CLAIMS

1. A system for performing intra-corporeal ultraviolet therapy, the system comprising:

an endotracheal tube (ETT); and

a light catheter comprising:

a light delivery portion disposed at a proximal end inside the light catheter, the light delivery portion comprising a set of LEDs positioned to emit UV-A light circumferentially outward;

a cooling tube disposed inside the light catheter, the cooling tube comprising at least one opening towards the proximal end of the light catheter; and

an ETT connector disposed at the proximal end of the light catheter and configured to connect to the ETT,

wherein the light catheter is configured to be deployed into the ETT by being advanced through the ETT connector such that a desired length of the light catheter is positioned within the ETT.

2. The system of claim 1, wherein a portion of each LED in the set of LEDs is in direct contact with the cooling tube positioned centrally with respect to the LEDs.

3. The system of claim 1, wherein within the cooling tube, a coolant gas flows in a first direction towards the at least one opening and exits via the at least one opening, and flows backwards within the light catheter in a second direction opposite to the first direction.

4. The system of claim 1, further comprising a heat sink coupled to each LED in the set of LEDs.

5. The system of claim 1, wherein the set of LEDs emit peak wavelengths in the 340 – 349 nm range or in the 340 – 345 nm range or emit wavelengths between 320 nm and 410 nm with a peak wavelength in a range from 343 nm to 345 nm.

6. The system of claim 1, wherein the set of LEDs emit light only in the UV-A and UV-B ranges, and not in the UV-C ranges or the set of LEDs emit only UV-A light.

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7. The system of claim 1, wherein cooling air exits through the at least one opening from the cooling tube.

8. The system of claim 1, wherein the ETT connector comprises a flap valve.

9. The system of claim 1, further comprising a compressor system comprising:
one or more processors;
an air compressor; and
a dual connector comprising an air connector and an electrical connector.

10. The system of claim 9, further comprising an umbilical tube comprising:
an air passageway;
electrical conductors;
a light catheter connector configured to connect to the light catheter; and
a compressor connector configured to connect to the compressor system.

11. The system of claim 10, further comprising a light source controller comprising:
one or more processors;
a memory;
a control system coupled to the memory comprising one or more processors, the control system configured to execute machine executable code to cause the set of LEDs to emit light for a specified duration and an intensity.

12. The system of claim 11, wherein the specified duration is at least 20 minutes, 40 minutes, or 60 minutes daily, for at least one, two, three, four or five days.

13. The system of claim 11, wherein the intensity comprises at least 1,100 microwatt/cm^2, 1,500 microwatt/cm^2, 2,000 microwatt/cm^2, 2,100 microwatt/cm^2, 2,200 microwatt/cm^2, 2,300 microwatt/cm^2, 2,400 microwatt/cm^2, 2,500 microwatt/cm^2, 2,600 microwatt/cm^2, 2,700 microwatt/cm^2, 2,800 microwatt/cm^2, 2,900 microwatt/cm^2, 3,000 microwatt/cm^2, or 2 milliwatt/cm^2.

14. A method of deploying the light catheter in the system of claim 11, the method comprising:

connecting the ETT connector to the ETT;

deploying the light catheter into the ETT by advancing the light catheter through the flap valve;

providing instructions to the controller to energize the set of LEDs; and

energizing the air compressor to pump air through the air passageway into the cooling tube and out of the at least one opening towards the proximal end of the light catheter.

15. The method of claim 14, further comprising determining a temperature based on signals received from a thermistor in thermal contact with the light delivery portion and adjusting the flow rate of the air compressor based on the determined temperature.

16. The method of claim 14, further comprising determining a temperature based on signals received from a thermistor in thermal contact with the light delivery portion and adjusting the power to the LEDs delivered by the light source controller based on the determined temperature.

17. A system configured for performing intra-corporeal ultraviolet therapy for use in the treatment of a respiratory infection, wherein the system comprises a light catheter for connection to an endotracheal tube (ETT), wherein the light catheter comprises a set of LEDs configured to emit UV-A and a cooling channel, the cooling channel positioned centrally with respect to the LEDs, the LEDs being positioned such that a portion of each LED is in contact with the cooling channel,

wherein the set of LEDs are disposed at a proximal end inside the light catheter,

wherein the cooling channel is disposed inside the light catheter, the cooling channel comprising at least one opening towards the proximal end of the light catheter,

wherein the light catheter is configured to be deployed into the ETT by being advanced through an ETT connector disposed at the proximal end of the light catheter such that a desired length of the light catheter is positioned within the ETT, and

wherein the system is configured for radiating UV-A light outwardly from the light catheter along a substantial length of the light catheter from the set of LEDs.

18. The system of claim 17, wherein the infection comprises at least one of pneumonia, a bacteria, a virus, an RNA virus, a coronavirus, or SARS-CoV-2.

19. The system of claim 17, wherein the system is configured for radiating for 20 minutes at 2,000 microWatt/cm^2 intensity.

20. The system of claim 17, wherein the system is configured for radiating using at least 1,000 microWatt/cm^2 intensity.

21. The system of claim 17, wherein the respiratory infection is SARS-CoV-2 and the radiating is performed for at least 20 minutes daily, for at least five days.

22. The system of claim 17, wherein the system is configured for radiating for at least 10 minutes and between 1,000 – 5,000 microWatt/cm^2 intensity.

23. The system of claim 17, wherein the system is configured for radiating the light outwardly from the ETT is performed using a UV light source integrated in a catheter, introduced inside a canal in the ETT.