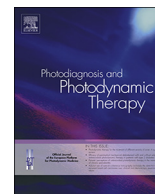




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Short communication

Does PDT have potential in the treatment of COVID 19 patients?

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ABSTRACT

The corona virus pandemic has ignited a proliferation of research aimed at prevention of spread, early diagnosis and treatment.

Coincidentally, in recent years the Yorkshire Laser Centre has been engaged in developing the methodology of applying PDT in chronic bronchiectasis. Our methodology is based on Methylene Blue (MB) mediated PDT used topically within the airway.

The novelty of the method is the use of a nebulizer to deliver the photosensitizer.

We suggest that our protocol and methodology could be modulated for use in respiratory infections of COVID-19.

1. Background

PDT is usually considered for cancer treatment [1]. However, since the early 1990s, there has been growing interest in its antimicrobial (a-PDT) potentials because of the mismatch between availability of antimicrobial agents and the rising multidrug resistance of infecting organisms [2].

In 2009 [3] Mark Wainwright argued that, based on available laboratory and experimental data, a-PDT trials should be undertaken in clinical studies; but for a few studies in dentistry, a-PDT has been mostly locked in laboratories.

In recent years the Yorkshire Laser Centre has been engaged in the design of a protocol and infrastructure for a-PDT in respiratory infection.

The aims of this communication are:

- 1 To report on work in progress.
- 2 To hypothesize that PDT could and should be considered for treatment of respiratory infection in COVID 19 using the methodology that we are developing.

2. Method and comments

Candidates for our study were to be selected from a cohort of patients with widespread chronic bronchiectasis, whose sputa contained multi drug resistant organisms, who require repeated hospitalization.

Our priority was to identify the prohibitive factors for the application of PDT in this cohort and move from the laboratory to the clinic [4].

These were:

- Key information about the drug (PS) and light.
- Suitable devices for the delivery of PS and matching light to bronchial tree.
- Compliance with regulatory barriers for translational studies

In the course of setting up an experimental model- after many U-turns in an effort to find method/s for delivery of the PS and light - we concluded that:

- The most appropriate PS for PDT in the airway seems to be Methylene Blue (Phenothiazine derivative) with which there is considerable experience in various therapeutic packages for clinical use and which has a good track record for safety. The drug is activated by light of 650 – 660 nm.
- The most suitable method for delivery of PS into the respiratory tract would be via a **nebuliser**, details of which we are currently investigating.
- The light can be delivered through the crico-thyroid membrane using a fine catheter. The method has a history of use for topical anaesthetics
- In those with tracheostomy, the drug and light are delivered through the tracheostomy.
- MB-PDT in a topical setting is safe, without expected morbidity.

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3. Rationale of use of our method in COVID 19 Respiratory Infection

From what we have learnt so far about COVID 19 [5–9]:

- Its transmission is through the respiratory tract.
- Its physio-pathology and injuries are through the bronchial tree and lungs
- In early cases, mechanical ventilation may not be necessary *but a nebuliser appears not to be contra-indicated*.
- In cases affecting the pulmonary parenchyma there is consolidation and lack of ventilation, perfusion and diffusion in the areas affected by the disease, resulting in lung and then multi organ failure from oxygen deprivation.
- In some cases, mechanical ventilation is required to maintain oxygenation. However, in some cases, high pressure ventilation can result in pulmonary barotraumas which further complicate the lung failure.

Our hypothesis/suggestion;

- Given the lack of treatment for COVID 19, MB-mediated PDT could be tried in treatment of early and advanced broncho-pulmonary infection.
- Outcome: Destruction of the Virus and maybe better clinical results

Antimicrobial PDT should be given a chance; Corona-virus respiratory infection may just be that chance.

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