cytiva

How ergonomics and cleaning ease reduce repetitive stress injuries and contamination in pharmaceutical lab workflows

cytiva.com

Introduction

The repetitive nature of routine laboratory work puts pharmaceutical technicians and scientists at risk for repetitive strain injuries (RSI). Routine activities often include the same movements over and over, which can take a toll on hands, wrists, and shoulders and can lead to serious injury. According to the Occupational Safety and Health Administration (OSHA), RSI in the workplace resulted in over 300,000 cases as far back as 2015 (1).

According to an article on common laboratory worker disorders by certified ergonomist Kevin Costello, musculo-skeletal movements involving repetition, contact stress, force, and awkward posture present the most risk for injury (2).

RSI can lead to laboratory user fatigue and variability that causes poor technique, errors, and cross contamination. This can result in the need for retesting which adds up to 14 days for procedures like sterility testing. In addition, the societal costs of carpal tunnel syndrome, a consequence of RSI, has been estimated at $30,000 per case. This figure does not include indirect costs, such as lost productivity and quality of life issues that extend to everyday activities (2).

This paper explores new filtration designs that are more ergonomic and easier to clean than conventional products.

Reducing RSI: The secret is in product design

In a pharmaceutical microbiology laboratory, there are ways to avoid manual labor stress by working in an ergonomic manner. Choosing the right tools makes the difference. Pre-sterilized filter funnels are an efficient option for microbial contamination and quality-control testing, with the funnel and membrane in a ready-to-use, disposable system. The membrane is contained within the funnel for filtration, limiting handling and transfer, which reduces repetitive laboratory motions.

On most of these disposable devices the funnel top is removed by twisting or other motions that put stress on wrists and arms. Twisting the top of the funnel can result in a tear of delicate membranes causing a need for retesting. With our MicroFunnel™ filter funnel, the funnel is removed with a simple squeeze of the sides for easy access to the membrane.

Another step forward in reducing RSI is the ergonomically designed Cytiva laboratory manifold.

Our laboratory manifold has few parts, no required tools for assembly, and simple friction fittings for easy disassembly and reassembly. This simplified design saves precious time and reduces RSI risk.

Additionally, since the device's end cap and hose barb can be setup in left or right handed orientation, and all valves are situated at the front of the manifold. This means there is no need to reach over the top of a filter funnel and maneuver behind a manifold to turn the valves on and off. Both features improve contamination prevention and reduce injury risk.

Cytiva's laboratory manifold is able to process up to six samples at one time when two manifolds are connected together with a coupling device. Over time, this design means less handling and lower risk of RSI.

Reducing RSI: Improving laboratory techniques

RSI can be further reduced when technicians are well-trained in techniques such as the use of forceps and membrane handling. Proper orientation and handling of forceps is not only important to the technician's health, but also crucial for good microbial growth.

In the figures below, you can see in the left image that the hand is in an awkward position. This can cause pain during membrane removal. In the right image, the forceps are held properly, giving the hand more freedom and a more natural and comfortable feel.

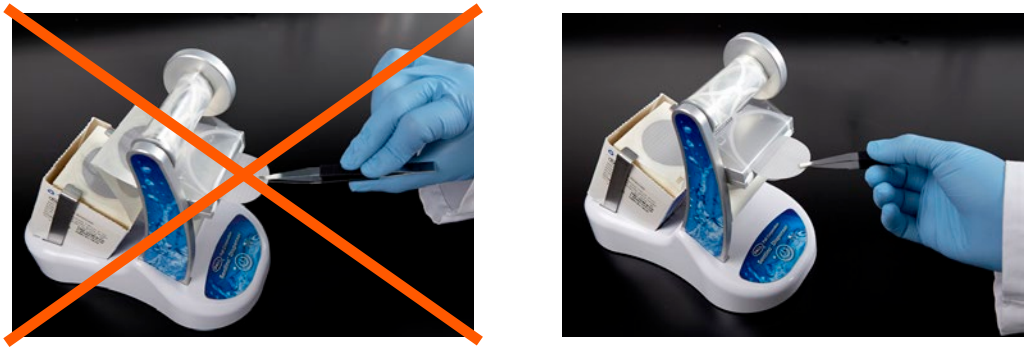

Fig 1.

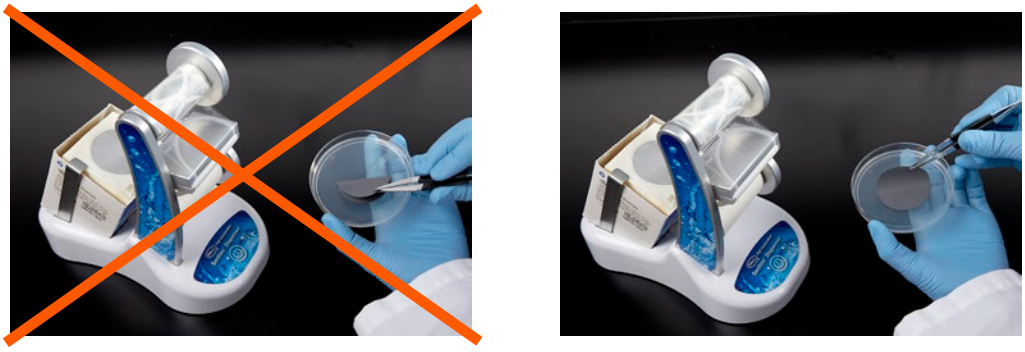

Fig 2.

In figure 2, the plating technique in the left image is not only awkward, but also increases the risk of creating bubbles on the bottom of the filter membrane. Air bubbles are a concern because when the agar media does not properly touch the membrane, nutrients do not reach the membrane as expected. This can cause improper cell growth that can result in false negatives. Proper technique is demonstrated in the image on the right.

Cleanliness: The key to eliminating cross contamination

The cleanliness of your laboratory equipment is key to eliminating cross contamination and resulting delays caused by retesting. Using manifolds, pumps, and funnels with easy to clean or disposable designs results in contamination-free devices—a welcome advantage when cleaning is required at least once daily in high-throughput labs.

Laboratory manifolds often have small spaces between components where microbes can grow. Look for stainless steel devices with few pieces to disassemble and assemble such as the Cytiva's laboratory manifold. Fluid paths should be free of O-rings, and lowered hose outlets eliminate the back-burping that can require expensive and time-consuming retesting. Make sure the manifold is designed to easily fit in laboratory autoclaves by separating into manageable components.

When purchasing a new microbiology pump, such as our Sentino™ pump, make sure it has a disposable fluid path that requires no cleaning or disinfection. A disposable pump fluid path, combined with a gamma-irradiated filter funnel option, virtually eliminates risk of cross contamination from test equipment.

Disposable filter funnels, such as the MicroFunnel ST filter funnels, eliminate cross-contamination from reusable funnels, and have a second overpack layer that streamlines cleanroom or hood entry, with only one wipe down needed for multiple individually-packed funnels. This overpack layer reduces gross particulate contamination from cardboard.

Conclusion

RSI and ease of cleaning are often overlooked when choosing microbiology filtration solutions for pharmaceutical laboratorys. It is important to select high-performance products with ergonomics that reduce long-term injury risk. The goal is to eliminate the user fatigue and variability that leads to poor technique, errors, and retesting. Reducing microbial cross-contamination and subsequent retesting saves your laboratory time, resources, and product development delays.

References

1 Nonfatal Occupational Injuries and Illnesses Requiring Days Away From Work, 2015. Bls.gov. Published 2015. https://www.bls.gov/news.release/osh2.nr0.htm

2 DePalma A. Repetitive Strain Injury in the Laboratory. www.biocompare.com. Published March 2019. https://www.biocompare.com/Bench-Tips/348286-Repetitive-Strain-Injury-in-the-Laboratory/

Explore **here** our microbiology portfolio offering a suite of funnels, membranes, and equipment designed for flexibility in various microbiology testing applications and workflows including pharmaceutical testing, food sample analysis, and water testing.

cytiva.com

CY48643-10Dec24-AR