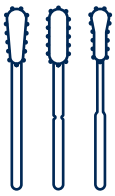
Respiratory infections

Breathtaking preanalytics tools

Better diagnostics begins
with a better sample collection.

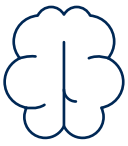
Copan
innovating together



Collection

Transport

Processing



Artificial Intelligence

Our comprehensive approach to preanalytics

Background

Public enemy number 3

According to the WHO[1], **respiratory tract infections are among the most common disorders affecting today's population**, representing the first leading cause of death in low economic status countries and the third in the whole world. From the common cold to pneumonia, their clinical spectrum ranges from generally mild upper airway symptoms to severe lower airway pathology.

What's the Copan solution for respiratory infections?

- ***Nucleic acid and antigen preservation. For NAAT and/or Ag testing***

  UTM® - Lollisponge™ - Mswab™ - eSwab®

- ***Nucleic acid preservation and microbial / viral viability inactivation. For NAAT testing***

  eNat®

- ***Microbial and viral viability preservation. For culture testing***

  eSwab® - Mswab™ - UTM®

- ***Sample fluidification***

  SLsolution™

- ***Mycobacteria collection and transport***

  MycoTB™

- ***Molecular testing sample preparation***

  UniVerse™

Etiology

A complicated affair

Most respiratory infections are caused by viruses, but also bacteria and viral-bacterial coinfections may be involved. A complicating factor when talking about respiratory infections is that any syndrome may be caused by several different microorganisms and, similarly, any pathogen may cause a variety of distinct clinical syndromes.

On top of that, Hospital Acquired Infections, Multi-Drug Resistant bacteria, and spillover infections – as SARS-CoV-2 – are putting a **huge strain on today's clinicians' and researchers' activity.**

Diagnostics advancements

Modern tools and traditional methods

Luckily, modern molecular techniques offer unpaired sensitivity and specificity. PCR, RT-PCR, and multiplex RT-PCR panels became common in clinical laboratories, opening the possibility to assaying simultaneously several pathogens in less than 24 hours.
These tests – which joined immunodiagnostic and culture techniques – must be interpreted carefully because of their high sensitivity; it's also essential to avoid sample contamination during collection in the first place, to **obtain a biological specimen best suited for these analyses.**

That's why **for a proper diagnosis, proper sampling is necessary.** Among the upper respiratory sampling methods[2], Copan FLOQSwabs® efficiency has been proven equivalent to more invasive procedures, with a reduced patient discomfort[3].

FLOQSwabs®

The swab that reinvented sample collection

Unlike the structure of other swabs, FLOQSwabs® patented tip ensures a **quick, capillarity-driven sample uptake and a superior elution** of the biological specimen.

Shafts and tips

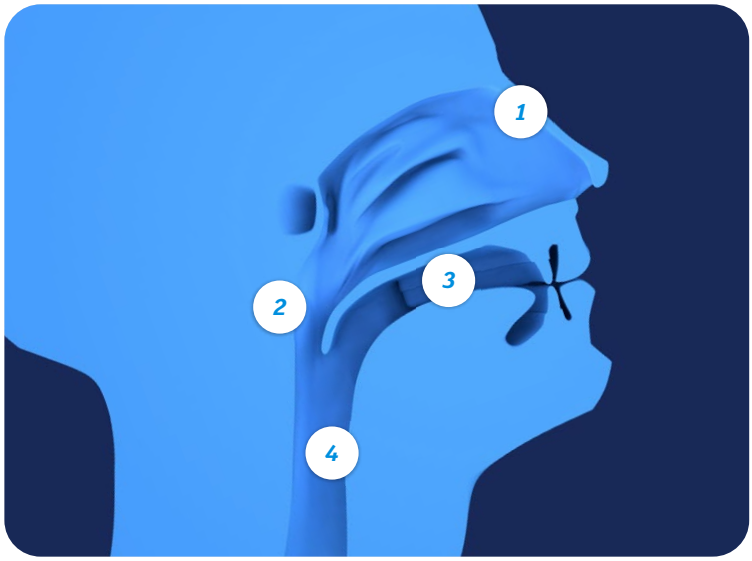
Cut out for everyone

Our anatomically designed FLOQSwabs® offer variable shaft sizes, diameters, and tip shapes to fit plenty of applications. All this made FLOQSwabs® a well-tolerated alternative to painful and costly collection procedures[4,5].

Collection sites

The easiest way

Upper respiratory tract sampling represents a non-invasive way to obtain respiratory tract specimens and diagnose upper and - in some cases[6] - even lower respiratory tract infections.
Compared to invasive procedures – such as thoracentesis and needle aspiration – upper respiratory tract sampling can be performed repetitively and exploited for screening purposes.



1. Nasal

2. Nasopharyngeal

3. Oral/Saliva

4. Throat

Maintaining viability

For culture, antigen detection, and molecular biology

While the diagnosis of viral infections relies mainly on molecular biology techniques, the gold standard for diagnosing bacterial infections remains culture — although new techniques have been developed over the past years[7]. Maintaining microbial viability is an excellent choice for keeping any testing options open: from culture to enzymatic assays, antigen detection, and molecular biology techniques.

SLsolution™

Sputum-liquefying device

The most accepted sample to diagnose bacterial respiratory infections is sputum, but its laborious processing represents a significant limitation. Our SLSolution is the answer to this processing problem, as its mucolytic activity **rapidly liquefies sputum without affecting the vitality and the morphology of bacteria and fungi.** Easy and ready-to-use for a reduced risk of cross-contamination, SLSolution™ is suitable for manual and automatic processing with WASP®.

eSwab®

For traditional bacteriology culture and molecular assays

If you plan to perform other assays on the specimen besides culture, you should opt for eSwab®. eSwab® medium preserves the viability of aerobes, anaerobes, fastidious bacteria from swab specimens for bacterial culture purposes and can be used for the preservation of bacterial, viral or Chlamydial antigens and nucleic acids from swab specimens[8,9,10,11,12]. There is no need to say: also eSwab® is compatible with WASP® automated processing.

MSwab®

Specimen Collection and Preservation Optimized for Molecular and Culture Applications

MSwab® offers the possibility to **collect, transport, and lyse the sample in the same tube without the need for further manipulation**. A true all-around pre-analytical device designed for optimized compatibility with molecular platforms, MSwab® enables a rapid direct nucleic acid heat extraction and allows backup culturing of bacteria and viruses.

UTM®

Collection, transport, and virus storage medium

UTM® is our Universal collection and Transport Medium suitable for **collection, transport, and long-term freeze storage of viruses, chlamydia, mycoplasma, and ureaplasma**. Preserving viability for 48 hours at room temperature, UTM® is compatible with viral culture, antigen detection, and molecular assays[13]. This versatility made UTM® one of our most popular products, elected by CDC as the product of choice for COVID19 screening[14] using PCR[15] and viral culture[16].

Microbial inactivation

Preserve nucleic acids and ensure safety

For an errorless molecular biology analysis, RNA and DNA must be preserved with a proper specimen collection and transport method. Moreover, microbial inactivation can be a desired feature when working with dangerous pathogens.

eNAT®

Nucleic acid collection and preservation medium

eNat® is our medium designed for viral and bacterial nucleic acids collection and preservation[17]. Containing guanidine-thiocyanate, eNat® **lyses cells and virus particles, preventing bacterial proliferation and preserving RNA and DNA integrity.** eNat® allows long-term storage of the sample for up to four weeks at RT or six months at -20°C by denaturing proteins - including nucleases - in only 30 minutes.

Broths

Enrich or select

For bacterial culture purposes, we offer a wide range of enrichment and selective broths:

- *BHI*
- *TSB*
- *CAT*
- *Thiol*
- *TSB Salt*
- *eMRSA*
- *Fungi*
- *GN*
- *LIM*
- *Selenite*

Mycobacteria

Deceitful sampling: solved

Tuberculosis (TB) is one of the main global healthcare threats. In 2019, an estimated 10 million people fell ill with TB worldwide, and a tenth of them died[18]. **A fast diagnosis is essential to prevent TB severe symptoms and the spread to other individuals;** nowadays, sputum culture and Nucleic Acid Amplification are the tests of choice to diagnose a mycobacteria infection. Mycobacteria collection trickiest aspect is the contamination of most samples – as sputum and bronchial lavage – by rapidly growing flora or other bacteria. To avoid the interference of these contaminants with the results, each specimen must then be processed before the analysis.

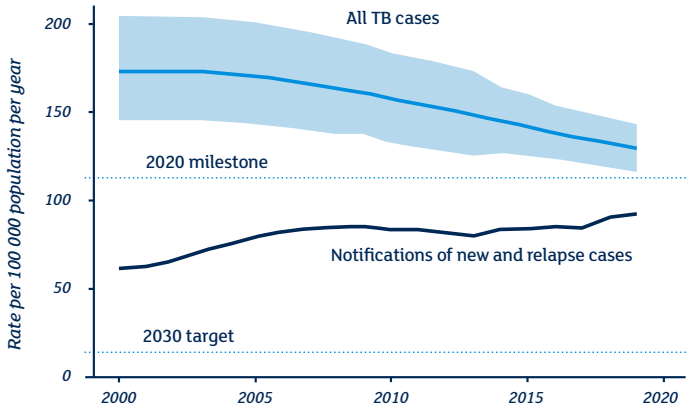
MycoTB™

Respiratory samples processing system for mycobacteria detection

We designed our MycoTB™ specifically for this purpose. With it, you can take care of all the steps needed for mycobacteria detection in the respiratory tract and extra-pulmonary specimens[19,20] with a safe, easy, and ready-to-use kit.

How it works

Mix › *Incubate* › *Neutralize* › *Centrifuge* › *Resuspend*



Global TB incidence rate

Progresses and milestones

Globally, the TB incidence rate is falling, but not fast enough to reach the first milestone of the End TB Strategy; that is, a 20% reduction between 2015 and 2020. Worldwide, the cumulative reduction from 2015 to 2019 was 9% (Global tuberculosis report 2020, WHO).

SARS-CoV-2

From the pandemic and beyond

In 2020 the Covid-19 pandemic caused a global surge in viral collection systems demand, and put us into the spotlight the leading producers of microbiology collection and transport devices.
We faced this challenge head-on: on top of rethinking and expanding our production chain across the globe, **we exploited our innovative thinking to conceive new products that helped the fight against the virus.**

Global guidelines

A quest for quality

Covid-19 pandemic stressed more than ever the crucial role of sample quality in preanalytics and diagnostics. This global search for quality made UTM® and FLOQSwabs®, our products for viral collection and transport, to be declared by WHO and the CDC the products of choice for the sample collection from suspected cases of coronavirus disease.

LolliSponge™

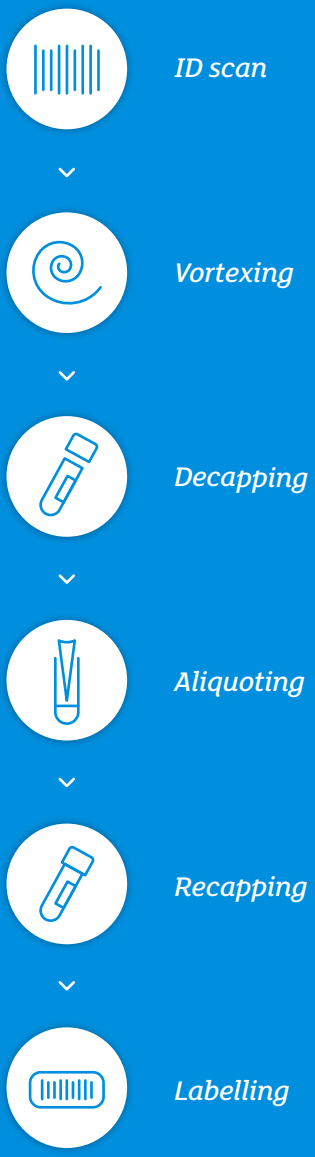
The sponge-made device for saliva collection

LolliSponge™ can be used to collect saliva when professional assistance is not available. Its key feature is the **easy sampling, performed just by keeping the dry sponge stick in the mouth for a few minutes.** After collection, the sponge is placed in the tube and transported to the lab, where it can be centrifuged and tested with molecular diagnostic assays.

UniVerse™

The answer to lab challenges and bottlenecks

UniVerse™ is the symbol of Copan's drive to share Laboratories challenges. It has been **developed to answer some of the most critical needs faced by laboratories during the Covid-19 pandemic:** the massive increase of sample numbers – especially hazardous ones – the variability of tube and transport media types, the risk of cross-contamination, and fragmented workflows and traceability errors caused by the lab overload.

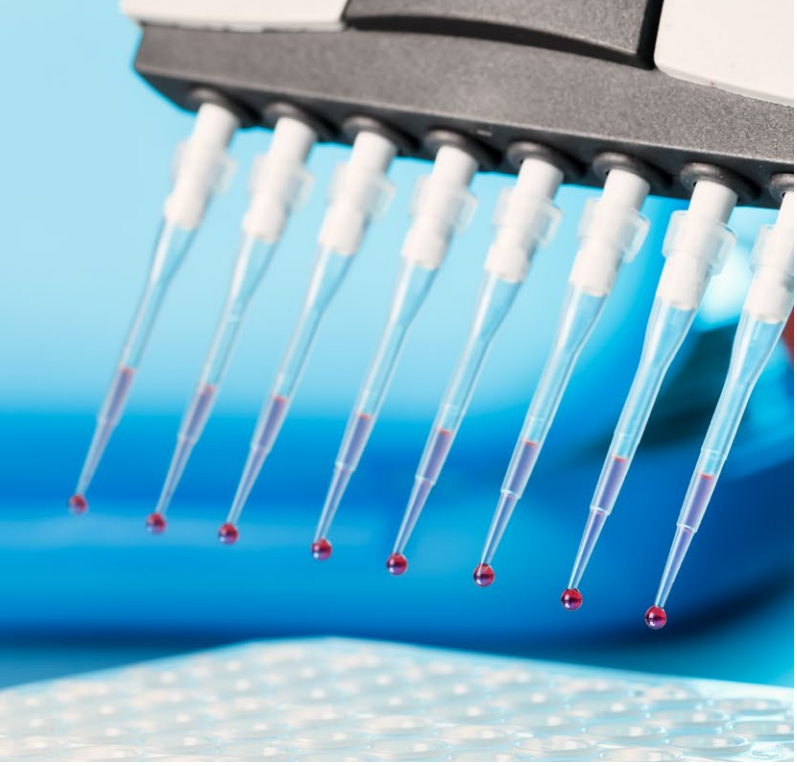


Expedite your workflow

Flexible and open solution for molecular testing sample preparation

UniVerse completely automates samples' preparation for molecular testing, as tube decapping and recapping, barcode identification, and liquid transfer to secondary tubes or 96-well plates.

With its four operational modes and three independent robotic arms, UniVerse™ handles 130 tubes/hour or 220 96-well plate samples/hour, integrating impeccably into your molecular biology lab's workflow.



Downstream Applications

Designed with diagnostic assays in mind

Our liquid-based media offer excellent performances for many respiratory disease downstream diagnostic assays, from traditional culture to the most advanced molecular platforms. Discover below some examples!

Bacterial culture

Bacterial culture is eSwab® proper application. For example, this study exploits eSwab® to determine the prevalence of S. aureus in microbiology and non-microbiology medical laboratories. Of note, the study demonstrates that eSwab® is compatible with downstream molecular testing as well[21].

Viral culture

The first isolation of SARS-CoV-2 from a Korean patient has been possible by UTM®, which allowed both culture and Next-Generation sequencing of the virus[22]

Mycobacterial culture

MYCO-TB™ proved to be effective for the rapid digestion and decontamination of respiratory materials for Mycobacteria detection - by culture and molecular assays[23] - while eSwab® appeared to be an appropriate system for maintenance, transport, and recovery of select nontuberculous (NTM) and Nocardia species[24].

RT-PCR

Respiratory viruses and immunological markers can be analyzed by RT-PCR after eNat® or UTM collection and storage (RT, 4°C and -80°C[25,26]. Moreover, SARS-CoV-2 RNA has been detected up to 7 days at RT and 14 days at refrigerated conditions (4°C, -20°C) starting from UTM® and eSwab®-collected specimens[9].

LAMP

mSwab collection and preservation is compatible with Loop-mediated isothermal amplification, ensuring a rapid specimen-to-result diagnosis of respiratory syncytial virus infection[27].
Mycoplasma pneumoniae, leading cause of community-acquired pneumonia (CAP), can be also detectable by LAMP assay starting from respiratory samples collected in UTM[28].

Filmarray multiplex

Human Adenovirus can be identified in tracheal aspirate by Filmarray multiplex PCR respiratory panel after UTM® collection and elution[29].
UTM® has been used also for SARS-CoV-2 detection by rapid fully automated assay[30].

Gram stain

Mucous-rich respiratory samples can be treated with SLSolution™ before Gram smear processing, culturing, and molecular tests[31].

DFA/IFA

Starting from samples collected with FLOQSwabs® and eluted in UTM®, respiratory syncytial virus can be detected with Direct Immunofluorescence assay (DFA)[32], while SARS-CoV-2 can be recognized by several Antigen Fluorescent Immunoassays (FIA)[33,34].

Immunoassay

Nasopharyngeal and oropharyngeal specimens can be collected in UTM® for the identification of SARS-CoV-2 antigens. Of note, UTM® is compatible with several immunochromatographic rapid test[35].

TMA

Respiratory viruses and bacteria can be identified using a Pan-microarray based technology as in this study, Nasopharyngeal and oropharyngeal samples obtained using FLOQSwabs® eluted in viral transport medium[36].

Scientific references

All the independent studies we cited in this product focus are listed here.

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Code: JMKC037R01

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