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DETECTION OF ENDOGENOUS ELECTROMAGNETIC FIELD OF THE HUMAN BODY

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ABSTRACT

Studies have shown that human body emits their own signal radiation, which emit their frequency radiations into space surround the body. In this paper, an investigation of body radiation wave detector is performed to measure the frequency of human radiation wave. At first, the performance of body radiation wave detector is calibrated by considering two parameters; measurement distance and antenna length. The appropriate distance and length used for measurement is concluded and the accuracy for detection is determined. It is found that the detector has less than 1% of vagueness and it measurement characteristic is validated using a spectrum analyzer. Then, the human radiation wave of endogenous electromagnetic fields is examined on seven points of the human body which the results shows that each points has their own frequency that correspond to the unique attribute of human being.

Keywords: electromagnetic wave, frequency, human radiation wave.

INTRODUCTION

In recent years, a scientific investigation of signal radiation of the living body has shown increase. All living body particularly human is stated has their own signal radiation. The signal radiation of the human is portrayed as radiation fields of the body and explained as endogenous electromagnetic (EM) fields produced by the human body. This radiation is known as human radiation wave which encircles the physical body, basically in multilayer shell [1] and vibrates at a certain radiation frequency [2]. The phenomenon of human radiation has been identified as EM field driven by the biological system of the body. The EM radiation of the human body is produced relating on electrical characteristics in the human body [3, 4]. There is ample evidence that endogenous EM fields are produced by the human body and it radiated beyond the skin. Physicians and biomedical researchers are generally using electroencephalography (EEG), electrocardiography (ECG) and electromyography (EMG) to measure the manifestation of endogenous EM fields. In EEG, extremely low frequency is used that arise from the brain waves which occupying the bottom part of EM spectrum. For a higher EM frequency (up to gigahertz), other methodologies have been used. For example, the infrared thermography is used for subcutaneous examination, whereby this involves infrared and microwave detection. Generally, all regions in the EM spectrum involved in presenting EM field radiation around the biological body that depends on the instruments used for the investigation [1].

The concept of human radiation wave is also expressed as bioenergy or biofield radiated by a biological system [5-7]. This radiation portrayed as endogenous that surrounds and permeated the physical body. In addition, the EM phenomena within and between biological systems is also reported as bio electromagnetic field [4, 8], which based on interaction of living beings. The EM field generated by a living system propagates in free space and capable of transferring energy and information from one system to another. With the ability to communicate among bio objects, the field may also deemed as bio information radiation [9].

In essence, the hypothesis of biologic field of all living beings was first conducted by Russian scientist, Alexander Gurwitsch, who discovered the phenomenon of mitogenetic radiation of cells [10] and introduced the concept of embryonic (morphogenetic, biological, and cellular) field. In his experimentation, radiation was detected as a result of changes in biological organisms, which suggested the existence of a form of radiation of an electromagnetic nature. He afterward found this radiation in many other biological organisms. Recently, in a scientific study of EM cellular interactions of the organism, EM fields have been observed to be generated in the cells suggesting that the fields are generated as a result of the communication within biological cells [11].

BACKGROUND STUDY

Human radiation wave

Basically, the electromagnetic radiation produced by the human body is associated with electrical properties of the body [3, 4]. The electrical properties of human body has been identified since 1930s, which Burr and Northrop [12, 13] introduced the concept of electrodynamic field. This concept describes stable voltage differences in various biological systems can be changed when the organism go through any variety of biological processes,

where this field is physically considered as electrical [14, 15]. In recent years, the existence of the electrical properties was explicitly supported by McCaig [16], which describes direct current (dc) electric field is involved in normal developmental processes of embryonic and changed in time space and magnitude.

As a complex biological system, the human body is made up of cells, chemical composition and organ systems. In a view of physiological, the body consists of a collection of interacting systems which enables the body to adjust the function of each organ according to the needs of the entire body and maintains itself in the state of balance, that known as homeostasis. In order to maintain homeostasis, communication within the body may occur through the nervous system or through chemical stimulation. Basically, the human body works on an electro-chemical energy system [17].

As part of the normal functioning of the body, chemical reaction occur causes a tiny electrical current to exist that known as bioelectricity. Based on the theory of electromagnetism, a magnetic field is produced around the body when there is a flow of electrical current. The principle is known as Ampere's Law. Ampere's Law quantifies the relationship of electric field and magnetic field produced from the current flows. If the EM field generated by human body is static i.e. does not vary in time, no wave is transmitted. On the other hand, when the EM field is dynamic which is caused by varying currents in the body, results a variation in field intensity appears as waves radiating outwards from the body. These waves are called as EM radiation of the human body which can be described as human radiation wave and could represents a unique feature of the human body. As a biological system, the human radiation wave will vary in accordance to health and activity of the body [7, 18].

Frequency of the human body

The radiation of electromagnetic wave is generally expressed as an oscillation of self-propagating transverse wave of electric and magnetic fields, where it travels in straight lines at the speed of light. It oscillates in a periodic mode exhibiting a characteristic of amplitude, wavelength, and frequency. Essentially, the electromagnetic field emitted by the human body is a sign of natural frequency. Studies have shown that everything has its own fundamental frequency, at which it is naturally vibrating [19]. Several different frequencies of the human body have been reported, indicating the human body vibrates at its own frequency. This frequency spectrum ranges from 10^{-4} to 10^{11} Hz [20].

On the other hand, other researchers have been described the frequency of the human body as a resonant frequency [21]. Resonance is defined as the natural vibratory rate that is specific to the frequency oscillations generated by all kinetic forms of wave. It is able to communicate and transmit frequency information from one to another when their resonant frequencies are matched. Meaning that, resonance occurs when body's natural frequency is augmented by vibrations of another body at the same frequency. The two objects are able to interact without contact when they have similar natural frequency in which their vibration become coupled and resonate. Such study by Creath and Schwartz [22] found that stronger signal can be seen when the leaves are closer together suggesting the potential of resonance.

Basically, every living body is a resonance cavity that able to radiate, absorb and also react to frequencies [23]. Many studies also have been reported that the human body responds significantly when exposed to the electromagnetic fields [24, 25]. The resonance cavity of the human body is dissipates the electromagnetic fields [26]. The EM fields in the body is invisible and dynamic that consists of the reflection and superposition of EM waves produced by various oscillators such as organs, tissues, cells and molecules [27]. Radiation of the human body is interrelated to the distribution of EM fields in the body. As a dynamic behavior, the electric and magnetic components of the human body change and oscillate continuously, causing an emission of fundamental frequencies. The harmonic frequencies is automatically generated and also transmitted throughout the EM spectrum. Both fundamental and harmonic frequencies carry the same information's.

APPARATUS AND EXPERIMENTAL SETUP

Body radiation wave detector

The radiation of endogenous EM fields of the human body is detected using a hand-held frequency meter, namely body radiation wave detector. The detector is capable to detect a wide range of EM fields for human radiation waves in range of Megahertz. It is comes outfitted with telescopic dipole whip antenna and will provides a real-time reading of the human radiation frequency at the point of testing.

Besides, the frequency meter is also equipped with a filter unit and ultra-sensitive synchronous detector to enhance detection performance. The filter unit is used to scan the presence of interference to avoid random noise. Meanwhile, the ultra-sensitive synchronous detector is used to show the relative strength of the EM field that interacts with the antenna which can be suspected as a distraction.

Generally, during measurement, the antenna is adjusted at a particular length and placed at a distance from the human body. The frequency of the human body is then displayed on the LCD screen of the detector. The detector is also equipped with two measurement scales namely 300 MHz range and 3 GHz range.

The antenna has a maximum length of approximately 7th segment (57 cm); with a maximum input impedance of 50 Ω. This maximum impedance is

produced at the ends of the antenna and is stable for the entire bandwidth that the detector can measure. The minimum impedance in the antenna is found at the center.

Calibration of the detector

The reliability and accuracy of detector in measuring frequency of human radiation wave is confirmed by conducting calibration experiments. In this experiment, the system consists of a transmitter (Marconi Instruments 2024 signal generator) and two receivers of Spectrum Analyzer (Advantest U3751) and body radiation wave detector (Aceco FC1003). The signal generator offers carrier frequencies from 9 kHz to 2.4 GHz with 1 Hz resolution. The spectrum analyzer is used to confirm the frequency detected by body radiation wave detector.

The experimental design for the calibration setup is shown in Figure-1. The two receivers of spectrum analyzer and body radiation wave detector are placed at different distances, from 1 cm to 30 cm, from the signal generator. Initially, the antennas of the transmitter and receivers are set at equal length to allow optimum signal transmission and detection, where the length of the dipole antennas are adjusted to approximately 40 cm. Basically, the optimum signal transmission and reception occur when both transmitter and receiver antenna have equal orientation [28]. The length of antenna of body radiation wave detector is varied from 1st segment to 7th segment (approximately from 10 cm to 57 cm). The distances of measurement, D varied from 1 cm to 30 cm are selected by reason of body radiation exists at such a weak level of intensity radiated from the human body [29]. The measured frequencies are recorded for each combination in variations of measurement distances and antenna lengths.

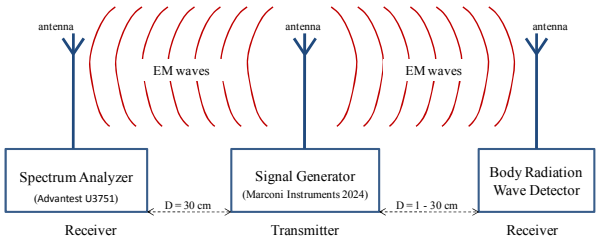


Figure-1. Calibration experimental setup.

Calibration of frequency measurement

For the purpose of frequency calibration, two experiments are performed on frequencies of 1 MHz to 1 GHz. In the first experiment, the frequencies of 10 MHz to 1 GHz are measured with the antenna length is adjusted from 10 cm to 57 cm and the measurement distance between transmitter to receivers is varied from 5 cm to 30 cm. In this experiment, both measurement scale of 300 MHz range and 3 GHz range in body radiation wave detector are used for measurement. The results obtained are then examined and compared according to their measurement distances and antenna lengths.

In the second experiment, the frequencies of 1 MHz to 100 MHz are measured with the antenna length is adjusted for optimum signal transmission at 40 cm and the measurement distance between transmitter to receivers is varied from 5 cm to 30 cm. In this experiment, the measurement only uses measurement scale of 300 MHz range in the detector. The results obtained are examined and compared according to their measurement distances. The appropriate setup for measurement distance to be used in the frequency measurement is then determined.

Measurement of distance and antenna length

As explained previously, various antenna length and distance are used to calibrate the frequencies. The body radiation wave detector is then investigated at frequencies of 10 MHz, 20 MHz, 30 MHz and 50 MHz, to determine the appropriate measurement distance and antenna length. In this experiment, antenna length from 1st segment to 7th segment are used with the measurement distance between transmitters to receivers is adjusted from 1 cm, 5 cm and 10 cm. The results obtained are examined and compared according to the antenna lengths and measurement distances. Then, the appropriate setup for antenna length to be used in the frequency measurement is determined.

PERFORMANCE OF THE DETECTOR

The results of the calibration experiments are described as follows which all the experiments are performed at the Communication laboratory, Universiti Teknologi MARA, Malaysia.

Frequency measurement of 10 MHz to 1 GHz

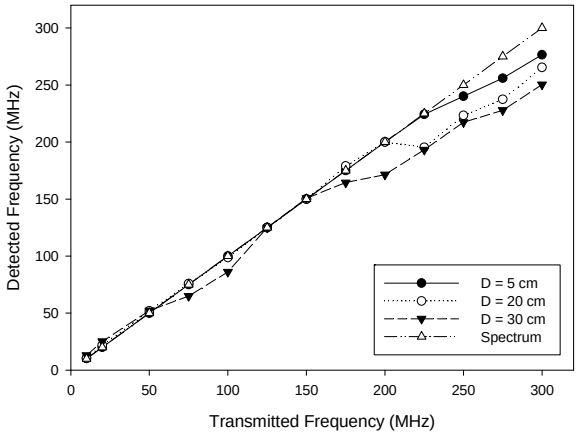
In the beginning, the experiments are performed at frequencies from 10 MHz to 1 GHz. The antenna length used for this experiment is varied from 10 cm to 57 cm and the measurement distances between transmitters to receivers varied from 5 cm to 30 cm.

The frequency measurement of 10 MHz to 300 MHz is shown in Figure-2, while the frequency measurement of 50 MHz to 1 GHz is shown in Figure-3. It can be seen in Figure-2 that at the measurement scale of 300 MHz, the detector is capable to measure the lower range of frequencies, whereas at the measurement scale of 3 GHz (Figure-3), it can measure frequencies from 300 MHz up to 1 GHz.

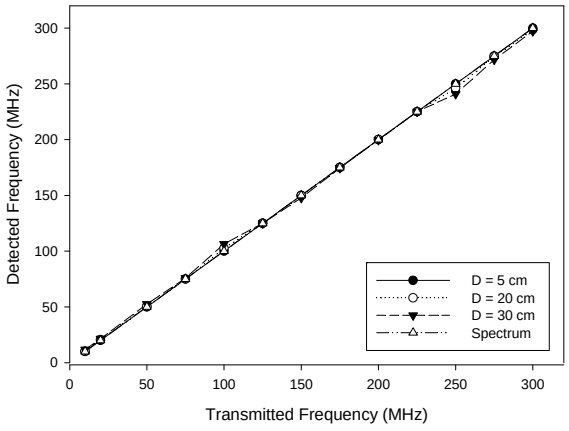
Three distances and three antenna lengths are considered; D is equal to 5 cm, 20 cm and 30 cm are selected due to the existence of a weak level of intensity radiated from the human body [29], while antenna length, L equal to 10 cm, 40 cm and 57 cm are used as these represent the shortest, optimum and longest length for the setup, respectively.

The results show that all the transmitted frequencies can be detected by detector depending on the distance of measurement and antenna length used for the measurements. The results in Figure-2 and Figure-3 demonstrated that the detected frequency in accordance to operating frequency of transmitting signal, thus it is confirmed that the detector can detect the transmitted signal. Moreover, the detected frequency is also validated by spectrum analyzer reading.

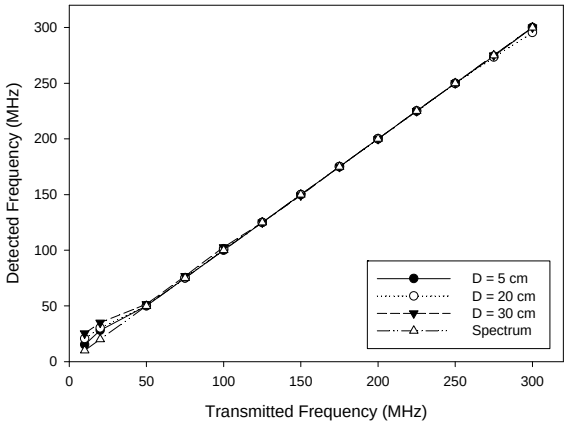
From the plots in Figure-2 and Figure-3, it is observed that for the antenna lengths of 40 cm and 57 cm, the distance of 5 cm is the most appropriate distance for frequency detection. However, for the antenna length of 10 cm at distances of 20 cm to 30 cm (Figure-2 (a)) and at distance of 30 cm (Figure-3(a)), there are slight fluctuations on the measured frequency reading due to the mismatch of the receiver antenna length. Thus, the results show that the antenna lengths of 40 cm to 57 cm are more appropriate for detecting frequencies for use in the study.



(a) L = 10 cm

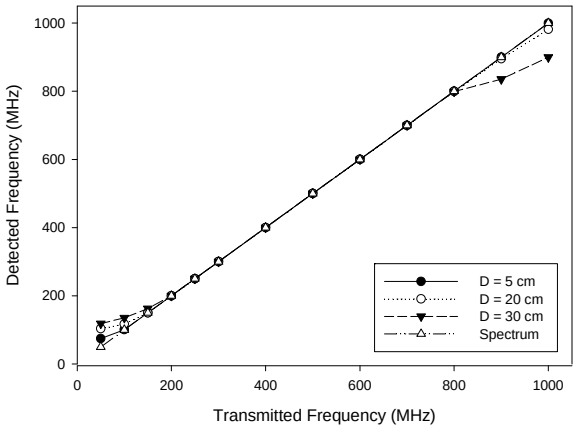


(b) L = 40 cm

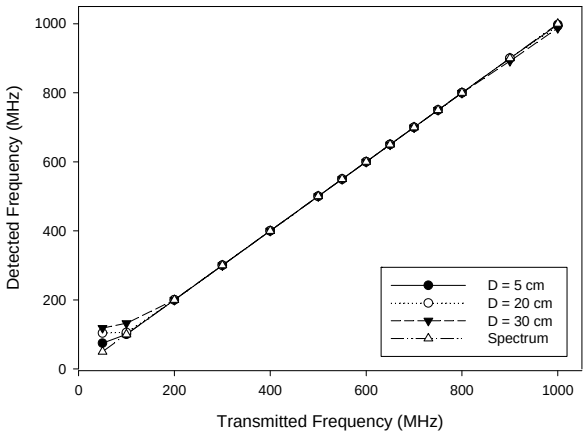


(c) L = 57 cm

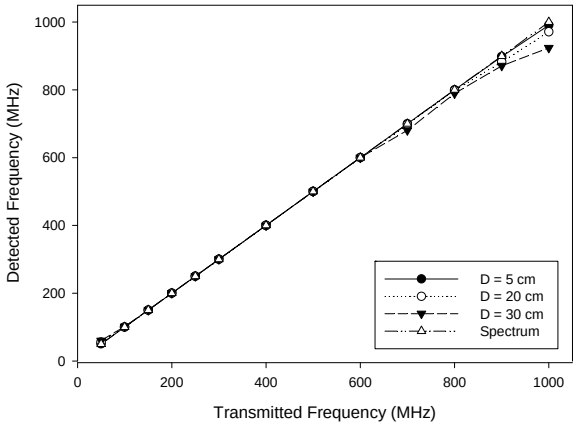
Figure-2. Frequency measurement of 10 to 300 MHz for measurement scale of 300 MHz at receiving antenna length (a) 10 cm, (b) 40 cm, and (c) 57 cm for three distances of 5 cm, 20 cm and 30 cm. All the measurements are validated against spectrum analyzer reading.



(a) L = 10 cm



(b) L = 40 cm



(c) L = 57 cm

Figure-3. Frequency measurement of 50 MHz to 1 GHz for measurement scale of 3 GHz at receiving antenna length (a) 10 cm, (b) 40 cm, and (c) 57 cm for three distances of 5 cm, 20 cm and 30 cm. All the measurements are validated against spectrum analyzer reading.

Frequency measurement of 1 MHz to 100 MHz

This experiment is conducted to focus on frequency from 1 MHz to 100 MHz, using the measurement scale of 300 MHz in body radiation wave detector in order to determine the appropriate measurement distance can be used for measurement. The optimum antenna length of 40 cm is used while measurement distance between transmitters to receivers is varied from 1 cm to 30 cm.

As shown in Figure-4, the detector accurately measured the transmitted frequencies at all distances for frequencies above 5 MHz. However, for transmitting frequency of 1MHz, the reading is inaccurate because the detector tends to measure the ambient frequency. The recorded ambient frequency is varied from 40 to 60 MHz and has been measured before and after the experiments. Referring to Figure 5, the average detection accuracy is about 99% for measurement distance of 1 cm and 5 cm. Therefore, the results confirmed that the distance of 1 cm to 5 cm is the most appropriate distance for frequency detection.

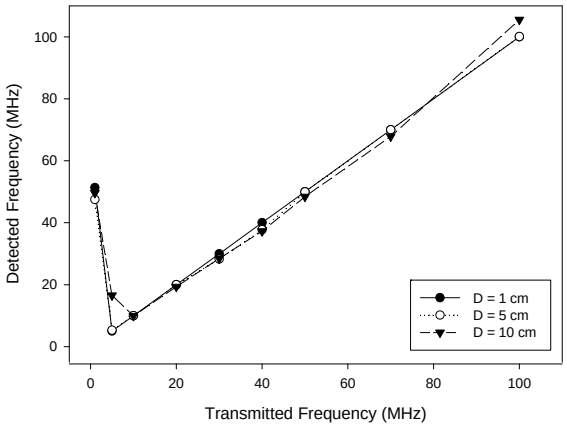


Figure-4. Frequency measurement of 1 MHz to 100 MHz for distances of 1 cm, 5 cm and 10 cm.

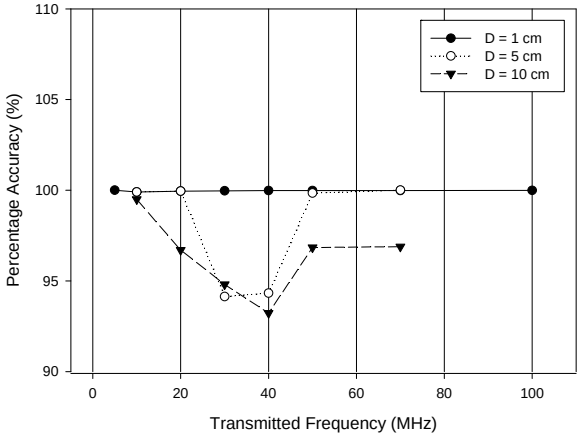


Figure-5. Frequency detected accuracy of 5 MHz to 100 MHz for distances of 1 cm, 5 cm and 10 cm.

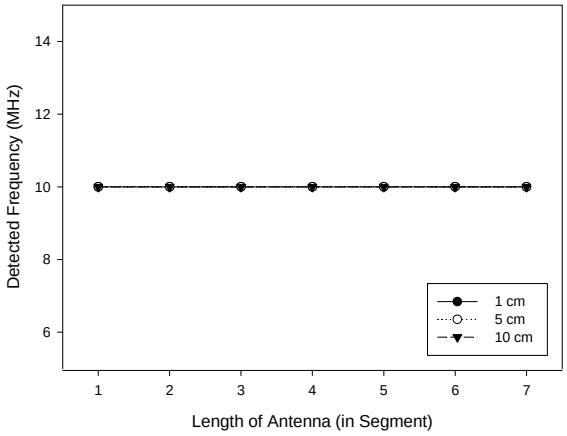
Distance and antenna length setup for measurement

As the distance of 1 cm to 5 cm previously described as the appropriate distance for frequency detection, therefore further discussion will focus on this distance in order to determine the appropriate size for antenna length. For the purpose of comparison, the results for distance of 10 cm are also shown in the plot.

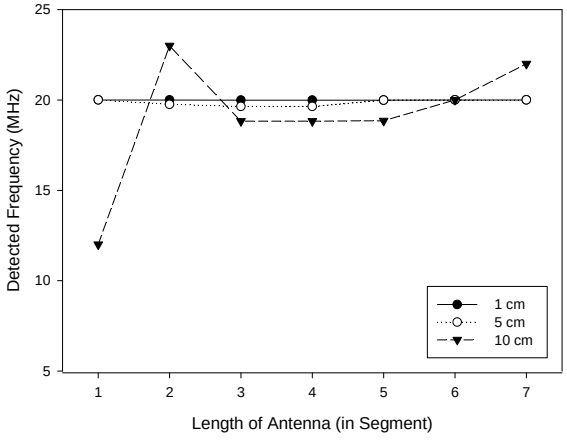
The antenna length of body radiation wave detector has been examined at frequencies of 10 MHz 20 MHz, 30 MHz and 50 MHz, which all frequencies are tested on antenna length from the 1st segment to 7th segment. Figure-6 (a) to (d) shows the plots of frequency detected along the x-axis of seven lengths. It can be seen that the detector accurately measure all frequencies in all segments of antenna length at a distance of 1 cm. However, at a distance of 5 cm and 10 cm, the detector precisely measure only at 10 MHz in all segments of the antenna length. At a distance of 5 cm, there is slight

deviation of the measured frequency on 20 MHz, 30 MHz and 50 MHz for the antenna length from 1st segment to 4th segment. In the antenna length of 5th segment to 7th segment, the detector accurately measures the frequency on 20 MHz, 30 MHz and 50 MHz. Besides, the results also show that the distance of 10 cm is unsuitable for measurement due to fluctuation of the reading frequencies from the expected values in most of the segments of antenna length. At the antenna length from 5th segment to 7th segment the detector measure the transmitting frequency with high accuracy.

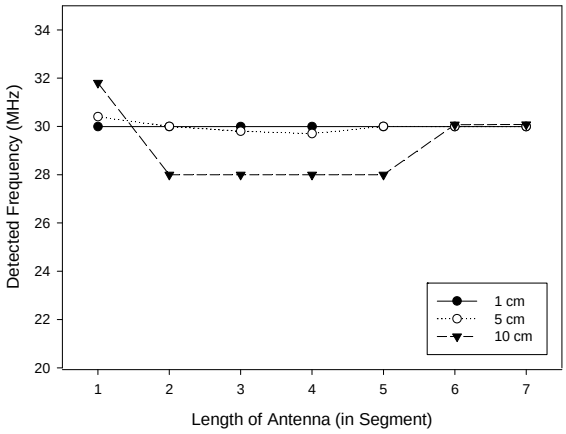
Therefore, from the experimental results it is confirmed that the antenna lengths of 5th segment to 7th segment are more appropriate for detecting frequency, while the distance of 1 cm to 5 cm is observed as the most applicable distance for frequency detection.



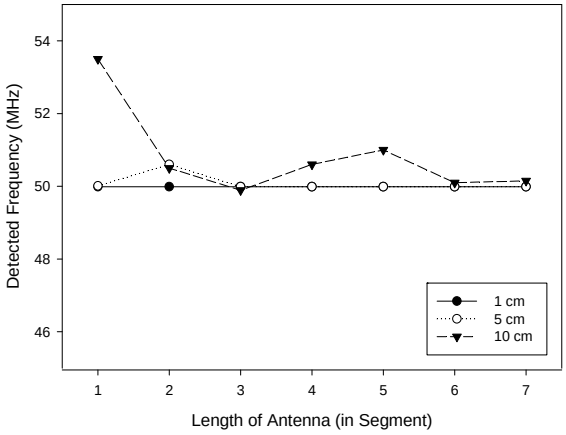
(a) 10 MHz



(b) 20MHz



(c) 30 MHz



(d) 50 MHz

Figure-6. Length of antenna at frequency (a) 10 MHz, (b) 20 MHz, (c) 30 MHz and (d) 50 MHz for distances of 1 cm, 5 cm and 10 cm; to determine the appropriate setup for frequency measurement.

FREQUENCY MEASUREMENT OF HUMAN BODY RADIATION

As an initial study, the human radiation frequencies are investigated from 26 healthy subjects. The measurements are performed in the anechoic chamber in order to establish reliable data and to eliminate the influence from environmental frequencies. The confidence level of reading frequency can be enhanced by considering the background frequencies as for ambient conditions that measured immediately before and after experiment [30] and all subjects are measured at the same location. In this study, the background frequencies of ambient conditions obtained before and after measurement are observed constant to confirm the stability of the detecting system.

Subjects

The human radiation frequencies are taken from a group of 14 males and 12 females, giving a total of 26 subjects between the ages of 20-28 years. All subjects are students at Universiti Teknologi MARA Malaysia. Information about their anthropometric measures, age, general state of health, *etc*., was obtained via questionnaires. All subjects are healthy person during the measurement with no history of disease.

Frequency measurements

For the purpose of human radiation frequency measurement, the length of antenna and distance of measurement for the frequency detector are arranged to precisely measure the human radiation wave. The frequencies are captured at distance of 1 cm to 5 cm above the body for each point of all seven chakras while the lengths of antenna are set at the 6th segment. It should be noted that prior to each measurement of the human subject, each subject is informed about the experiments, which included the purpose of the study. Informed prior consent is signed by each subject.

The experiment involves capturing frequencies of seven chakras from points labeled as CA to CG that taken along a central axis of the human body from the base of the spine to the top of the head [31]. The arrangement of these seven points is illustrated in Figure 7[32].

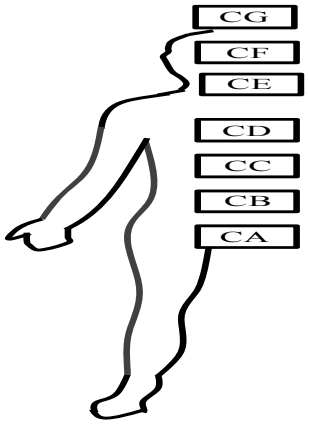


Figure-7. Seven points of human body in chakra.

Human radiation frequency

The human radiation frequency is analyzed using boxplot to determine the frequency distribution of the chakras. Figure-8 shows the variation of human radiation frequency, which every point of chakra exhibits different range of frequencies. Higher range of frequency is observed on CF and CG, while the other chakra points have a lower range of frequency. The results also show that the highest mean frequency is obtained on forehead chakra, CF and the lowest mean frequency is obtained on heart chakra, CD (See Table-1).

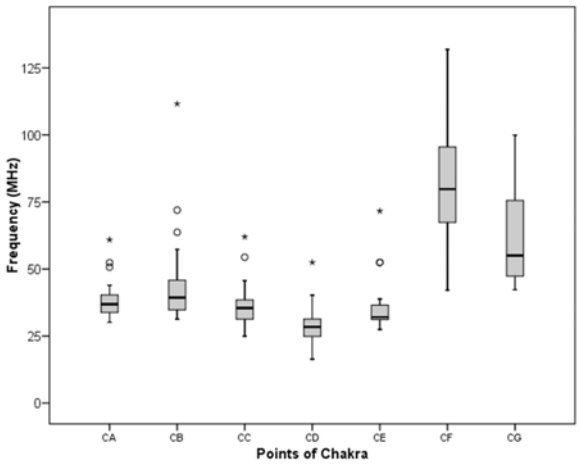


Figure-8. Distribution of frequency radiation on chakra.

Table-1. Mean frequency of chakra.

Chakra	Mean frequency (MHz)
CA	38.408
CB	44.424
CC	36.659
CD	29.067
CE	35.696
CF	86.271
CG	61.285

DISCUSSIONS

In the present investigation, the frequency detector of body radiation wave detector has been calibrated which the results show that the detector clearly detects the transmitted signals. It has been examined at signal frequency of 1 MHz to 1 GHz with the antenna length varies from 1st segment to 7th segment and the distance of measurement varies from 1 to 30 cm. The results demonstrate that the detected frequency is in accordance with the operating frequency of the transmitted signal, thus it is confirmed that the detector can detect the transmitted signals.

Moreover, for the measurement setup, it is established that the antenna lengths of 5th segment to 7th segment are more appropriate in capturing frequencies. The distance of measurement of 1 cm to 5 cm also is observed as the appropriate distance for frequency detection. The setup is suitable since intensity of the fields emitted from the human body is fades with distance [33].

In analyzing human radiation frequency, a pilot study of human radiation measurement has been performed for 26 healthy participants on seven major chakra points. The results indicate that each of the seven chakras have their own frequency which shows that their individual properties correspond to the unique attribute of human being. In this study, the average frequency obtained varying from the range of 20 MHz to 100 MHz. Higher frequencies is found in head region (in the CF and CG). However, the detected frequencies occupy the HF and VHF regions in the EM spectrum, which some of these frequencies are found similar within the range of other wireless communications. Therefore, the reliability of data is established by investigating the ambient frequencies in before and after measurement. The results show that before and after conditions are observed constant which support the firmness of the detecting system. In addition, the measurements also has been performed in controlled environment at the anechoic chamber which having minimum interference from environmental frequencies.

In conclusion, the experimental results from this study support the idea that the body radiation wave detector instrument can be used to measure frequency of human radiation wave.

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