JOURNAL OF BIOLOGICAL REGULATORS & HOMEOSTATIC AGENTS Vol. 34, no. 4, xx-xx (2020)

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EDITORIAL

5G Technology and induction of coronavirus in skin cells

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Received May 13, 2020 – Accepted June 9, 2020

In this research, we show that 5G millimeter waves could be absorbed by dermatologic cells acting like antennas, transferred to other cells and play the main role in producing Coronaviruses in biological cells. DNA is built from charged electrons and atoms and has an inductor-like structure. This structure could be divided into linear, toroid and round inductors. Inductors interact with external electromagnetic waves, move and produce some extra waves within the cells. The shapes of these waves are similar to shapes of hexagonal and pentagonal bases of their DNA source. These waves produce some holes in liquids within the nucleus. To fill these holes, some extra hexagonal and pentagonal bases are produced. These bases could join to each other and form virus-like structures such as Coronavirus. To produce these viruses within a cell, it is necessary that the wavelength of external waves be shorter than the size of the cell. Thus 5G millimeter waves could be good candidates for applying in constructing virus-like structures such as Coronaviruses (COVID-19) within cells.

Coronavirus disease (COVID-19) is the main problem this year involving the entire world (1). This is an infectious disease caused by a newly-discovered coronavirus. This virus is a member of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19. Among them, COVID-19 is an enveloped virus with a positive-sense single-stranded RNA genome and a nucleocapsid of helical symmetry. The genome size of coronaviruses ranges from approximately 27 to 34 kilobases, the largest among known RNA viruses (2, 3). To date, many scientists have tried to find a method to cure this disease (4, 5); however, without success. COVID-19 may have effects on different types of cells. For example, it has been argued that this virus may have some effects on dermatologic cells (6). On the other hand, it has been known that some waves in 5G technology have direct effects on the skin cells (7). Thus, there are some similarities between effects of COVID-19 and waves in 5G technology.

A new question arises regarding a relationship between 5G technology and COVID-19. The 5G technology is the fifth-generation mobile technology in which its frequency spectrum could be divided into millimeter waves, mid-band, and low-band. Low-

Key words: dermatologic antenna; COVID-19; 5G technology; millimeter wave; DNA; inductor

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0393-974X (2020)
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band uses a similar frequency range as the predecessor, 4G. 5G millimeter wave is the fastest, with actual speeds often being 1–2 Gbit/s down. Its frequencies are above 24 GHz, reaching up to 72 GHz, which is above the extremely high frequency band's lower boundary. Millimeter waves have shorter range than microwaves, therefore the reactive cells are those with smaller size (8-10). Consequently, biological cells also could act like a receiver for these waves. Many researchers have considered the effects of 5G technology on human health. For example, it has been shown that 5G mobile networking technology will affect not only the skin and eyes, but will have adverse systemic effects as well (11). In another study, it was argued that 5G technologies cause great harm to human health. Cancer is only one of the many problems. 5G causes 720 (factorial) different diseases in human beings, and can kill everything that lives except some forms of microorganisms (12). To consider the effects of 5G millimeter waves on biological systems, we propose a model which describes the process of exchanging waves between 5G towers and host cells.

To date, some researchers have tried to propose a model for using waves in extracting information within cells (13, 14). These waves could be transverse electromagnetic fields or longitudinal ultrasound waves. A DNA is built from charged particles and according to laws of physics, by any motion of these particles, some electromagnetic waves emerge (15). Also, the structure of a DNA is similar to the structure of an inductor (16) in a receiver and can produce some waves. Thus, a DNA could emit some waves and interact with external waves. However, most waves have a length more than the size of cells and pass them without any effect. Only limited waves with lengths smaller than millimeter could penetrate into cell membrane and interact with DNA inductors. These wavelengths could be observed in 5 G technology. Thus, towers in this technology could exchange waves with DNAs within cells and produce various types of diseases such as COVID-19. In this study, we propose a mechanism for exchanged waves between towers and host cells to obtain effective wavelengths. In our method, skin cells act as dermatologic antenna, take waves in 5G technology and transfer them to host cells. Then, DNAs within host cells interact with these waves and move. By motions of a DNA, some hexagonal and pentagonal holes emerge. To fill these holes, some bases are constructed within cells. These holes join to each other and form RNAs of COVID-19.

MATERIALS AND METHODS

A mechanism for exchanging waves between towers and dermatologic cells in 5G technology

Skin cells are in close connections with nerve fibers. These fibers in the nervous system play the role of wires which carry some electrical currents; these currents produce some electromagnetic waves. These waves and currents are taken by melanocytes, keratinocytes and other dermatologic cells and transmitted to the medium. On the other hand, skin cells could take waves of towers and transfer to other cells and neurons. Thus, dermatologic cells could act as an antenna (Fig. 1).

An antenna could take waves in which their wavelengths are equal to its size. Thus, millimeter waves in 5G technology could be taken more by dermatologic antennas. These waves could pass the cell membranes, enter the nucleus and interact with DNAs. Previously, it has been shown that a DNA could act as the inductor and receiver or sender of waves (16). Thus, a DNA within a dermatologic cell like a keratinocyte receives external waves and sends them to DNAs of other cells like melanocytes. Waves in 5G technology and higher technologies could contribute in gene expressions, turn on some genes and turn off others (Fig. 2).

The question is whether millimeter waves in 5G technology could contribute in constructing some viruses like COVID-19 within a cell. To reply to this question, we should consider the electronic structure of a DNA and its emitted waves. A DNA is built from atoms and electrons. These particles have some electrical charges and emit electrical fields. Also, by each motion of a DNA, its atoms and electrons move. According to the laws of physics, by motion of charged particles, some magnetic waves emerge. Consequently, a DNA emits both electrical and magnetic fields and plays the role of electrical devices within a cell. The structure of a DNA within a cell is similar to the structure of an inductor. When a DNA coils around a nucleosome, it takes the shape of a toroid

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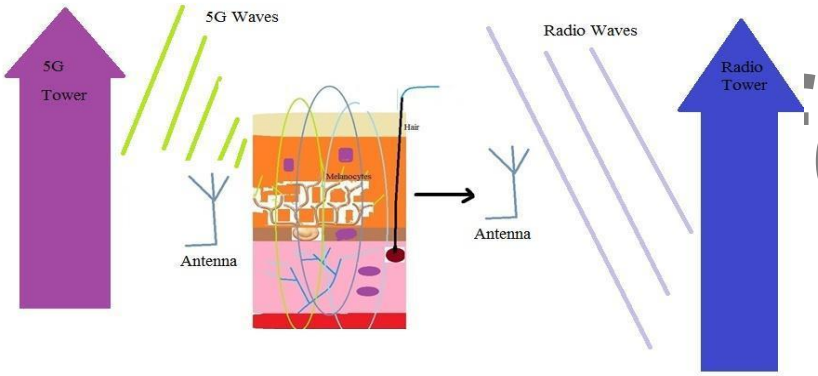

Fig. 1. *Some waves in 5G technology could be taken by dermatologic antennas, however radio waves could not pass the skin cells*

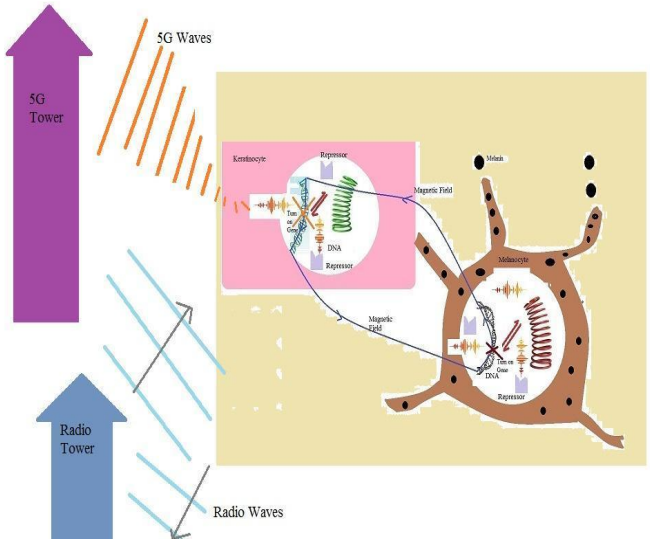

Fig. 2. *Waves in 5G technology pass the cell membranes and contribute to gene expressions*

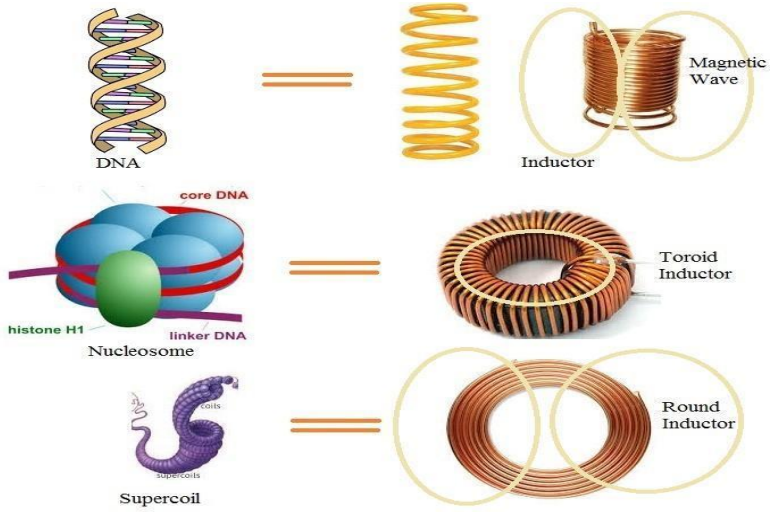

Fig. 3. *A similarity between different states of DNA with different types of inductors*

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inductor. Also, by coiling around another axes, a DNA becomes very similar to round inductors (Fig. 3).

A DNA coils several times around different axes within chromosomes and produces different types of inductors and electronic devices. Thus, any state of a DNA is similar to a type of an inductor and emits a special wave. Some of these waves are linear, some are curved and others have toroidal shapes (Fig. 4).

A DNA, as an electronic device within a cell, could exchange waves with medium, especially when an electromagnetic wave passes the cell membrane and the nuclear membrane, it induces an extra magnetic field within the DNA inductor and interacts with its fields. This interaction causes extra motions of this DNA, and through the motion of this DNA, its charges move and emit electromagnetic waves. The wavelength of emitted waves from a DNA is equal or less than its size within a cell. Also, shapes of radiated waves by a DNA have direct relations with the shapes of their genetic source. A DNA is formed from hexagonal and pentagonal manifolds; thus, its emitted waves have hexagonal and pentagonal shapes. These waves produce hexagonal and pentagonal holes within the liquids of a nucleus and a cell. To fill these holes, hexagonal and pentagonal molecules are built. These extra hexagonal and pentagonal bases may join to each other and form structures like RNAs of COVID-19 viruses. To produce these viruses, it is necessary that the wavelengths of external electromagnetic fields be equal or less than the size of a cell. For this reason, 5G technology waves could have the main role in the emergence of COVID-19, however radio waves could not have any effect on the evolutions within a cell (Fig. 5).

RESULTS

Effective wavelengths within a cell in 5G technology

We propose a model to obtain a probability for the amount of effects of external fields on the evolutions of cells within a cell. This probability is related to the number of microstates of a DNA within a cell:

$$P_{DNA} = \Omega_{DNA,\,EM} / \Omega_{DNA,\,tot} \quad (1)$$

Where Ω_{DNA} is the probability, $\Omega_{DNA,\,EM}$ is the number of microstates which are produced by the interaction between DNAs and electromagnetic waves, and $\Omega_{DNA,\,tot}$ is the total number of microstates. These microstates have direct relations with entropies:

$$S_{DNA} = K_S \, LOG \, (\Omega_{DNA,\,EM}) \quad (2)$$

Where S_{DNA} is the entropy and K_S is a constant. On the other hand, entropies have direct relations with energies:

$$S_{DNA} = E_{DNA} / T_{cell} \quad (3)$$

Where E_{DNA} is the excited energy of a DNA and T_{cell} is the temperature within a cell. Excited energy of a DNA depends on the linear and curved energies of hexagonal and pentagonal bases:

$$E_{DNA} = U_{B,\,linear,5} V_{B,\,linear,5} + U_{B,\,curved,5} V_{B,\,curved,5} + U_{B,\,supercoil,5} V_{B,\,supercoil,5} + U_{B,\,linear,6} V_{B,\,linear,6} + U_{B,\,curved,6} V_{B,}$$

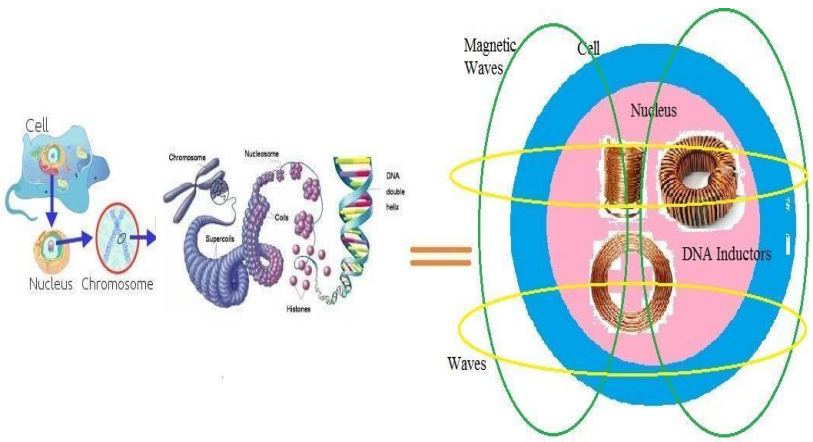

Fig. 4. *A DNA within the nucleus acts as the inductor and emits magnetic waves*

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$_{curved,6} + U_{B,\ supercoil,6} V_{B,\ supercoil,6}$ (4)

Where $U_{B,\ linear,5/6}$ is the energy density of a pentagonal/hexagonal molecule, $V_{B,\ linear,\ ,5/6}$ is the volume of a pentagonal/hexagonal disk , $U_{B,\ curved,\ ,5/6}$ is the energy density of a pentagonal/hexagonal molecule which coils around a nucleosome, $V_{B,\ curved,\ ,5/6}$ is the volume of a coiled pentagonal/hexagonal disk, $U_{B,\ supercoil,\ ,5/6}$ is the energy density of a pentagonal/hexagonal molecule which coils around supercoil axes and $V_{B,\ supercoil,\ ,5/6}$ is its volume. Volumes can be obtained from the following equations:

$V_{B,\ linear,5} = 5\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})]\ [r_{base} + x_{EM}]$

$V_{B,\ linear,6} = 5\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})]\ [r_{base} + x_{EM}]$

$V_{B,\ curved,5} = 5\pi\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})] \times [r_{base} + x_{EM}][r_{histone} + x_{EM}]^2$

$V_{B,\ curved,6} = 5\pi\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})])] \times [r_{base} + x_{EM}][r_{histone} + x_{EM}]^2$

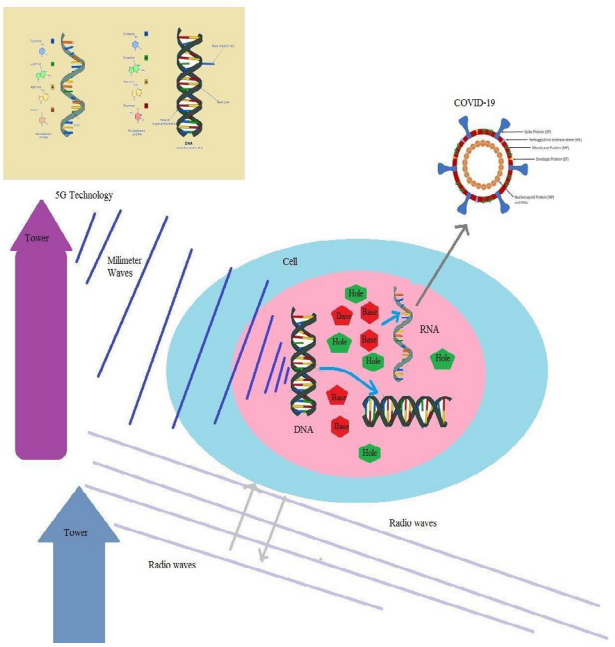

Fig. 5. *5G technology waves could pass the cell membranes and lead to production of COVID-19; however the size of radio waves are more than the size of cells and thus radio waves could not pass the cell membranes.*

$V_{B,\ supercoil,5} = 5\pi^2\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})] \times [r_{base} + x_{EM}][r_{histone} + x_{EM}]^2 [r_{supercoil} + x_{EM}]^2$

$V_{B,supercoil,6} = 5\pi^2\ [1/2\ (r_{base} + x_{EM})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})])] \times [r_{base} + x_{EM}][r_{histone} + x_{EM}]^2 [r_{supercoil} + x_{EM}]^2$ (5)

Where r_{base} is the length of a base ($\sim 10^{-9}$), $r_{histone}$ is the radius of histones ($\sim 10^{-8}$), $r_{supercoil}$ is the radius of a supercoil ($\sim 10^{-7}$), Θ_{hexa} ($\pi/6$) is the central angle of a hexagonal molecule, Θ_{penta} ($\pi/5$) is the central angle of pentagonal molecule, x_{EM} is the oscillating length which has a direct relation with the wavelength of external field:

$E_{EM} = 1/2\ K_{EM}\ x_{EM}^2 = h\ \upsilon_{EM} = h\ c/\ \lambda_{EM}$ (6)

Where υ_{EM} is the frequency, λ_{EM} is the wavelength of external field, c is the velocity of light and h is the plank constant. Thus, we can write the following equation:

$x_{EM} \sim \lambda_{EM}^{-1/2}$ (7)

We should then calculate magnetic energies and magnetic fields. We assume that a DNA acts like an inductor and thus, we write the following equation for its magnetic fields:

For linear inductor:

$B_{DNA,\ linear,5/6} = \mu_0\ n_{gene5/6}\ I_{gene,5/6}$ (8)

For curved inductor:

$B_{DNA,\ curved,5/6} = \mu_0\ n_{gene5/6}\ I_{gene,5/6}/2\pi[r_{histone} + \lambda_{EM}^{-1/2}]$ (9)

For supercoils:

$B_{DNA,\ curved,5/6} = \mu_0\ n_{gene5/6}\ I_{gene,5/6}/[4\pi^2\ [r_{histone} + \lambda_{EM}^{-1/2}]\ [r_{supercoil} + \lambda_{EM}^{-1/2}]]$ (10)

Where $n_{gene5/6}$ is the density of genes including hexagonal and pentagonal molecules (17) within DNAs, $r_{histone}$ is the size of histone (3×10^{-10}) (18), $r_{supercoil}$ is the radius of supercoil ($\sim 10^{-9}$) and $I_{gene,5/6}$ is ther current which moves along pentagonal/hexagonal molecules of genes. We assume that each gene is in fact a long wire that is coiled around the axis of a DNA. A DNA may have 50,000 or more gene (N_{gene}) (17) and each gene is around 10^{-12} meter long (L_{gene}) within a cell. Thus, we can calculate density of genes (n_{gene}):

$n_{gene,\ 5/6} = N_{gene}/L_{gene5/6}$ (11)

$N_{gene} = 50000$ (17) (12)

$L_{gene} = 10^{-12}$m (19, 20) (13)

$L_{gene,\ 5/6} = 2 \times 10^{-12}$ m (19, 20) (14)

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$n_{gene,\ 5/6} = 2.5 \times 10^{16}$ (15)

To calculate the value of the current along genes, we should calculate the total effective charge of all genes ($Q_{gene,5/6}$) and their velocity ($V_{gene,5/6}$).

$I_{gene,5/6} = Q_{gene,5/6}\ V_{gene,5/6}$ (16)

Effective charges of all genes are different from their normal total charges. A gene may have a few normal charges because its charges cancel the effect of each other in the static state. However, during the gene expression and DNA evolutions, each charge has a separate effect. For this reason, we should regard total charges of all genes. To obtain this charge, we should write:

$Q_{gene,5/6} = N_{gene,5/6}\ q_{gene,5/6}$ (17)

Where $N_{gene,5/6} = 2\ N_{gene}$ is the number of genes including pentagonal/hexagonal molecules and $q_{gene,5/6}$ is the effective charge of pentagonal/hexagonal molecules in a gene. Again, we insist that effective charge of a gene is different from its normal charge. In fact, we should regard all electrons and atoms that contribute in gene expression. For this reason, we should write:

$q_{gene,5/6} = 4N_{base}\ q_{base}$ (18)

where N_{base} is the number of base pairs within a gene (17, 18) and q_{base} is the effective electrical charge of a base. We can put approximate numbers and obtain the effective charge of all genes:

$N_{base} = 10^9$ (21, 22) (19)

$q_{base} = (10\text{-}20)\ q_{electron} = (10\text{-}20) \times 1/6 \times 10^{-19}$ (20)

$Q_{gene,\ 5/6} = 4 \times 10^{-4}$ (21)

Now, we calculate the effective velocity of genes:

$V_{gene,\ 5/6} = L_{gene,\ 5/6}\ \omega_{gene,\ 5/6}$ (22)

This velocity depends on the length of a gene ($L_{gene,\ 5/6}$) and its rotating velocity ($\omega_{gene,\ 5/6}$).

$L_{gene,\ 5/6} = 2 \times 10^{-12}$ m (19, 20) (23)

The rotating velocity of a gene ($\omega_{gene,\ 5/6}$) can be obtained by summing over rotating velocities of all its effective charges ($\omega_{charge,\ 5/6}$):

$\omega_{gene,\ 5/6} = n_{charge,\ 5/6}\ \omega_{charge,\ 5/6}$ (24)

To obtain the number of charges, we multiply number of bases and number of atoms/electrons

$n_{charge,\ 5/6} = 2N_{base}\ N_{atom}$ (25)

Now, we put approximate values for numbers and obtain velocity of genes:

$N_{base} = 10^9$ (21, 22) (26)

$N_{atom} = 10$ (27)

$n_{charge,\ 5/6} = 2 \times 10^{10}$ (28)

$\omega_{charge\ ,\ 5/6} = 2\pi / T_{charge,\ 5/6}$ (29)

$T_{charge,\ 5/6} = [\lambda_{EM}]^{1/2} / c$ (30)

$\omega_{charge,\ 5/6} = 6.28 \times 10$ (31)

$V_{gene,\ 5/6} = 2.516 \times 10^0$ (32)

Substituting values of velocity from equation (32) and charges from equation (21) in equation (16), we can obtain the current of genes:

$I_{gene,\ 5/6} \sim 10^{-3}$ (33)

Putting the current from the above equation (33) and density of genes from equation (15) in equations (6-10), we calculate magnetic fields of a DNA within a cell.

$B_{DNA,\ linear,5/6} \sim 10^7\ [\lambda_{EM}]^{-1/2}$ (34)

$B_{DNA,\ curved,5/6} \sim 10^{16}\ [\lambda_{EM}]^{-1}$ (35)

$B_{DNA,\ supercoil,5/6} \sim 10^{25}\ [\lambda_{EM}]^{3/2}$ (36)

Using these fields, we can obtain energy density of magnetic fields around a DNA within a cell.

$\mu_0 = 4\pi \times 10^{-7}$ (37)

$U_{B,\ linear,5/6} = (\ [B_{DNA,\ linear,5/6}]^{\ 2}/2\ \mu_0) \sim 10^{21}\ [\lambda_{EM}]^{-1}$ (38)

$U_{B,\ curved,5/6} = (\ [B_{DNA,\ curved,5/6}]^{\ 2}/2\ \mu_0) \sim 10^{38}\ [\lambda_{EM}]^{-2}$ (39)

$U_{B,\ supercoil\ ,5/6} = (\ [B_{DNA,\ supercoil,5/6}]^{\ 2}/2\ \mu_0) \sim 10^{56}\ [\lambda_{EM}]^{-3}$ (40)

Consequently, substituting above results in equation (4), total energy can be obtained from the following equation:

$$E_{DNA} = [5\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})]\ [r_{base} + \lambda_{EM}^{-1/2}]$$
$$+ 5\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})][r_{base} + \lambda_{EM}^{-1/2}]] \times 10^{21}\ [\lambda_{EM}]^{-1}$$
$$+ [5\pi\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})] \times [r_{base} + \lambda_{EM}^{-1/2}][r_{histone} + \lambda_{EM}^{-1/2}]^2$$
$$+ 5\pi\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})]\ )] \times [r_{base} + x_{EM}][r_{histone} + \lambda_{EM}^{-1/2}]^2 \times 10^{38}\ [\lambda_{EM}]^{-2}$$
$$+ [5\pi^2\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{penta}) \sin(\Theta_{penta})] \times [r_{base} + x_{EM}][r_{histone} + \lambda_{EM}^{-1/2}]^2 [r_{supercoil} + \lambda_{EM}^{-1/2}]^2$$
$$+ 5\pi^2\ [1/2\ (r_{base} + \lambda_{EM}^{-1/2})^2 \cos(\Theta_{hexa}) \sin(\Theta_{hexa})]\ )] \times [r_{base} + \lambda_{EM}^{-1/2}][r_{histone} + \lambda_{EM}^{-1/2}]^2 [r_{supercoil} + \lambda_{EM}^{-1/2}]^2] \times 10^{56}\ [\lambda_{EM}]^{-3}$$ (41)

Substituting the above equation in equations (1-3), we can obtain the probability for the amount of effects of external fields on the evolutions of DNAs within a cell:

$P_{DNA} = \exp(K_S\ E_{DNA} / T_{cell}) / \Omega_{DNA,\ tot}$ (42)

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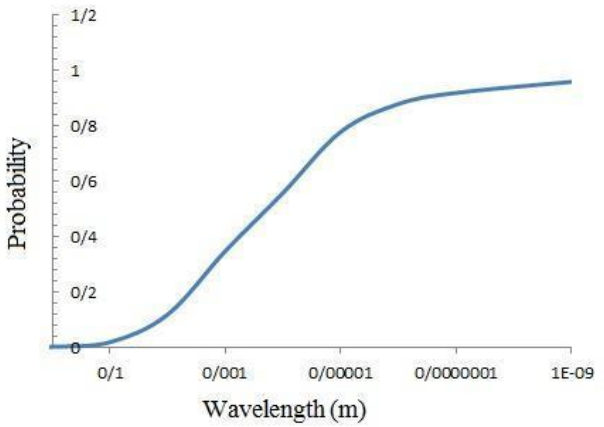

Fig. 6. *The probability of the effect of waves on the evolutions of a DNA within a cell in terms of wavelength*

The above probability depends on the wavelength of external fields.

In Fig. 6, we show the probability for producing hexagonal and pentagonal DNA holes within a cell. This figure indicates that by decreasing the wavelength ($< 10^{-3}$m), waves pass the cell membrane and interact with DNAs. This interaction causes the motions of DNAs. By motions of DNAs, their charges move and emit strong waves. These waves produce hexagonal and pentagonal holes within a cell. To fill these holes, extra bases are produced. These bases could join to each other and form viruses such as COVID-19.

DISCUSSION

Our results show that, by decreasing the wavelength, waves emitted from towers in 5G and higher technologies could have more effect on evolutions of DNAs within cells. This is because dermatologic cell membranes act as an antenna for these waves. They are built from charged particles, such as electrons and atoms, and could emit or receive waves. On the other hand, an antenna could only take waves in which their lengths are not greater than its size. Thus, a cell membrane could take millimeter waves in 5G technology. These waves could pass the membrane and interact with biological matters within a cell. If wavelengths of 5G waves be equal or less than the size of a nucleus, they can pass the nuclear membrane and interact with DNAs. These DNAs are built from hexagonal and pentagonal bases and, by their motions, some holes emerge. These holes are filled by hexagonal and pentagonal extra bases which are constructed by cells. These bases could join to each other and form some viruses such as Coronavirus. It is concluded that in the next generation of mobile technology, emitted waves of towers will have more effects on biological cells.

In this research, we have shown that new generation mobile technology, like 5G, could have the main role in constructing various types of viruses, such as Coronaviruses, within a cell. Some wavelengths in these technologies are smaller than the size of biological cells and could pass the cell membrane and enter the nucleus. These waves could be taken by dermatologic antenna, transfer to host cells, interact with DNAs and move them. A DNA is formed from charged particles and, by its motions, electromagnetic waves emerge. These waves produce hexagonal and pentagonal holes in liquids within nucleus and the cell. To fill these holes, bases are produced. These bases join to each other and can construct viruses like Coronaviruses.

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