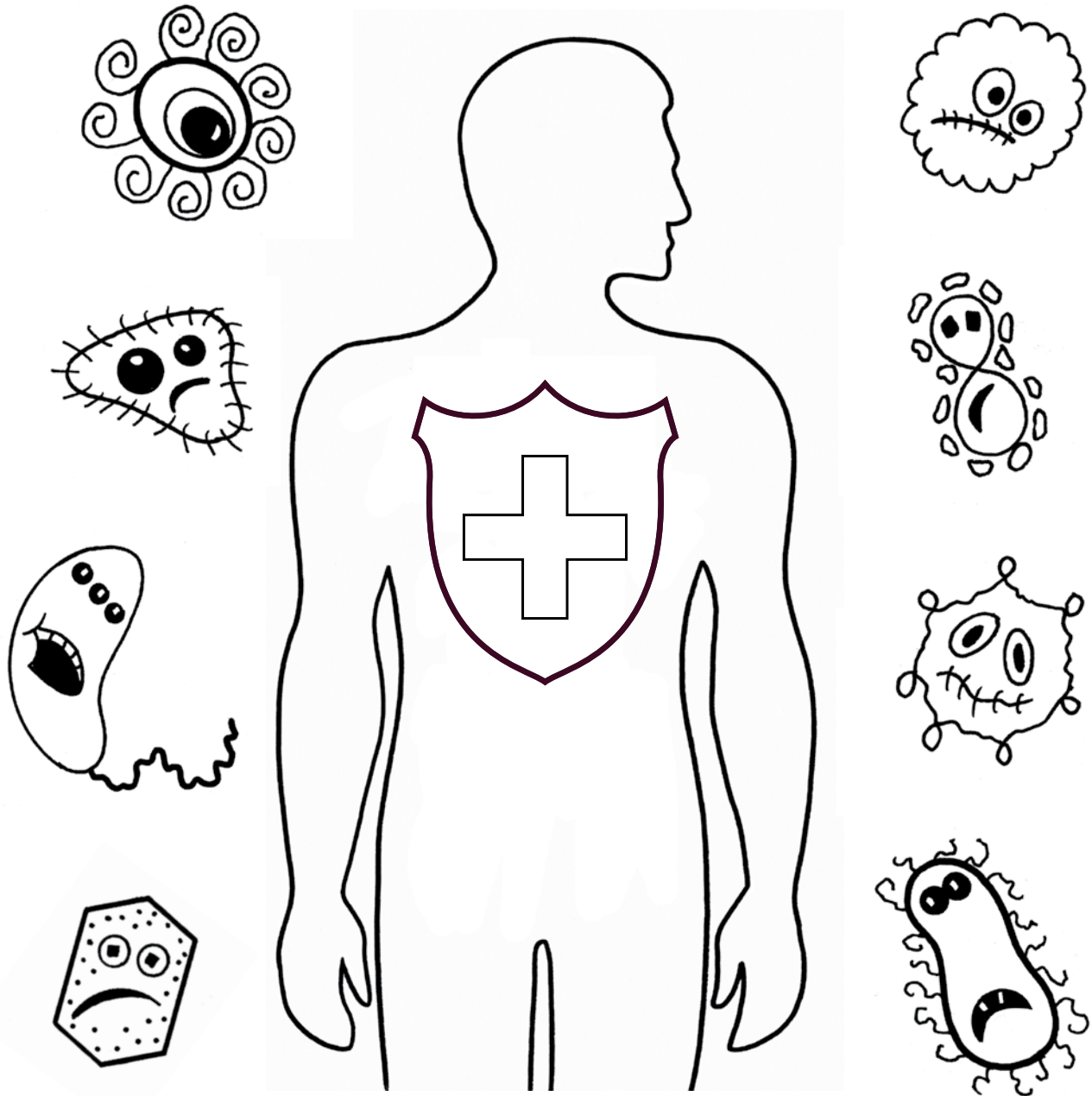
## Southie Science presents Bioprocessing

We are excited to share with you the awesome journey many scientists and engineers embark on every day. Learn how they grow specialized cells to make powerful medicines in the lab. This is called “bioprocessing.” Read, color, and learn how our body’s natural defenses inspire new medicines to be made.

Glenn A. Harris, PhD

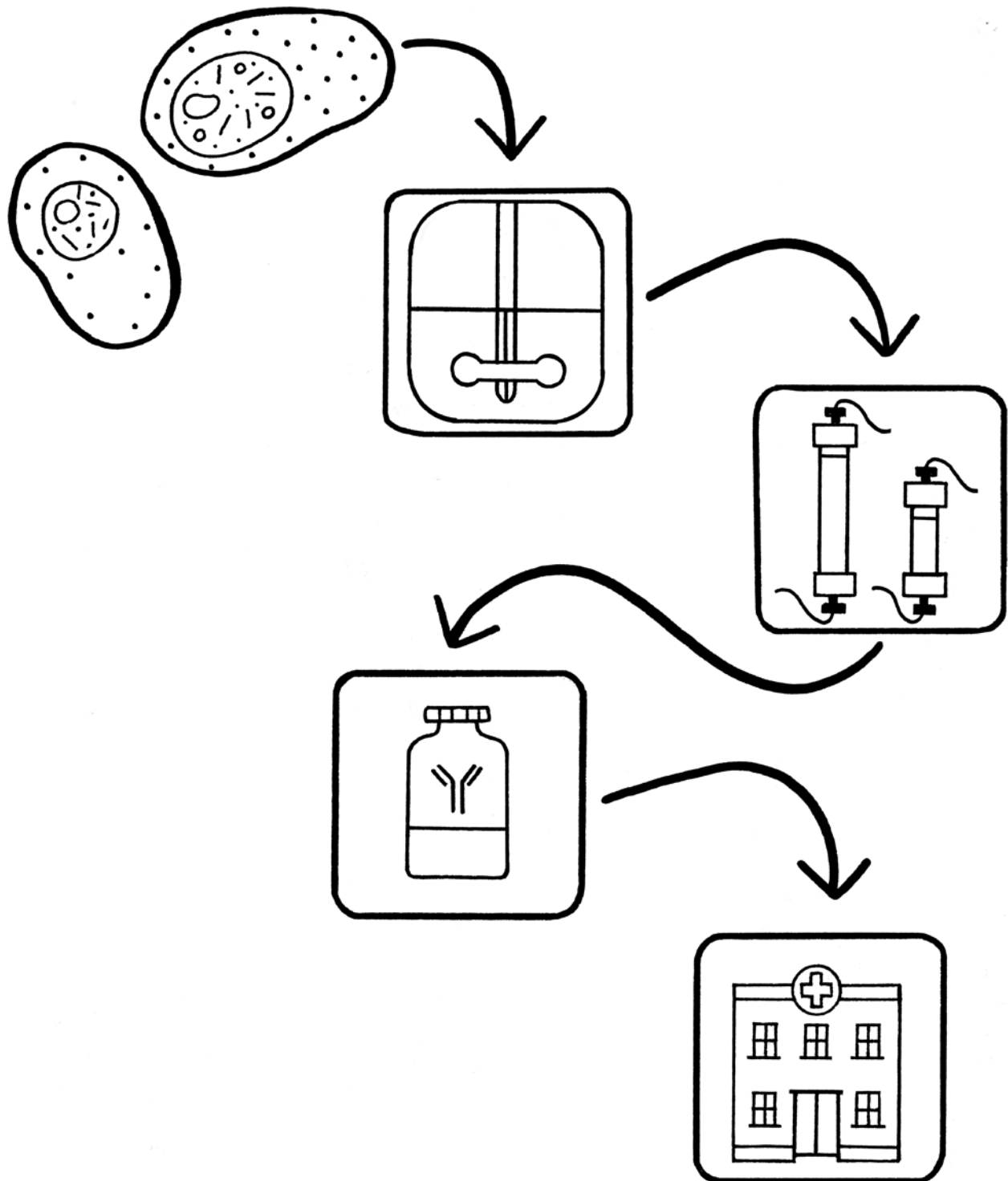


When our body is under attack, our immune system fights back with help from proteins called antibodies.



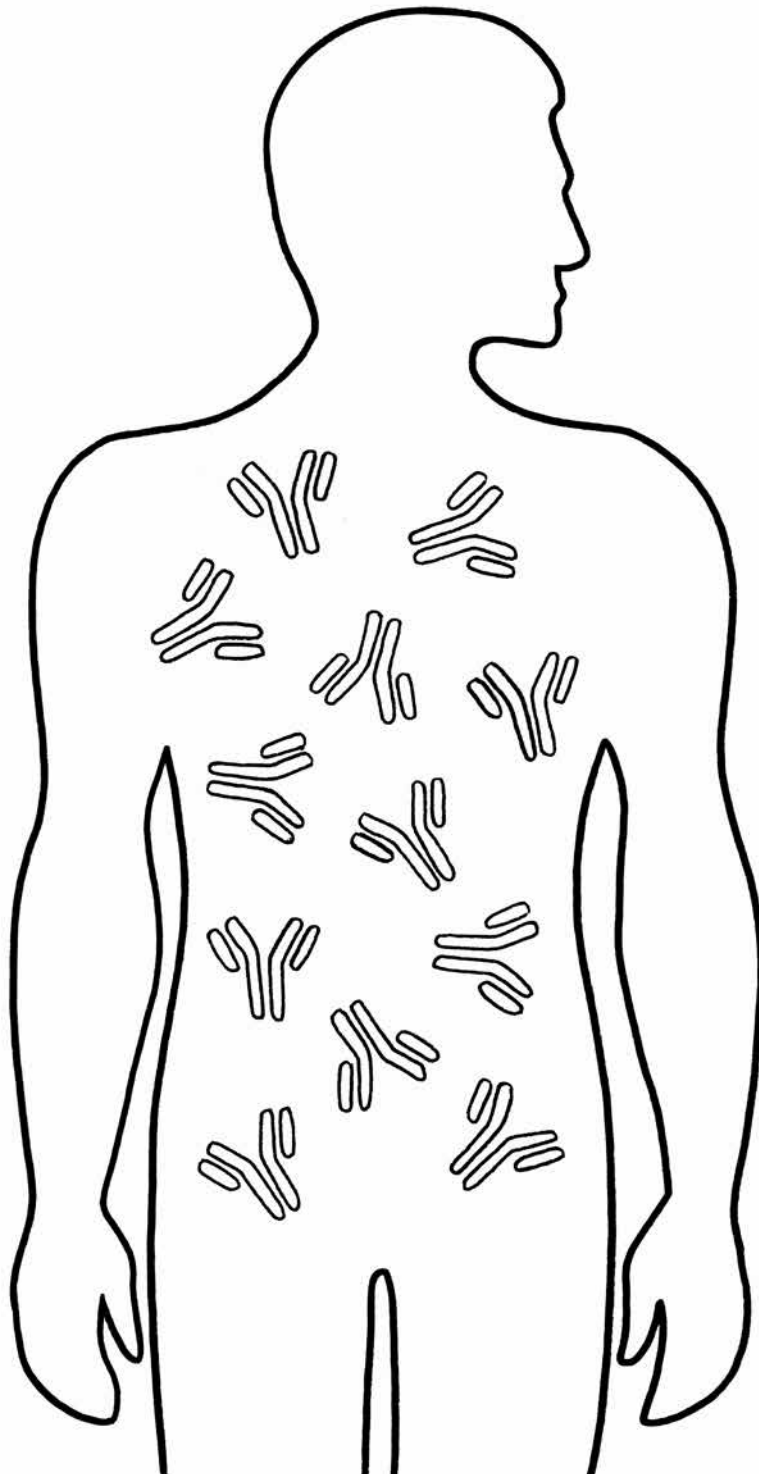
Medicines made from bioprocesses help our body's immune system identify and destroy whatever is making us sick by using antibodies made in a lab.

A bioprocess uses cells to make new drugs and vaccines.



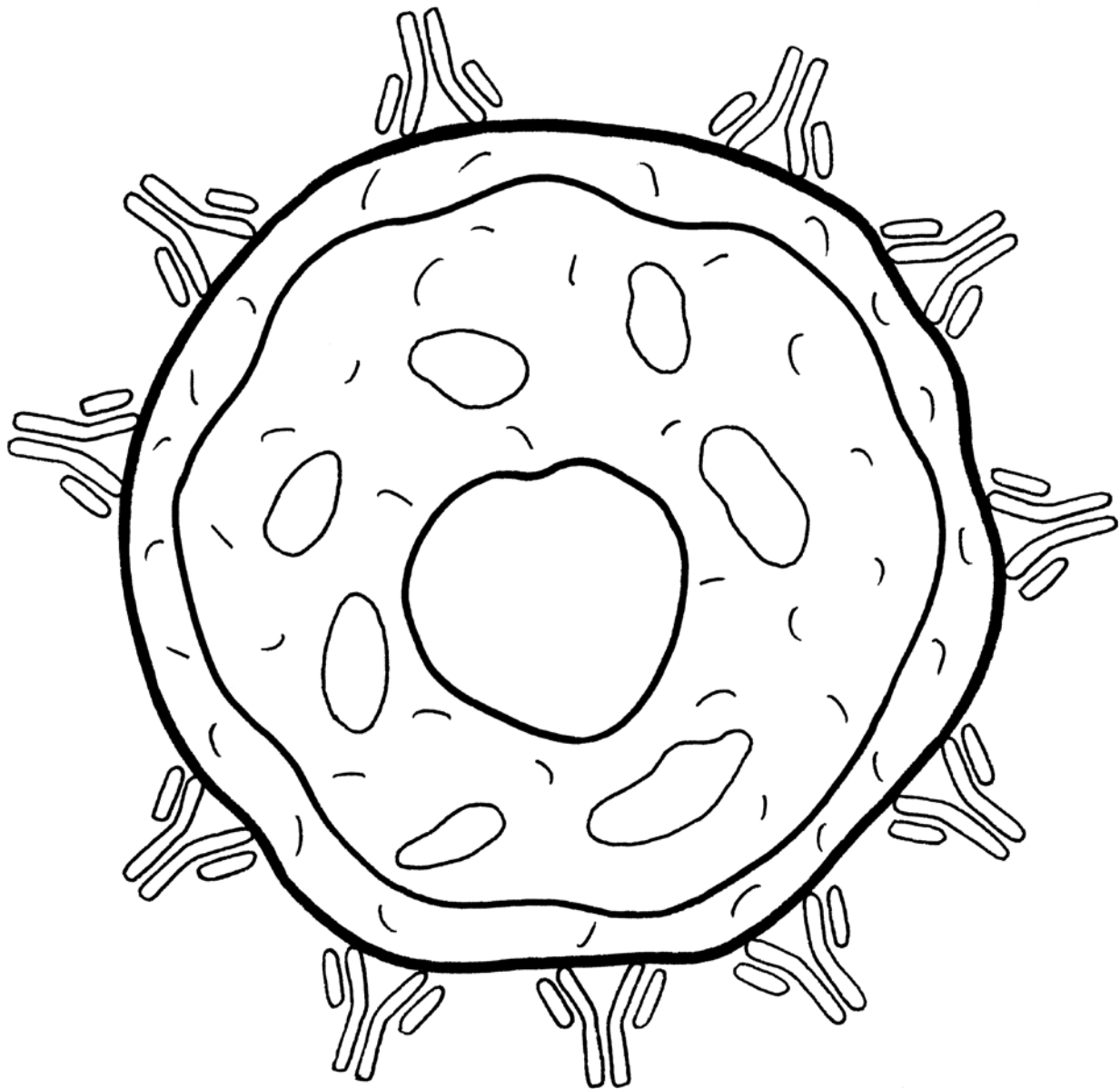
Doctors use these medicines to prevent or treat diseases that are difficult to treat with traditional methods.

Some bioprocesses make monoclonal antibodies or mAbs for short.



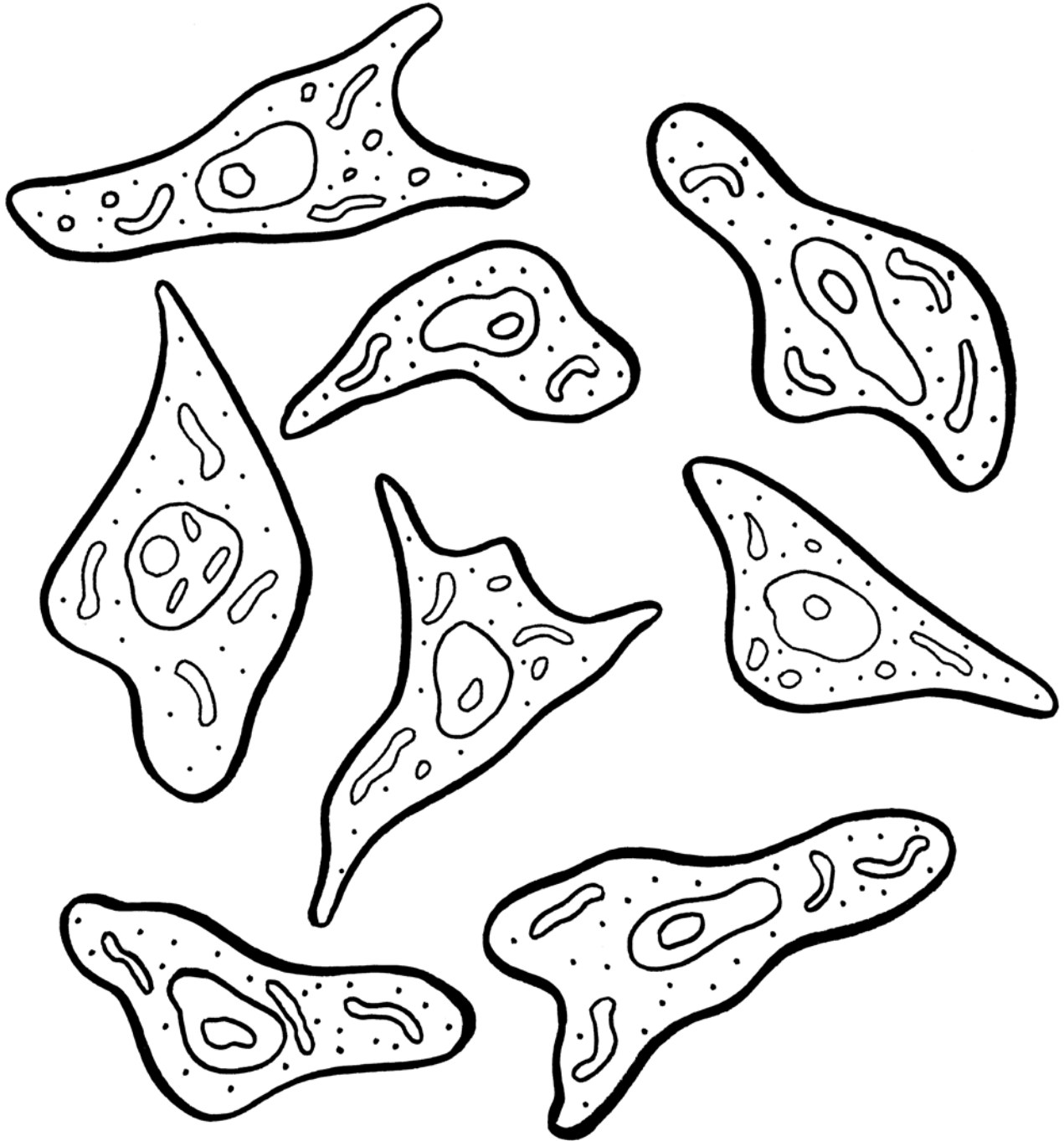
The mAbs are powerful Y shaped proteins that help our immune system fight off disease.

The mAbs find and attach to harmful cells and alert other fighters in our immune system to destroy them.



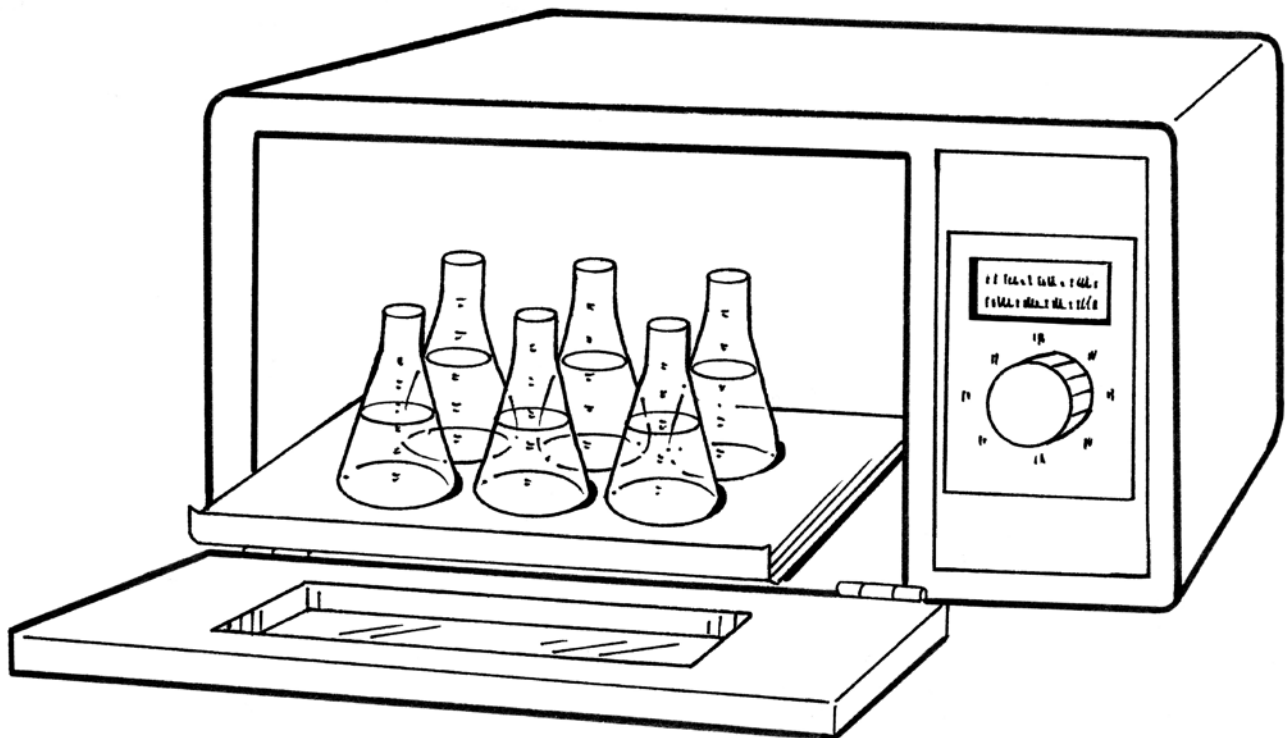


Scientists have discovered a way to make mAbs with the help of Chinese hamster ovary (CHO) cells.



CHO cells are tiny factories that can be engineered to produce lots of different kinds of mAbs.

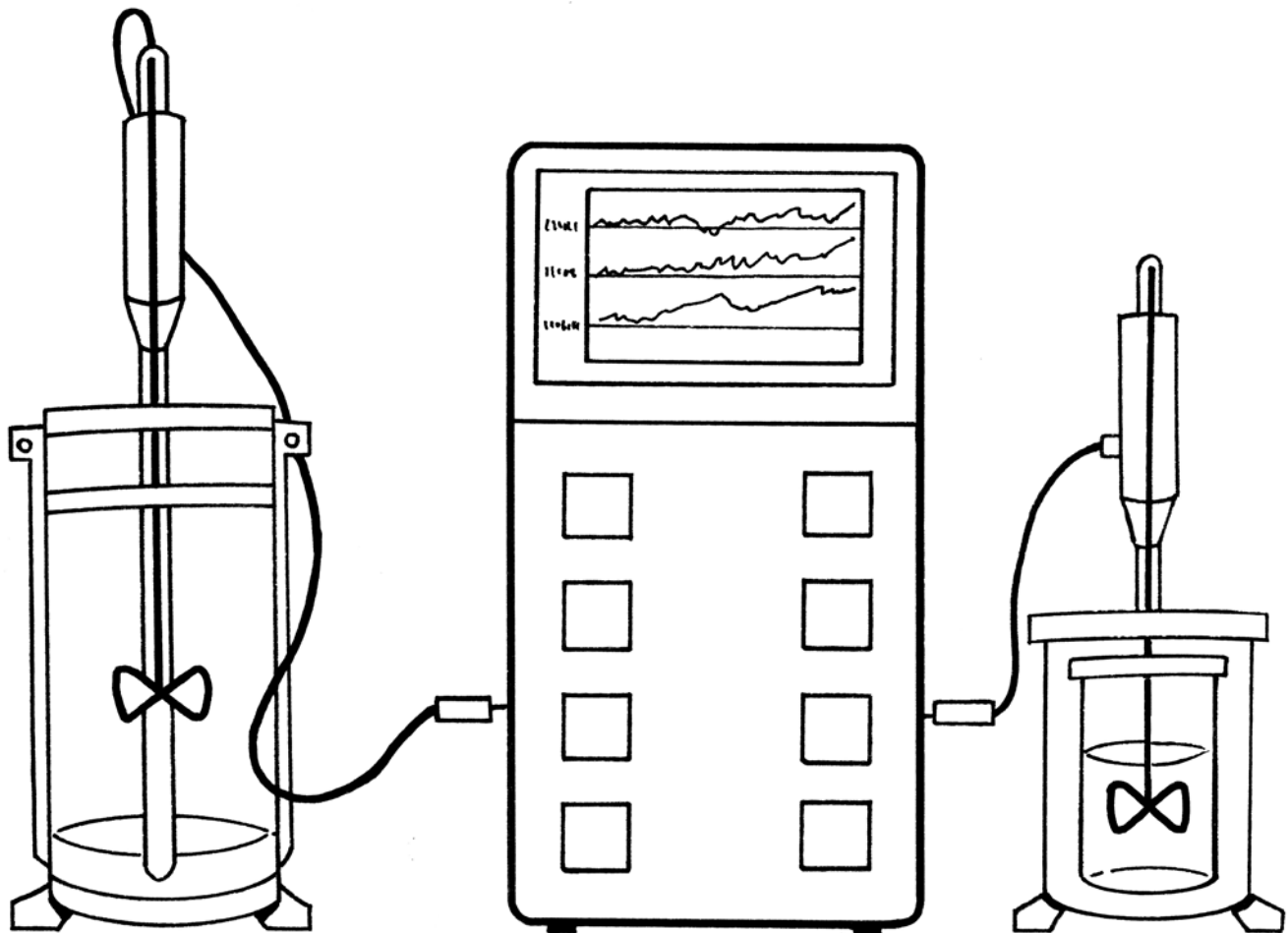
Scientists transfer the modified CHO cells into small flasks. The flasks are placed in an incubator with a controlled environment for one to two weeks.



The flasks are tested daily to see which CHO cells are producing the most mAbs. The best CHO cells are then moved into larger containers called bioreactors.

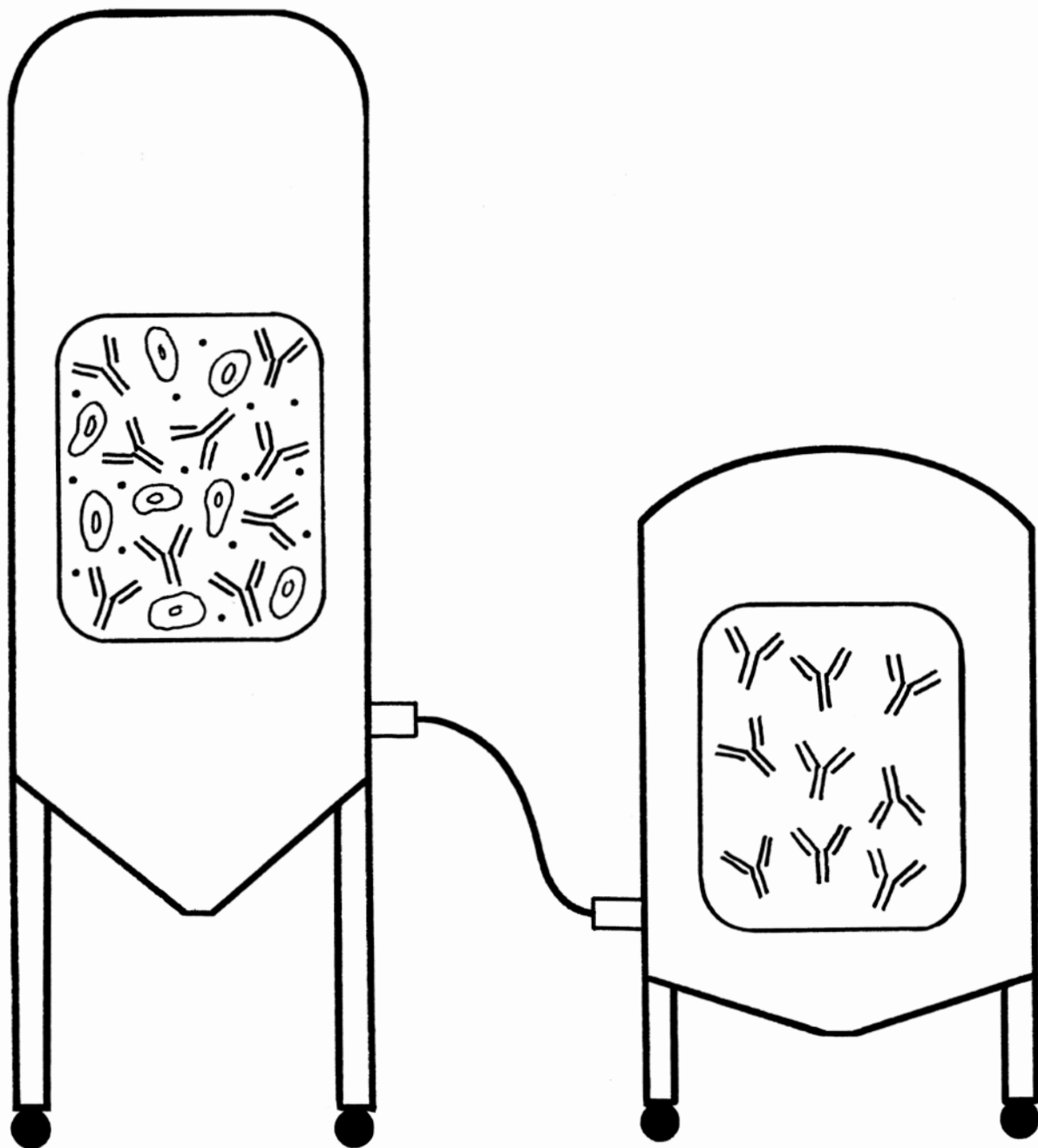


Bioreactors are special homes that provide the perfect environment and nutrients to help the CHO cells make mAbs.

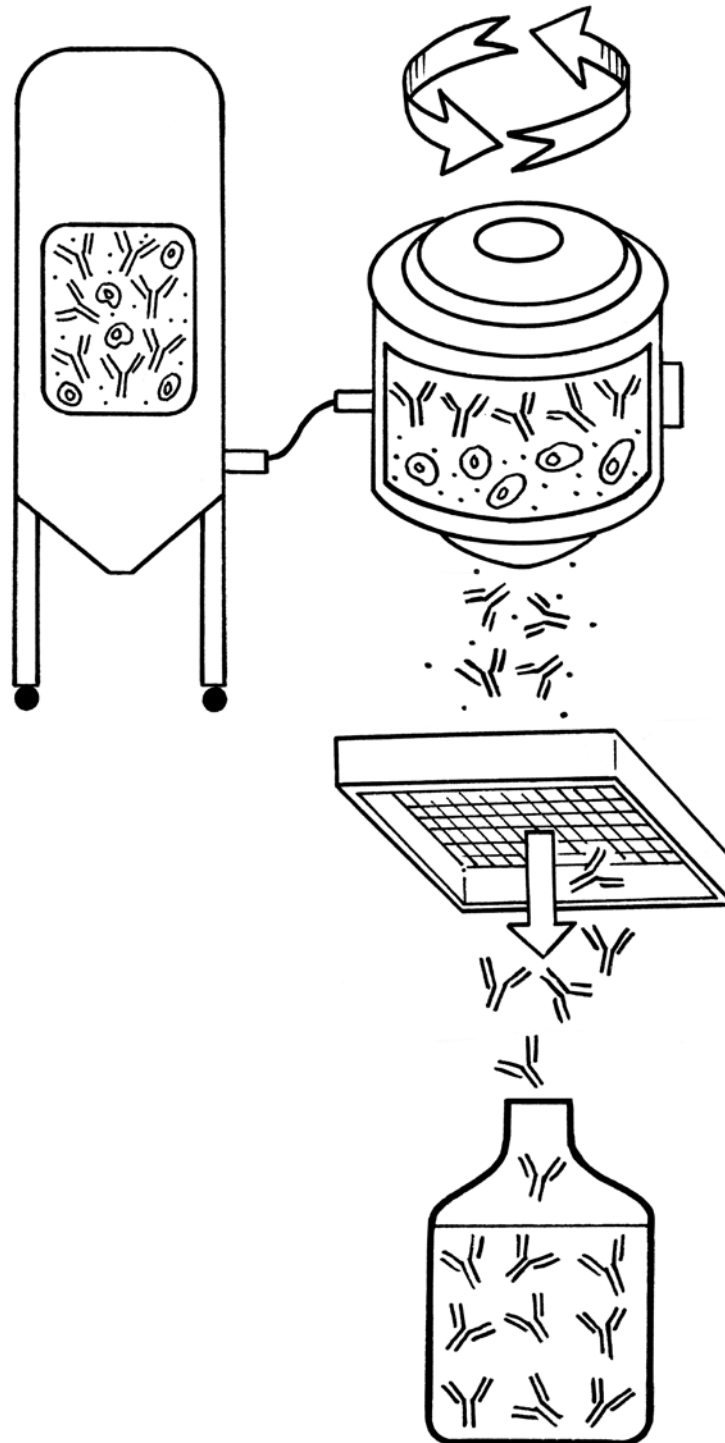


Scientists take daily samples to make sure the CHO cells are happy in the bioreactor, eating the right food (called media), and making the best mAbs.

After a couple of weeks, the CHO cells complete their job, and are harvested through a process that separates the mAbs from the cells and media.

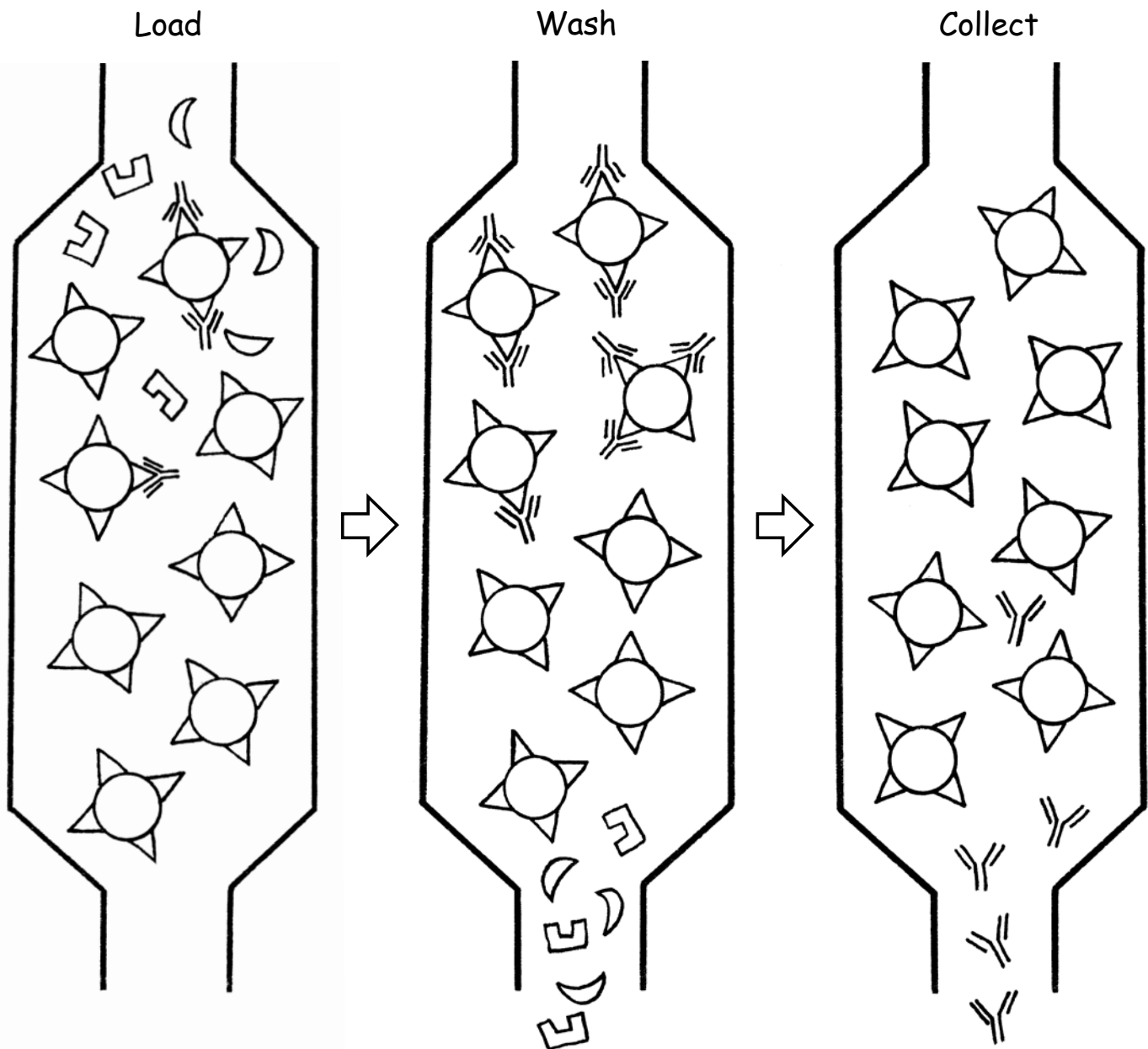


During the harvest, the bioreactor contents are sent to a centrifuge that spins and separates the CHO cells from the liquid.



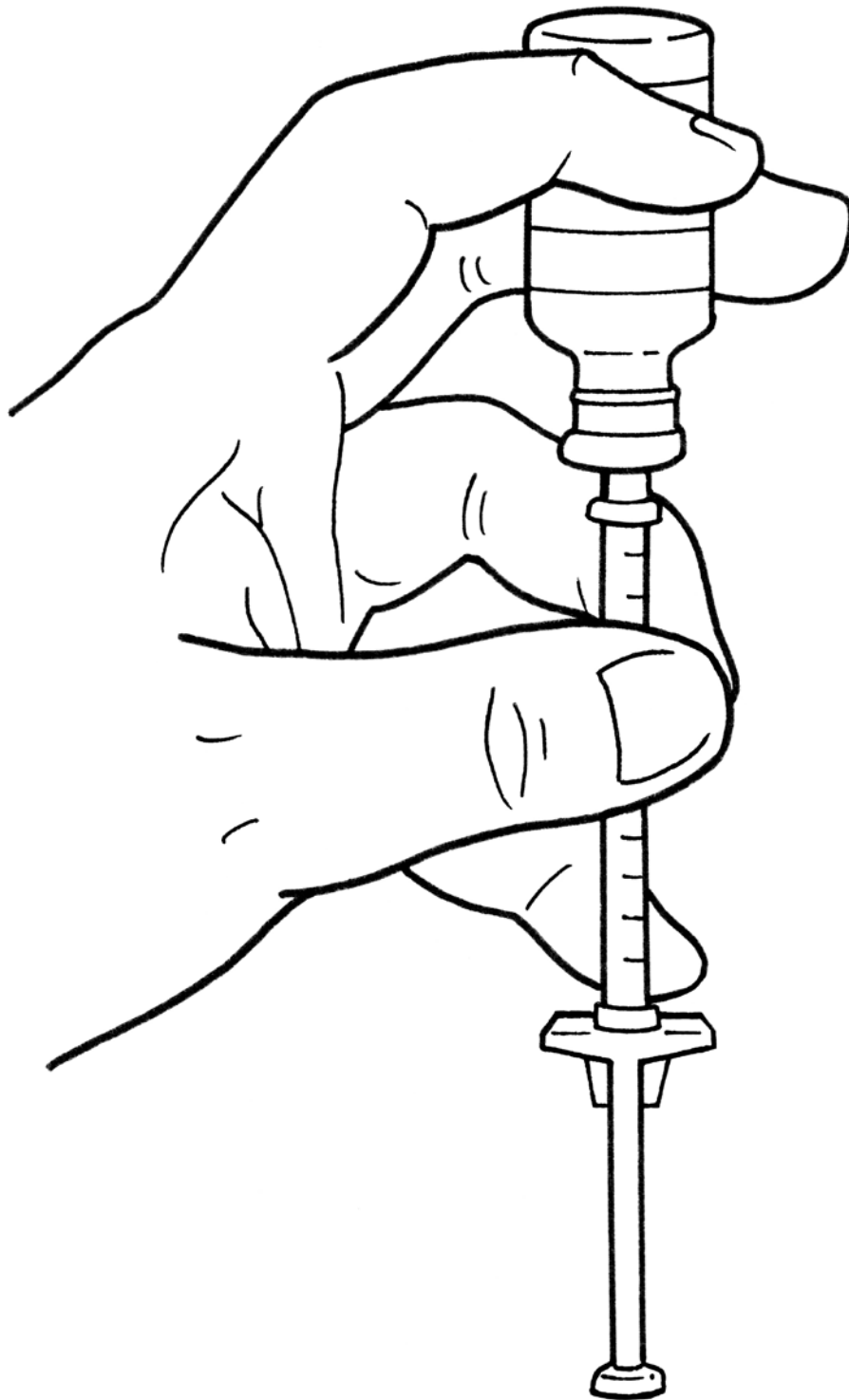
The liquid is then filtered to make sure just the mAbs and liquid are left.

The mAbs are then purified from the liquid using special tubes called chromatography columns.



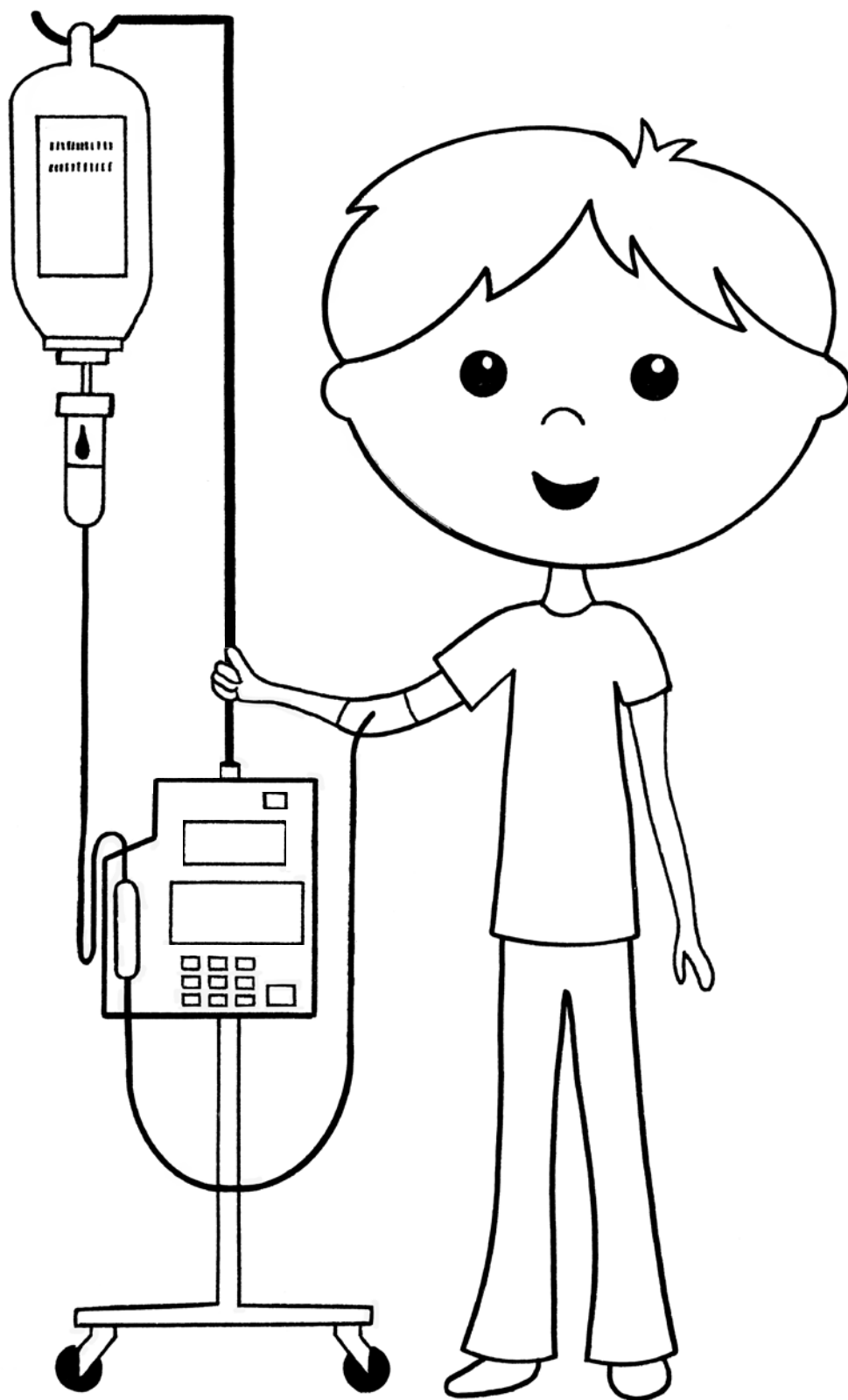
Several different columns are used until nothing but the mAbs are left.

The purified mAbs are sterilized and put in a mixture of additives so they don't degrade.



This solution is put into vials or syringes and shipped to doctors around the world.

These mAb medicines are injected or infused into patients to treat many different diseases.



# All Done!

P.S. Stay tuned for the next edition of Southie Science.

P.P.S. The next two pages feature some of the tools that help scientists keep track of how the mAb medicines are made during bioprocesses.



# Skip the status quo with the Rebel

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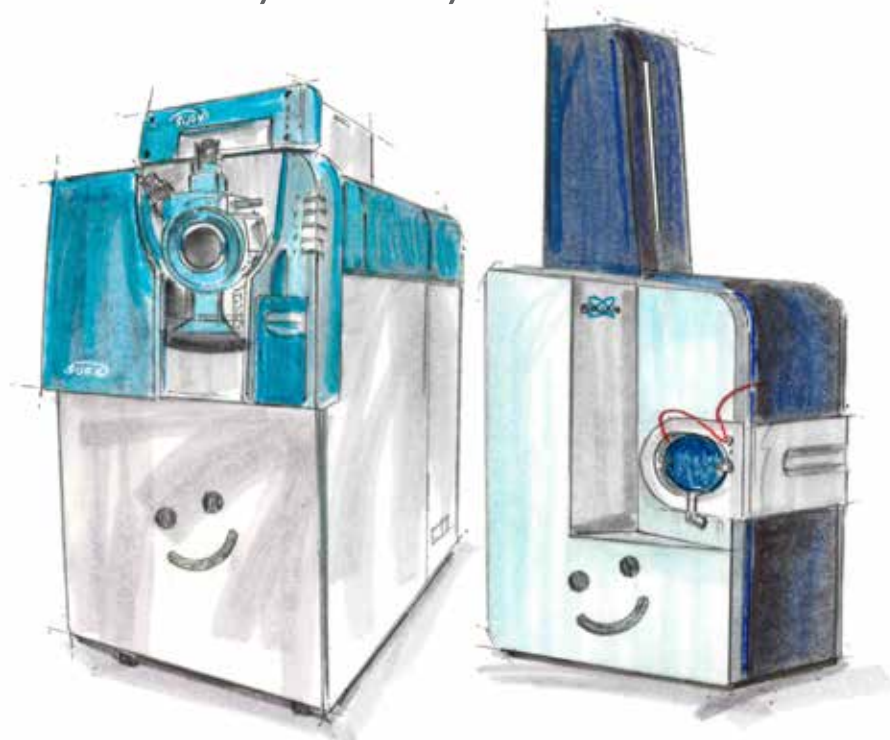
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