ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

- HYPERCAPNIA CONDITION
- CELL CULTURE
- DRUGS & PHARMA

A SOLID BUSINESS CASE IN COLLABORATION WITH THE
INSTITUTE of TECHNOLOGY in LAUSANNE (EPFL)

GENERAL INFORMATION ABOUT THE PROJECT

TARGET OF THE PROJECT:
Life Science - Pharma: Cell Cultures Studies

DEPARTMENT:
School of Life Sciences, Laboratory of Microbiology and Microtechnology (LMIC)

HEAD OF PROJECT MANAGEMENT:
Prof. John McKinney

ROLE OF MCQ INSTRUMENTS:
To create and control specific hypercapnia conditions.

MORE INFORMATION ABOUT THE EPFL

The École polytechnique fédérale de Lausanne (EPFL) is a research institute and university in Lausanne, Switzerland, that specializes in natural sciences and engineering. EPFL is widely regarded as a world leading university. **The QS World University Rankings ranks EPFL 12th in the world** across all fields in their 2017/2018 ranking, whilst Times Higher Education World University Rankings ranks EPFL as the world's 11th best school for Engineering and Technology.

DESCRIPTION OF THE APPLICATION AND THE TARGET

Nonreplicating and metabolically quiescent bacteria are implicated in latent tuberculosis infections and relapses following "sterilizing" chemotherapy. However, evidence linking bacterial dormancy and persistence in vivo is largely inconclusive. Here we measure the single cell dynamics of Mycobacterium tuberculosis replication and ribosomal activity using quantitative time-lapse microscopy and a reporter of ribosomal RNA gene expression. Single-cell dynamics exhibit heterogeneity under standard growth conditions, which is amplified by stressful conditions such as nutrient limitation, stationary phase, intracellular replication, and growth in mouse lungs. Additionally, the lungs of chronically infected mice harbor a subpopulation of nongrowing but metabolically active bacteria, which are absent in mice lacking interferon-g, a cytokine essential for antituberculosis immunity. These cryptic bacterial forms are prominent in mice treated with the antituberculosis drug isoniazid, suggesting a role in post chemotherapeutic relapses. Thus, amplification of bacterial phenotypic heterogeneity in response to host immunity and drug pressure may contribute to tuberculosis persistence.
Gas Blender 100 Series was used in one of the step of the experimental procedure, "Time-Lapse Microscopy of Intracellular Bacteria", to supply an Air mixed to 5% of CO2 in the chamber to create a stressfull Hypercapnia condition.

BENEFITS AND SAVINGS

A traditional method would require at least 2 mass flow controllers, an external control unit, a power supply, and a tubing system, or a massive investment of time in pre-mixed gas cylinders. This obsolete method would not neither solve the problem at its roots, because of a huge waste of time in gas delivering.
With MCQ Instruments, the École polytechnique fédérale de Lausanne (EPFL) required only a single Gas Blender 100 Series device and its Software in Pro Version. The simple combination of these two factors has made possible an exponential number of experiments, reducing time, efforts, investments and collecting much more results. In pills:

GAS MIXER VS MASS FLOW:

The GAS MIXER channels it's more compact than typical flow controller meters and can be specifically calibrated on the mixture to be used.

WITHOUT MCQ? (HARD)

3 Mass Flow Controllers with Power control Unit, tubes, NO-Software and different Gas Mixture Cylinders.

TIME SAVINGS:

Instead of changing a calibration cylinder for each point, our Gas Mixer uses pure gas allowing the EPFL to set all the desired calibration points in just a few steps.

SOFTWARE AUTOMATION:

Thanks to our Software PRO version and its option "Automatic Program", now EPFL can bring forward experiments in automation, painlessly.

MICRO FLOWS - NO CUT OFF:

OUR GB100 Series allows you to control the flow in all the calibration range, from 0,1 ml/min to 500 ml/min with NO cut-off

FLOW STABILITY:

Thanks to our revolutionary method every gas flow has a great stability making possible to have a stable flow also for lower flow-range.

READY TO TALK ABOUT YOUR SOLUTION?

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