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► **To cite this version:**

Deloge-Abarkan Magali, Thi-Lan Ha, Enric Robine, Denis Zmirou-navier, Philippe Hartemann, et al.. Aerosols containing Legionella measured by fluorescent in situ hybridisation: new approaches to metrology. EWGLI European working group for Legionella infections, May 2004, Chamonix, France. hal-03746702

HAL Id: hal-03746702

<https://hal.univ-lorraine.fr/hal-03746702>

Submitted on 5 Aug 2022

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Aerosols containing *Legionella* measured by fluorescent *in situ* hybridisation : new approaches to metrology

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The bacterial proliferation in domestic environments may constitute a real problem in public health and hygiene which lead to infections, allergies, ... and particularly, respiratory illnesses. One of the most relevant example is *Legionella*, ubiquitous bacteria responsible of Legionnaires' disease and Pontiac fever which are widely distributed in aquatic habitats (Morris *et al.*, 1979). The occurrence of *Legionella* in water is well-documented. Paradoxically only few studies have been performed on the measurement of *Legionella* in aerosols generated using contaminated water. At present, the management of this biological risk only depends on the microbial water quality control.

In this contexte, the metrological aspects, i.e.adapted metrological and analytical tools for *Legionella* detection, need to be improved in order to perform an exposure assessment. For this purpose, we have performed a study in order to test and compare (1) three tools for bioaerosols sampling : impactor , impinger and filtration and (2) two detection methods for airborne *Legionella* : culture method and *in situ* hybridisation with fluorescent probe.

The assays have been performed (a) in laboratory using an aerosol chamber to work with a controlled and stable aerosol of *Legionella* and (b) also in a health institution contaminated with *Legionella* to characterise the aerosol of *Legionella* generated by a shower head.

The laboratory assays lead to the conclusions that the efficiency of the impinger is 4 and 800 times greater than the impactor and filtration sampling, respectively. Moreover, the results obtained in field conditions lead to the same ranking of the tested biosamplers for *Legionella* detection.

Concerning the field assays, over a period of 6 months and in a real condition of exposure, **airborne *Legionella* can be detected by FISH** method when using the impinger (from 10^2 to 10^4 FISH cells/L) ; but no airborne *Legionella* were detected using the impaction technique. Results concerning the field and laboratory assays will also be compared.

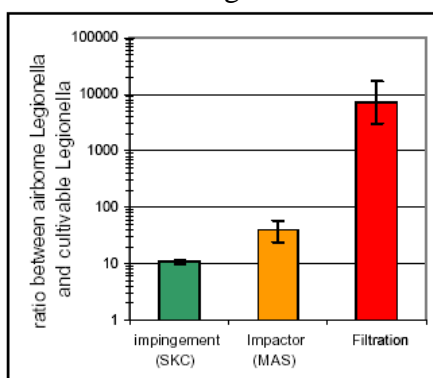


Figure 1 : Ratio between the concentration of airborne *Legionella* and the cultivable fraction according to the bioaerosol samplers (n=3).

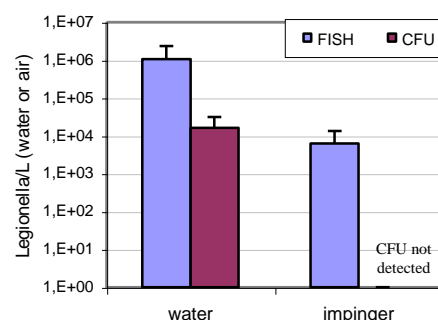


Figure 2 : Number of *Legionella* detected in hot water and aerosols using cultivability and FISH methods (n = 12).