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PTO/SB/16 (2-98)
Approved for use through 01/31/2001. OMB 0651-0037
Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

INVENTOR(S)					
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)	
George		BRAINARD		Haddonfield, New Jersey	
<input type="checkbox"/> Additional inventors are being named on the ____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (280 characters max)					
LIGHT SYSTEM, METER SYSTEM, AND MATERIALS FOR STIMULATING CIRCADIAN AND NEUROENDOCRINE SYSTEMS					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer Number		<input type="text"/>		<div>Place Customer Number Bar Code Label here</div>	
OR Type Customer Number here					
<input checked="" type="checkbox"/> Firm or Individual Name		Clifford Kent Weber			
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Country		United States	Telephone	(215) 503-0757	Fax (215) 923-3613
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages		3		<input type="checkbox"/> Small Entity Statement	
<input type="checkbox"/> Drawing(s) Number of Sheets		<input type="text"/>		<input checked="" type="checkbox"/> Other (specify) Express Mail Letter	
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)					
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input type="checkbox"/> No.					
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Respectfully submitted,

SIGNATURE

Clifford Kent Weber

TYPED or PRINTED NAME

Clifford Kent Weber

TELEPHONE

(215) 503-0757

Date

05/10/00

REGISTRATION NO.

42,215

(if appropriate)

Docket Number:

BRA01-P0002

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

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PTO/SB/21 (12-97)
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TRANSMITTAL FORM <i>(to be used for all correspondence after initial filing)</i>	Application Number	Not Known	
	Filing Date	Not Known	
	First Named Inventor	BRAINARD, George	
	Group Art Unit		
	Examiner Name		
Total Number of Pages in This Submission	8	Attorney Docket Number	BRA01-P0002

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60/203308
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ENCLOSURES (check all that apply)		
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Clifford Kent Weber
Signature	<i>Clifford Kent Weber</i>
Date	May 10, 2000

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1. Light system which emits an optimal balance of wavelengths to stimulate the circadian and neuroendocrine system and provides light therapy for Light Sensitive Disorders such as Seasonal Affective Disorder (SAD)

2. Transparent or translucent materials which specifically transmit or block the optimum balance of wavelengths for stimulating the circadian and neuroendocrine system and provides light therapy for Light Sensitive Disorders such as Seasonal Affective Disorder (SAD)

3. Meter system for quantifying light which stimulates the human circadian and neuroendocrine systems under normal conditions and provides light therapy for individuals with light sensitive disorders such as seasonal affective disorder (SAD)

This metering device will be specifically configured to accurately quantify electromagnetic radiation that stimulates the circadian and neuroendocrine systems of healthy humans. The meter's wavelength sensitivity will match the wavelength sensitivity of the photoreceptors for circadian and neuroendocrine regulation in humans. This device may also be used to quantify electromagnetic radiation which is optimum for treating Seasonal Affective Disorders (SAD) or other light-responsive disorders.

The science of photobiology involves the study of how the infrared, visible and ultraviolet portions of the electromagnetic spectrum influence biological processes. There are two broad categories of light measurement techniques: radiometric and photometric. Each measurement technique has its merits and drawbacks relative to circadian regulation, neuroendocrine regulation and light therapy. Radiometry is based exclusively on the physical properties of light - its energy and wavelength. A radiometer measures the radiant power of a light source over a defined range of wavelengths. Figure 1 illustrates an example of a radiometer detector response that measures radiant power from the middle ultraviolet spectrum (290 nm) into the near infrared spectrum (770 nm). Radiometers can be configured to measure different bandwidths across the electromagnetic spectrum. The wavelengths within the designated bandwidth can be detected equally as shown in Figure 1, or they can be filtered for differential sensitivity across the various wavelengths.

In contrast to radiometry, photometry is based on the selective responsiveness of the human visual system. A photometer is simply a radiometer that has filters added to the detector which "shape" the detector sensitivity to resemble the luminance (brightness) response of the human visual system. Thus, photometry is a special branch of radiometry. Figure 1 illustrates the well characterized visual responses: photopic or day vision, and scotopic or night vision. Between individual humans, there are substantial differences in visual responses. The curves shown in Figure 1 represent sketches of the average response curves for the "standard observer" as determined by the Commission Internationale de l'Eclairage (CIE 1987). The photopic and scotopic visual functions are defined with reference to the adaptive state of the rod and cone photoreceptors in the human retina. Radiometers can be filtered to detect only those relative proportions of wavelengths that comprise the photopic or scotopic visual response. Such photometers will detect photopic lux or scotopic lux, respectively. Specifically defined, lux measures are measures of illuminance - the amount of light, or luminous flux, falling on a surface. One photopic lux is one lumen per square meter (lm/m^2).

Most investigators operate from the assumption that light therapy is mediated via a photoreceptive mechanism in the human eye as opposed to a photoreceptive mechanism in the skin or some other part of the body. There is increasing evidence that the photoreceptive mechanism for the circadian and neuroendocrine system or that mediates light therapy is not identical to the photoreceptive system that mediates the sensory capacity of vision.

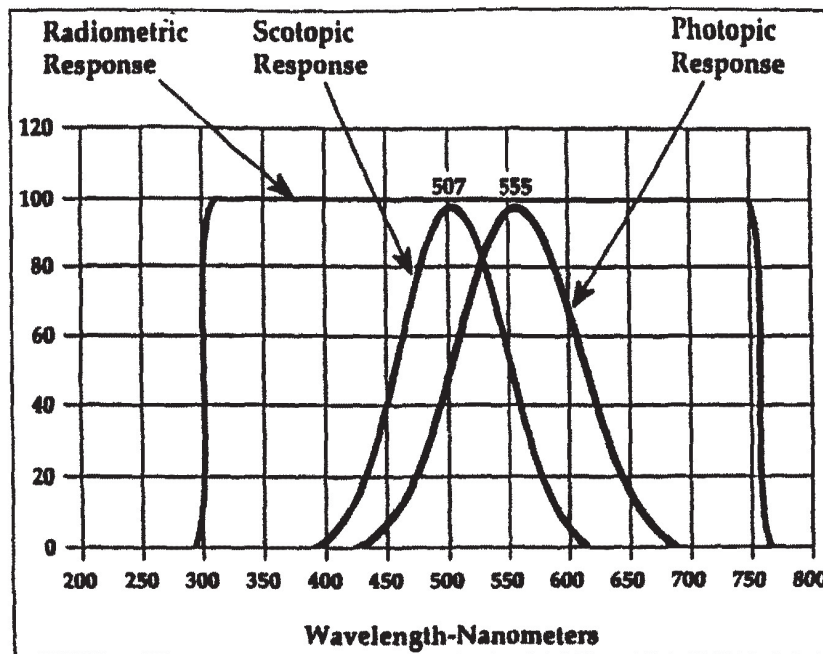


FIGURE 1-1. Response functions for three light detectors. One line indicates the characteristic response of a radiometer that has a flat sensitivity from 310 nm to 750 nm. The two other curves represent photometric responses for photopic lux and scotopic lux, based on the Commission Internationale de l'Eclairage standard observer (Commission Internationale de l'Eclairage 1987).

It is not known which photopigment(s) transduce light stimuli for circadian regulation in mammals. The aim of this ongoing study is to elucidate the ocular photoreceptor system for regulating the human pineal gland by establishing an action spectrum for light-induced melatonin suppression. The 33 females and 31 males who have entered this study have a mean age of 24.5 ± 0.4 yrs. and have normal color vision. Volunteers received full-field monochromatic stimuli while their pupils were dilated with a mydriatic agent. The light exposure system was illuminated by a xenon arc lamp connected to a grating monochromator, and an integrating sphere. Monochromatic light exposures were between 2:00 and 3:30 AM. Blood samples were collected before and after these light exposures and were quantified for melatonin by RIA. Each subject was tested with at least seven different irradiances of one wavelength with a minimum of one week between each nighttime exposure. Presently, over 600 individual nighttime melatonin suppression tests have been completed with eight monochromatic wavelengths ranging from 440 nm to 600 nm. Fluence-response curves were completed with 10 irradiances at 505 and 555 nm for 8 subjects, each. The entire 505 nm curve is "shifted to the left" compared to the 555 nm curve. For example, an equal photon dose of 4.19×10^{13} photon/cm²/sec stimulus at 505 nm induces a mean control-adjusted melatonin suppression of 61%. In contrast, the same photon density at 555 nm induced a significantly lower ($p < 0.01$) melatonin suppression of 15%. These data demonstrate that the cone system that mediates photopic vision is not the primary photoreceptor system to transduce light stimuli for melatonin regulation in the human. Support: NIH RO1NS36590 (to GB) and NSF IBN9809916 (to MR).