A CLEAN START

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Introduction

A clean start stands for the research of the quality of surfaces and air, the efficiency of disinfectants was also measured. This was tested with a couple of validation tests. These tests are used to determine the accuracy of the Biotrak and ATP bioluminescence meter. After these devices were validated, the real research could begin. The air and surface quality were tested before, during and one hour after a lesson. The efficiency of ethanol 70%, javelin and hydrogen peroxide 3% was also tested on a locker and the stair railing. In addition to these tests, the efficiency of Iso-Betadine, soap and alcohol gel on the skin was tested.

Material and method

The Biotrak is a device which makes use of Laser Induced Fluorescence to identify living particles in the air and to differentiate them between non-living particles in the air. The Biotrak was used to measure the living and non-living particles in classrooms on campus. First a zero-count with a HEPA-filter is used to remove particles inside the device. Afterwards the measurement took place without a filter on top. The measurements in the tested classrooms took place before, during and after lessons. The factors that can impact the measurements were noted down, for example the amount of people in the classroom, the ventilation through open doors and/or windows, the location of the Biotrak in the classroom, etc.

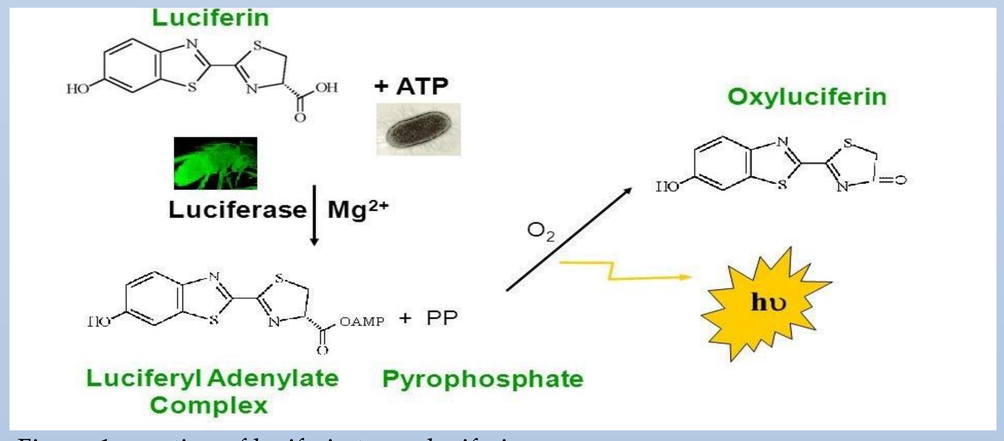

Figure 1: reaction of luciferin to oxyluciferin

The 3M Clean-Trace Luminometer is a device using ATP-bioluminescence to determine the quantity of Adenosine Trifosfaat (ATP) in a sample. ATP interacts, based on the ATP luminescence reaction like fireflies, as a result of which an amount of light produces depending on the amount of ATP, existing in all micro organisms. The more micro organisms found on the investigated surface, the more ATP, the higher the RLU-value (*relative light unit*) the device will indicate. Surfaces are being swabbed using the 3MTM Clean-Trace TM Surface ATP Test Swab UXL100 and the device was validated in advace. Using this devide, it is possible to execute a correlation research in diffrent classrooms with the *Biotrak* and the ATP-bioluminescence meter and the external infuences of ventilation and such other.

Results and discussion

For this correlation study the results of classroom 004, which has a build in ventilation system, are compared to the results of classroom 005 which does not have any ventilation system.

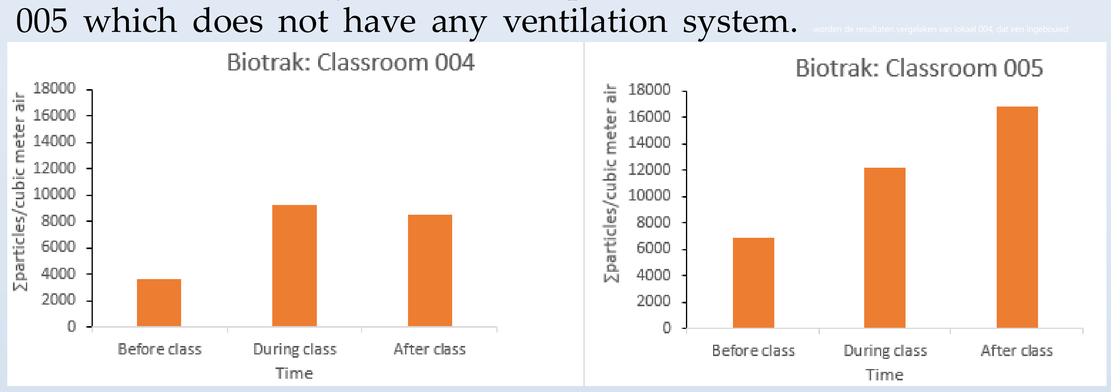

Figure 2: Biotrak living particles/cubic meters on diffrent times in classroom 004 and 005

Figure 1 shows that in classroom 004 the maximum values are reached at 9264 particles/m3 air on the measurement done during the lesson, while it declines afterwards. In classroom 005 on the other hand the maximum value is only reached one hour after the class is done at a value of 16784 particles/m^3 air.

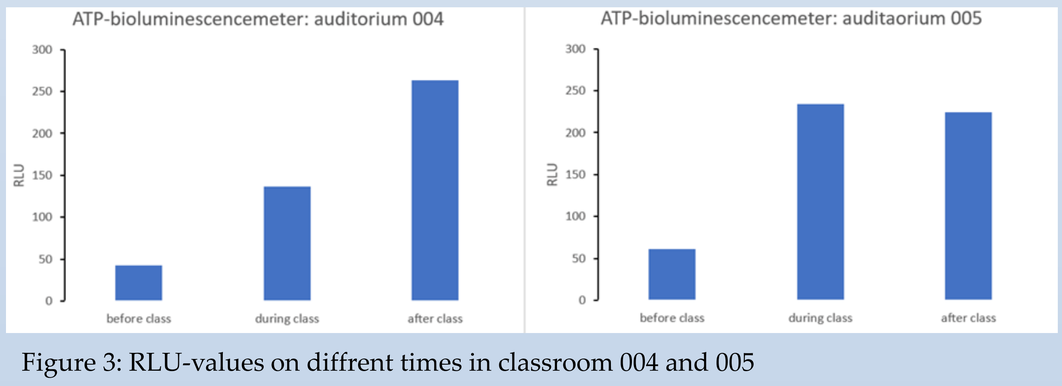

Figure 3: RLU-values on diffrent times in classroom 004 and 005

Graphic 2 shows that the RLU-value in auditorium 005, where there is no ventilation installed, reaches it maximum value much faster than in auditorium 004. The maximal value in auditorium 004 which is 263 only reached after the lesson. The maximum value in auditorium 005 which is 224 is already reached during the lesson and remains constant until half an hour after the lesson.

Conclusion

From the results and the graphs of the study with the Biotrak can be concluded that ventilated classrooms have a better microbiological air quality than non-ventilated classrooms. With the ATP bioluminescence meter is seen that on the surfaces, during a lesson without ventilation, the maximum RLU-value is reached faster than in a room with ventilation. The value remains constant afterwards. Therefore, it can be concluded that the air quality in a room with ventilation is better because of the constant air flow. For surface cleaning, all disinfectants tested were found to have good efficacy, the best being hydrogen peroxide 3 % and bleach 8°. On skin surfaces Iso-Betadine is the most efficient and when using ethanol, a hand gel 85 % is better than an ethanol solution 70 %. This can be explained by the fact that the hand gel 85 % is less volatile. This results in a more efficient disinfection of the skin surface. When cleaning the hands, it is best to use the World Health Organization procedure in combination with soap because it gives the best result when cleaning the hands.

Promotor research:
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