

SOFIA METROPOLITEN “UV” DISINFECTION FOR THE FIRST THREE METRO DIAMETERS - NOVEMBER 2020

Anelya Klisarova¹, Elka Radeva², Stanimir Karapetkov³,
Simeon Panev⁴, Atanas Mangarov⁵, Philip Philipoff⁶, Deian Rangelov⁷,
Blagovest Panev⁸, Daniela Arnaudova⁹, Diana Bankova¹⁰, Stoyan Velkosky¹¹

¹Medical University-Varna, e-mail: klisarova@gmail.com

²Medical University-Sofia, e-mail: eliradeva@abv.bg

^{3,4}TU-Sofia, e-mail: skarapetkov@yahoo.com

⁵Infectious Diseases Hospital, e-mail: amangarov@gmail.com

⁶Institute of Mechanics: philip.philipoff@gmail.com

⁷STREZA EOOD, e-mail: dianrangelov@gmail.com

⁸LevIns, e-mail: blago_99@yahoo.com

⁹News Paper Maritca Plovdiv, e-mail: daniela666@abv.com

¹⁰SU-Sofia, e-mail: diana_bankova@abv.com

¹¹IGAPE, Nord Macedonia, e-mail: contact@igape.edu.mk

Key words: Metropolitan UV Desinfection

Abstract: In all the final stations of the Sofia Metropolitan, after the passengers get off, the metro trains reverse the direction of traffic in a few minutes. Appropriate UV sources are then included in the wagons, which disinfect the metro trains. Similarly, vehicles from rail and urban transport are disinfected. Metro stations themselves are disinfected through suitable UV sources at night when there is no traffic. Also during the night, large UV food chains are included in the halls of large food chains for some time. Thus, every half hour the movement of metro trains, in addition to chemical disinfection, UV disinfection reduces the risk of contamination with harmful pathogens, including SARS-Cov-2.

UV ДЕЗИНФЕКЦИЯ НА ТРИТЕ МЕТРОДИАМЕТЪРА НА СОФИЙСКИ МЕТРОПОЛИТЕН - НОЕМВРИ 2020

Анелия Клисарова¹, Елка Радева², Станимир Карапетров³,
Симеон Панев⁴, Атанас Мангъров⁵, Филип Филипков⁶, Деян Рангелов⁷,
Благовест Панев⁸, Даниела Арnaudова⁹, Диана Банкова¹⁰, Стоян Велкоски¹¹

¹Медицински университет - Варна, e-mail: klisarova@gmail.com

²Медицински университет - София, e-mail: eliradeva@abv.bg

^{3,4}Технически университет - София, e-mail: skarapetkov@yahoo.com

⁵Инфекциозна болница - София, e-mail: amangarov@gmail.com

⁶Институт по механика – БАН, e-mail: philip.philipoff@gmail.com

⁷STREZA EOOD, e-mail: dianrangelov@gmail.com

⁸ЛевИнс, e-mail: blago_99@yahoo.com

⁹Вестник Марица - Пловди, e-mail: daniela666@abv.com

¹⁰Софийски университет, e-mail: diana_bankova@abv.com

¹¹ИГАПЕ, Северна Македония, e-mail: contact@igape.edu.mk

Ключови думи: Метрополитен, UV дезинфекция

Резюме: Във всички крайни станции на софийския метрополитен, след слизане на пътниците, влаковете на метрото обръщат посоката на движение за няколко минути. Във вагоните се включват подходящи UV източници, които дезинфекцират влаковете на метрото. По същия начин превозните средства от железопътния и градския транспорт се дезинфекцират. Самите метро станции се дезинфекцират чрез подходящи UV източници през нощта, когато няма трафик. През нощта в залите на големите хранителни вериги за известно време са включени големи UV източници. На всеки

половин час от движение на метро влакове се дезинфицират UV, в допълнение към химическата дезинфекция, UV дезинфекцията намалява риска от замърсяване с вредни патогени, включително sars-cov-2.

1. Introduction

It is believed that the Covid-19 virus spreads as an aerosol infection. The virus can enter the human body from a person carrying the virus through an aerosol infection through the mucous membranes of the recipient - the mucous membranes of the mouth and mouth, the mucous membranes of the nose and nostrils and mucous membranes of the eyes.

2. Metropolitan UV disinfection

The SARS-Cov-2 epidemic is declared in the Republic of Bulgaria on March 8, 2020. One of the anti-epidemic measures is the disinfection of the subway – Fig. 1 and vehicles with chemicals – Fig. 4. In case of subway disinfection is used, the capital is decomposed into separate areas with different epidemic characteristics. This increases the effectiveness of anti-epidemic measures.



Fig. 1. Sofia Metropolitan Scheme

3. Vaccine against Covid-19

The Bulgarian BCJ program from the national immunization calendar of the country against tuberculosis is one of the best in the world. During the state socialism in our country a number of obligatory immunization programs were carried out and today it turns out that this fact will have its effect. For example, after 1947, immunizations, re-immunizations, and re-immunizations were

administered against BCJ, Diff-Tet-Kok, and other infectious diseases. BCJ uses weakened tuberculosis bacteria, which cannot cause infection, but create a powerful lifelong immunity against tuberculosis. Today in the world there is an interesting positive phenomenon related to the BCJ program. According to the World Health Organization (WHO) in Eastern European countries, where the tuberculosis vaccine has been widespread and mandatory, the death rate from the Covid-19 pandemic, which is developing rapidly, is 5.8 times lower than in countries where such a program has not been implemented. Due to the mass and mandatory on the national immunization calendar of the then Bulgarian Ministry of Public Health, cross-immunity against a wide range of pathogenic pathogens was created, including against SARS-Cov-2. This is one of the reasons why the epidemic process in our country is currently proceeding at a moderate pace compared to other European countries, where the COVID 19 virus is widespread, there is a huge number of infected and dead citizens. Once the Coronavirus pandemic is controlled, it is good to consider restoring these Bulgarian immunization programs in a modern version.

Regarding Covid-19, people are three large groups. The first group of people who do not have the Covid-19 virus in their blood and do not have antibodies against it. These people have simply never encountered Covid-19 and have tested negative. However, they may have cross-immunity, which is discussed in the Bulgarian immunization programs paragraph. The second group of people are active carriers of the virus, they have positive tests, although they have no complaints. The third group of people do not have the virus in their blood, they have negative tests, but they have antibodies against it. They have had an asymptomatic attack of Covid-19 and are particularly valuable in the event that a blood serum with antibodies is required. In Germany, a variant of the method with blood serum has been developed, but not by humans, but by calves. Infected calves produce antibodies that are transfused through the blood serum to Covid-19 patients.

In early August 2020, Russia was the first in the world to produce a vaccine against Covid-19. USA, United Kingdom and China are ready with a vaccine against Covid-19 also.

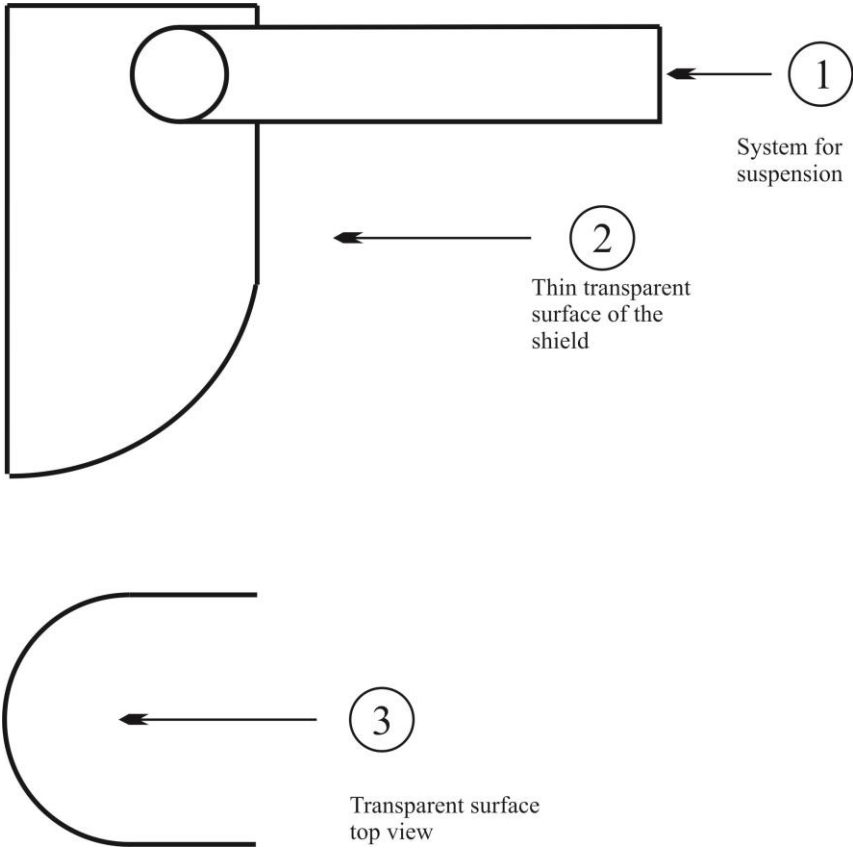


Fig. 2. Protective transparent shield

A good solution is to use an individual shield that protects 100% of all three mucous membranes simultaneously. Such a shield can be made of transparent plastic and has the dimensions of a two-liter bottle of Coca Cola – Fig. 2. It is easy to make, the materials, cost and effort of its manufacture are approximately the same as for the production of a two-liter bottle of Coca Cola. Can

be used repeatedly and combined with other protective equipment - masks on the inside, antibacterial gel on the outside. The shield protected the mouth, nose and mucous membranes of the eyes.

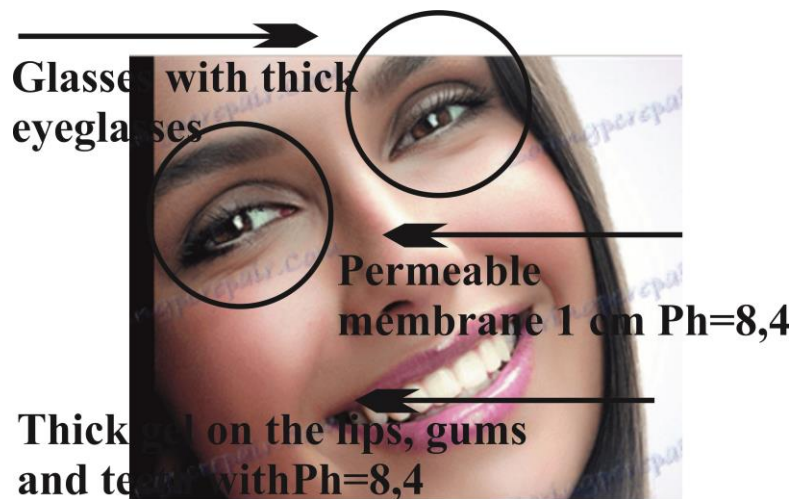


Fig. 3. Use of chemicals with an alkaline environment for protection

Another option is to wear glasses with thick glasses or very large fields of vision to protect the mucous membranes of the eyes and use chemicals with an alkaline environment - such as toothpaste, baking soda with $Ph = 8.4$ and others to destroy harmful pathogens, in the nose and mouth – Fig. 3.

In Sofia, in most food chains, huge flat shields have been introduced on the cash registers themselves, behind which cashiers or sellers of stands for unpackaged cheese, cold sweets and meat work. The most effective are the cash shields of Lidl, then of Kaufland, which introduced heavy shields for cheese and meat stands. At the back of this ranking are the Fantastico cash registers, which have not yet placed shields. Here is the place to point out that only Kaufland has free toilets, Fantastico has free washrooms somewhere (student town) but paid toilets, and Lidl has introduced mandatory disinfectant with disinfectant on the hands at the entrance and on shopping carts that are from metal.

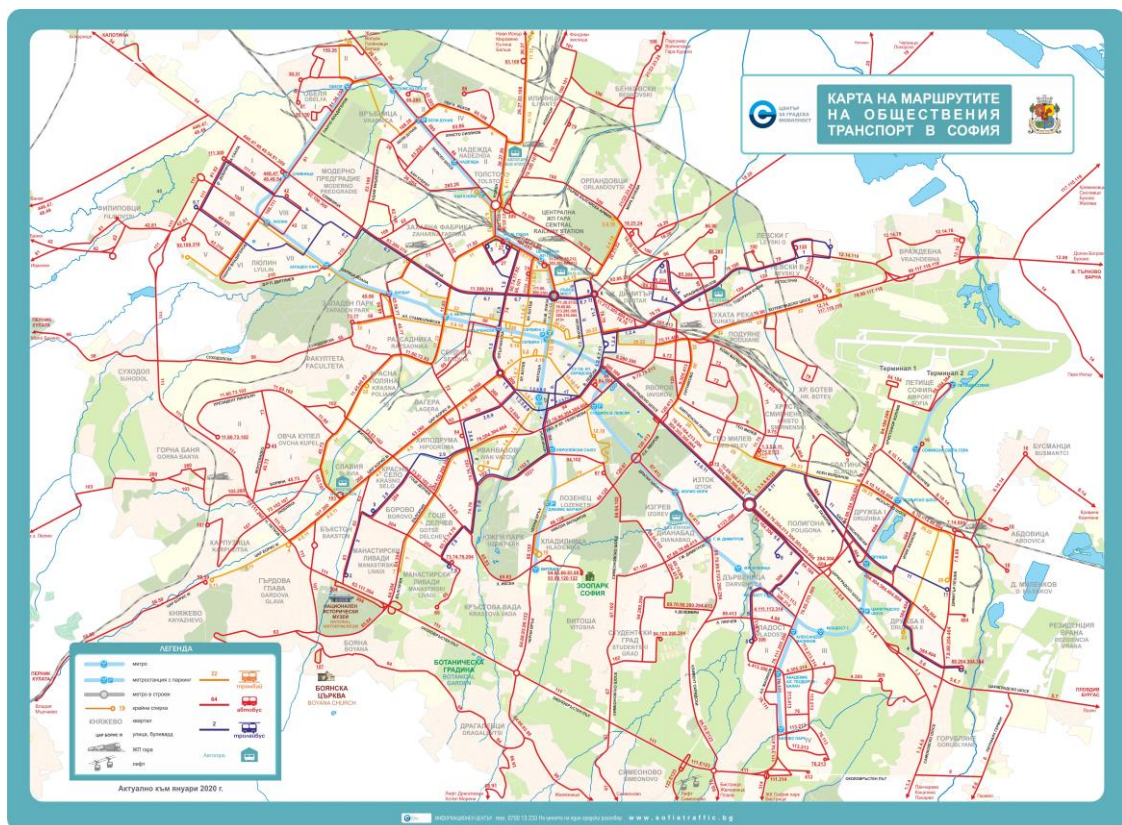


Fig. 4. Scheme of Public transport in Sofia

4. Conclusions

It is the time for the Parliament of the Republic of Bulgaria to OBLIGATE all chains, especially those that have a hot kitchen to organize free toilets and washbasins everywhere. By Sofia Metropolitan UV disinfection the capital could decomposes to the separate epidemic regions [1–9].

5. Acknowledgements

The authors express their acknowledgement for the financial support of this study by the grant COST Action ES1301 FLOWS and special acknowledgement to Bulgarian companies STREZA Ltd (<http://streza.bg>) and PENTAHRON Ltd (<http://pentahron.eu/lang/bg/architecture/>) for the financial support of the study.

References:

1. Bushev, S., S. Stefanov, K. Ishtev, Ph. Philipoff, (1994), Processes of Shot Peening Mechanics, Comptes rendus de l'Academie Bulgare des Sciences, Physique, Tome 47, N 11, IF = 0,343, pp. 9–12.
2. Philipoff, Ph., N.Shopolov, K.Ishtev, P.Dineva, (1997), Wave Propagation in Multilayered Media, Pergamon, Nonlinear Analysis, Theory, Methods & Applications, Vol.30, No.4, IF = 1,405, pp. 2031–2040.
3. Philipoff, Ph., Ph.Michaylov, (2007), BELENE Nuclear Power Plant Numerical and Experimental Bedrock, Layers and Surface Signals, J. Applied Mathematical Modeling, Elsevier, Vol. 31, Issue 9, September 2007, IF = 1,766, pp. 1889–1898.
4. Kurteva, Maya, Philip Philipoff, Dimitar Dimitrov, (2009), Assessment of Some Elements of Environmental Risk Factors in the Bulgarian Mountains, Comptes rendus de l'Acad'emie bulgare des Sciences, Tome 62, Number 6, IF = 0,343, pp. 745–752.
5. Philipoff, Ph., D.Demirev, A.Yusuf, M.Islam, D.Stankov, D.Bankova, Ph. Michaylov (2010). Some Psychology and Technical Aspects of a Rescue Operation in the Musala Peak Region (Rila Mountain), Procedia Social and Behavioral Sciences, Elsevier, WCPCG-2010.
6. Jivkov, Venelin, Philip Philipoff, Anastas Ivanov, Mario Mucoz, Galerida Raikova, Mikhail Tatur, Philip Michaylov. "Spectral properties of quadruple symmetric real functions", Applied Mathematics and Computation – Elsevier, IF = 1,766, 221 (2013), pp. 344–350.
7. Jivkov, V., Philipoff, Ph., Nikolov, N., Velocities in Contact Area of Turning Elastic Tires, (2016) Journal of the Balkan Tribological Association, Vol. 22, N 3-1, 2016, ISSN 1310-4772, IF = 0,737, pp. 2210–2217.
8. Jivkov, V., Nikolov, N., Philipoff, Ph., Wheels Slip Angeles in a Hybrid Vehicle with KERS During Movement in a Turn, (2017) Journal of the BalkanTribological Association,book 1, Vol. 23 (2017) of J Balk Tribol Assoc, IF = 0,737.
9. Jivkov, V., Natarajan V., Paneva A., Philipoff, P., (2017) Forecasting of Strong Earthquakes $M > 6$ According to Energy Approach. J Earth Sci Clim Change, IF = 1,161, 15 Dec. 2018, 8: 433. doi:10.4172/2157-7617.1000433