What is claimed is:

CLAIMS

1. A method of measuring intracellular Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS) in a subject, the method comprising the steps of:

(i) administering to the subject a compound of formula (I):

A-(O-B)n (I),

wherein A is a radical of a luciferin, each O is an oxygen atom linking A and B, each B is, independently, a cleavable protecting group, and n is an integer from 1-4; and

(ii) following step (i), extracorporeally measuring intracellular bioluminescence from the luciferin.

2. The method of claim 1, wherein A is a radical of coelenterazine, vargulin, prolume purple, or furimazine.

3. The method of claim 2, wherein A is a radical of coelenterazine.

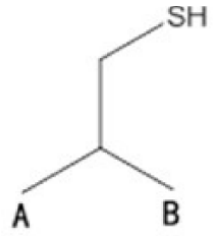
4. The method of claim 3, wherein the radical of coelenterazine is enduRen or viviRen.

5. The method of any one of claims 1-4, wherein each cleavable protecting group B is selected to cleaved by esterases or lipases.

6. The method of any one of claims 1-5, further comprising correlating the result of step (ii) to an intracellular ROS and RNS level in the subject.

7. The method of any one of claims 1-5, further comprising using the result of step (ii) to monitor the pathogenesis or severity of a disease or condition in the subject.

8. Use of a pharmaceutical composition comprising of a compound of formula (II):



(II),

or a pharmaceutically acceptable acid addition salt thereof, wherein

(x) A is $-CH_2NHR'$ and B is $-CH_2NHR$, or A = -NRR' and B = H; and

(y) each of R and R′ are, independently, selected from H, C_1-C_6 alkyl, and C_1-C_6 heteroalkyl, with the proviso that R and R' are not both H if B = H,

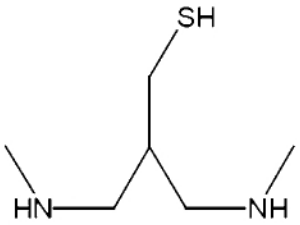
for the manufacture of a medicament for the treatment of a disease or condition mediated by intracellular Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS) in a subject, wherein the pharmaceutical composition is to be administered to said subject in a method comprising the steps of:

(a) measuring an intracellular ROS and RNS level in the subject; and

(b) on the basis of the level measured in step (a), administering to the subject an effective amount of said pharmaceutical composition comprising a compound of formula (II).

9. The use of claim 8, wherein step (a) comprises performing the method of any one of claims 1-7.

10. The use of claim 8, wherein the compound of formula (II) is



PrC-210,

or a pharmaceutically acceptable salt thereof.

11. The method of any one of claims 1 to 7, wherein the subject has undergone a solid organ transplantation (SOT) or vascularized composite allograft transplantation (VCA) and the transplant can be monitored for acute or chronic transplant rejections and treatment success.

12. The method of any one of claims 1 to 7, wherein the subject suffers from:

(i) a neurodegenerative disease, including but not limited to, Alzheimer's disease, Amyotrophic lateral sclerosis, Parkinson's disease or Huntington disease;

(ii) a neuroinflammatory disease, including but not limited to Multiple sclerosis or sterile and non-sterile encephalitis;

(iii) an acute brain trauma, such as Traumatic Brain injury, Spinal cord injury or stroke;

(iv) acute radiation syndrome, or was, is, or will be exposed to low and high energy radiation from a nuclear explosion, nuclear reactor leakage or space travel;

(v) neuropsychiatric disorders include, without limitation bipolar disorder (BD), schizophrenia, depression, anxiety disorders, attention deficit disorders, addictive disorders, personality disorders, autism and Asperger's disease;

(vi) cardiovascular diseases, including but not limited to such as arteriosclerosis, myocardial infarction, angioplasty, diseases of the heart valve, angina pectoris, peripheral circulatory disorders, vascular damage from dialysis, vascular dementia, and transient ischemic attacks;

(vii) myopathic diseases;

(viii) autoimmune diseases, including but not limited to such as rheumatoid arthritis, Diabetes Type I, Morbus Crohn, colitis ulcerosa, and psoriasis;

(ix) diabetes Type II, obesity, and metabolic syndrome;

(x) aging and age-related diseases;

(xi) asthma, and inflammatory pulmonary conditions (e.g., chronic obstructive pulmonary disease (COPD);

(xii) acute injuries including but not limited to such as major injuries, major surgeries and burns;

(xiii) complication of infections, including but not limited to such as post-Covid syndrome; or

(xiv) a disease leading to fibrosis, such as. such as but not limited to hepatitis leading liver fibrosis, glomerulonephritis leading to kidney fibrosis and primary and secondary lung fibrosis.

13. The method of any one of claims 1-7, wherein the bioluminescence of step (ii) occurs in the absence of any luciferase enzyme.