

The resonant frequency of exchanged sound waves in a Corona-cell microphone/speaker

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Abstract: One of ways to control or cure viral diseases like the Corona is using of exchanged waves between viral RNAs and cellular DNAs. In this research, we propose a model to compare the structure of cells and Corona viruses with the structure of speakers/microphones and obtain the frequency and the shape of exchanged waves. In this model, the cellular DNA and viral RNA are formed from charged particles and by their motions, some electromagnetic waves are emerged. In fact, they act like the inductors within speakers/microphones and produce some magnetic fields. These fields interact with charges around nuclear and viral membranes and produce some currents along them. In these conditions, membranes act like the magnet within speakers/microphones and emit some new magnetic fields. These fields interact with DNA and viral inductors, move them and produce some extra magnetic waves, These waves move charges along viral and nuclear membranes, vibrate them and produce some sound waves. Shape of these waves depend on their RNA/DNA sources. A cellular DNA coils several times around the histone and supercoiled axes and produce linear, toroid and round inductors. A viral RNA coils and creates round viral inductor. These inductors are formed from hexagonal and pentagonal bases and emit hexagonal/pentagound linear/curved sound waves. Frequency of DNA sound waves could be between 10^7 - 10^{20} . Also, frequency of viral sound waves could be between 10^7 - 10^{11} $[K_{\text{Virus}} / K_{\text{Cell}}]$ where K_{Virus} , K_{Cell} are some constants depending on the genus of liquids within viral and cell membranes. In some conditions, $K_{\text{Virus}} / K_{\text{Cell}} = 1$ and virus could be absorbed by cells.

Keywords: Coronavirus, Cell, DNA, RNA, Speaker/Microphone, sound, wave

I. Introduction

Up to date, many researchers have tried to propose a model for extracting information within cells [1,2]. In most of these models, waves of DNAs play the main role. 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 are emerged [3]. Also, the structure of a DNA is similar to the structure of an inductor [4] in a speaker/microphone and can produce ultrasound waves. The effects of ultrasound and sound waves on biological systems have been considered extensively. For example, some authors have investigated the effectiveness of the Ultrasound Tongue Scraper (UTS) to disrupt the structural morphology of the bacteria and their biofilm. [5]. Some other authors have shown that sound/ultrasound waves could control the rate of microbial growth [6]. In another research, authors have shown that the efficiency of the combination of ultrasonic waves under pressure with heat (MTS) for bacterial spore inactivation is directly correlated with the thermal resistance [7]. In another paper, authors have developed the new methodology of strategic ultrasound treatment on lactic acid bacteria (LAB) to induce stress response for the enhancement of β -glucosidase activity that can be used for the biotransformation of glucosides into aglycones isoflavones in soymilk [8]. In another investigation, ultrasound application on bacterial inactivation in municipal wastewater (MWW) has been evaluated [9]. In another work, it has been shown that by combinations of ultrasound, hydrogen peroxide, and active lactoperoxidase system, microbiota and selected spoilage and pathogenic bacteria in milk become inactive [10]. In other article, diagnostic accuracy of ultrasound scanning for prenatal microcephaly in the context of Zika Virus Infection has been considered [11]. In another research, authors have compared the clinical characteristics and imaging features on contrast-enhanced ultrasound (CEUS) of hepatitis B virus (HBV)-related combined hepatocellular–cholangiocarcinoma (CHC) and hepatocellular carcinoma (HCC) [12]. Motivated by these researches and using the similarity between DNAs within cells and inductors within speaker/microphones, we propose a model for determining shape and frequency of exchanged waves between Corona virus and cells.

The outline of this papers is as follows: In section II, we propose a model for exchanged waves between Corona virus and cells. In section III, we calculate the resonance frequencies for Corona-Cell systems. The last section is devoted to conclusion.

II. A model for exchanged waves between Corona viruse and cells

To prevent of viral diseases like Corona, we should consider the mechanism of their interactions with cells. In this section, we propose a model which compare the structure of cells and corona viruses with some electronic devices like speaker/microphones and describes the process of exchanged waves between them.

A speaker/microphone is built from an inductor, a magnet and a plastic. The inductor interacts with the magnet, exchange electromagnetic waves and vibrate. By vibration of the inductor, the plastic vibrates and produce sound waves. Within a nucleus of a cell, a DNA plays the role of the inductor and nuclear membranes play the role of magnet and plastic. A DNA is built from charged particle and by its motion, charge particles move. According to laws of physics, by motion of charged particles, some electromagnetic waves are emerged. These fields interact with nuclear membranes and move charges around it. By motion of charged particles around a nuclear membrane, a current is emerged. This current produces an extra magnetic field. This magnetic field interacts with the DNA inductor and leads to its motion. By motion of DNA inductors, some new extra magnetic fields are emerged which leads to the motion of charged particles around the nuclear membranes. Motions of these charges force to the nuclear membranes and lead to their vibrations. By vibrating of nuclear membranes , some sound waves are emerged. The shape of these sound waves depends on their DNA sources. A DNA is formed from hexagonal and pentagonal molecules and thus, these sound waves have hexagonal and pentagonal shapes (See Figure 1).

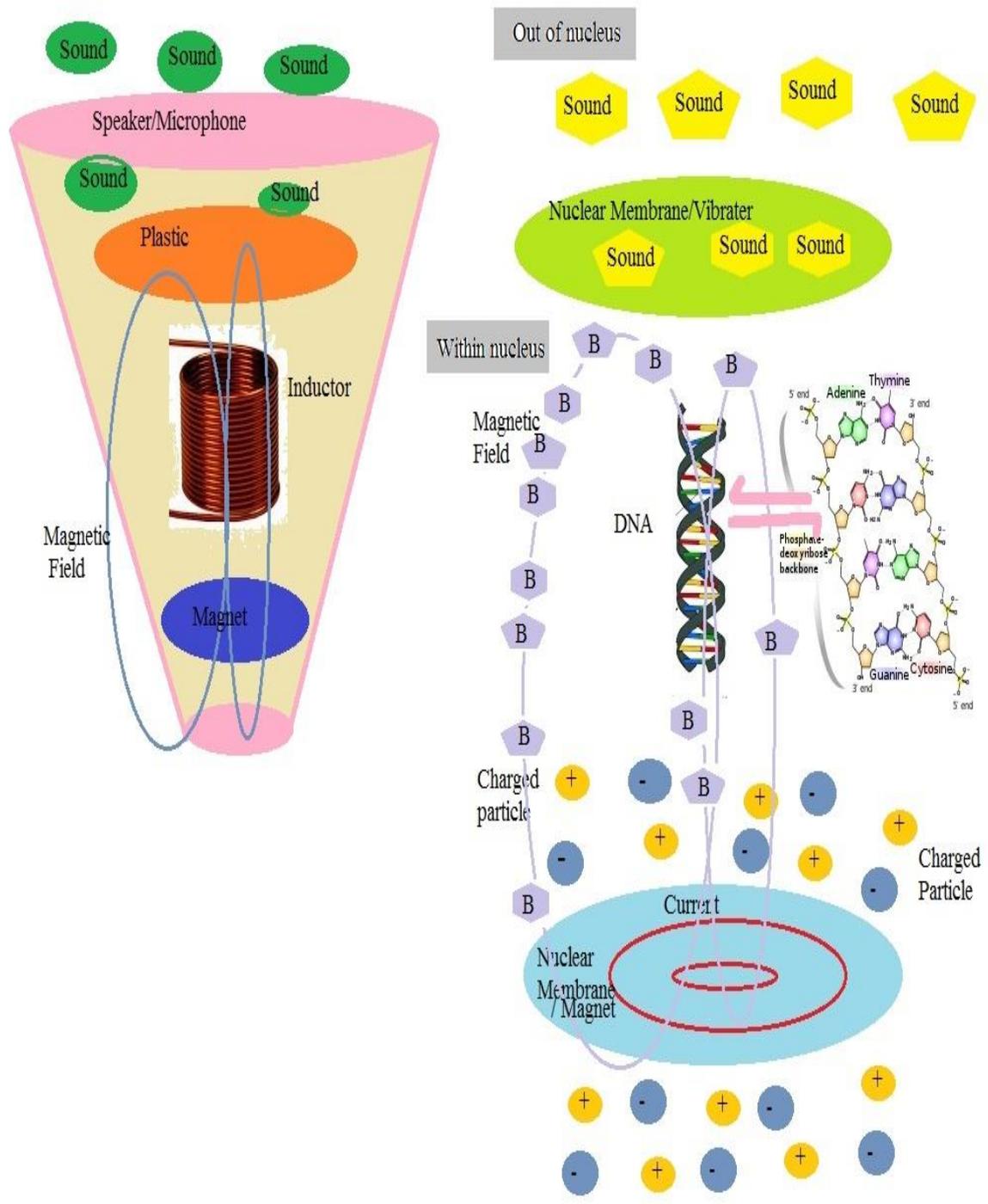


Fig 1: A DNA inductor in a cell speaker/microphone emit hexagonal/pentagonal sound waves

A DNA is coiled several times within a nucleus. By each coiling, the shape of DNA inductor changes. For example, by coiling a DNA around a histone, a toroid inductor is produced. By next coiling and producing supercoils within a chromosomes, some round inductors are emerged. Thus, a DNA could be divided into linear, toroid and round/supercoil inductors (See figure 2).

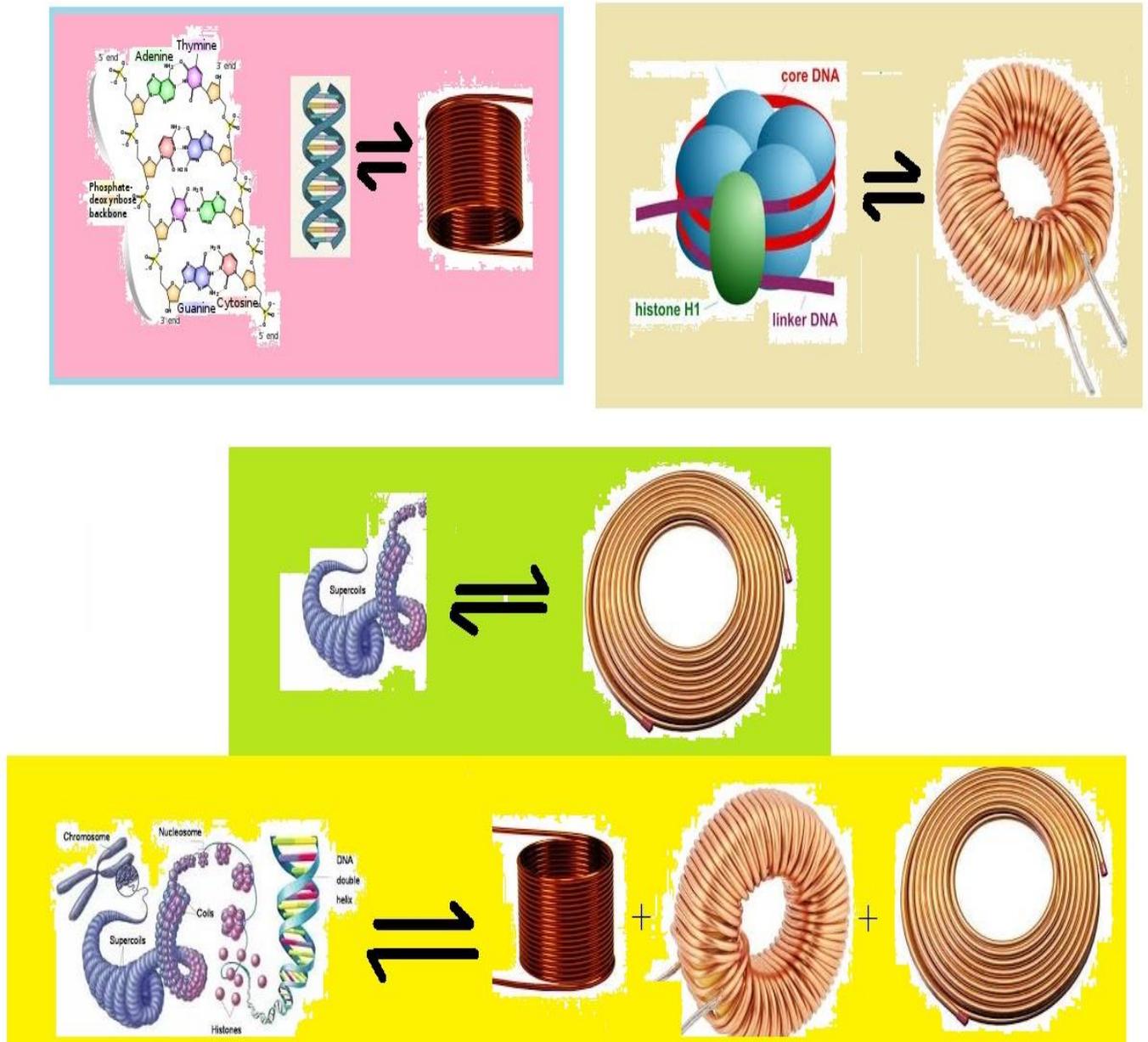


Fig 2: A DNA could be divided into several inductors

Each of these inductors produce a type of magnetic field. These magnetic fields interact with nuclear membranes and vibrate them. By vibration of nuclear membranes, sound waves are emerged that their shapes depend on their inductor sources. For example, a linear inductor produces linear sound. A round supercoiled inductor creates round supercoiled sound waves. Summing these shapes with hexagonal/pentagonal shapes of bases, a DNA could emit hexagonal/pentagonal linear/curved sound waves (see figure 3).

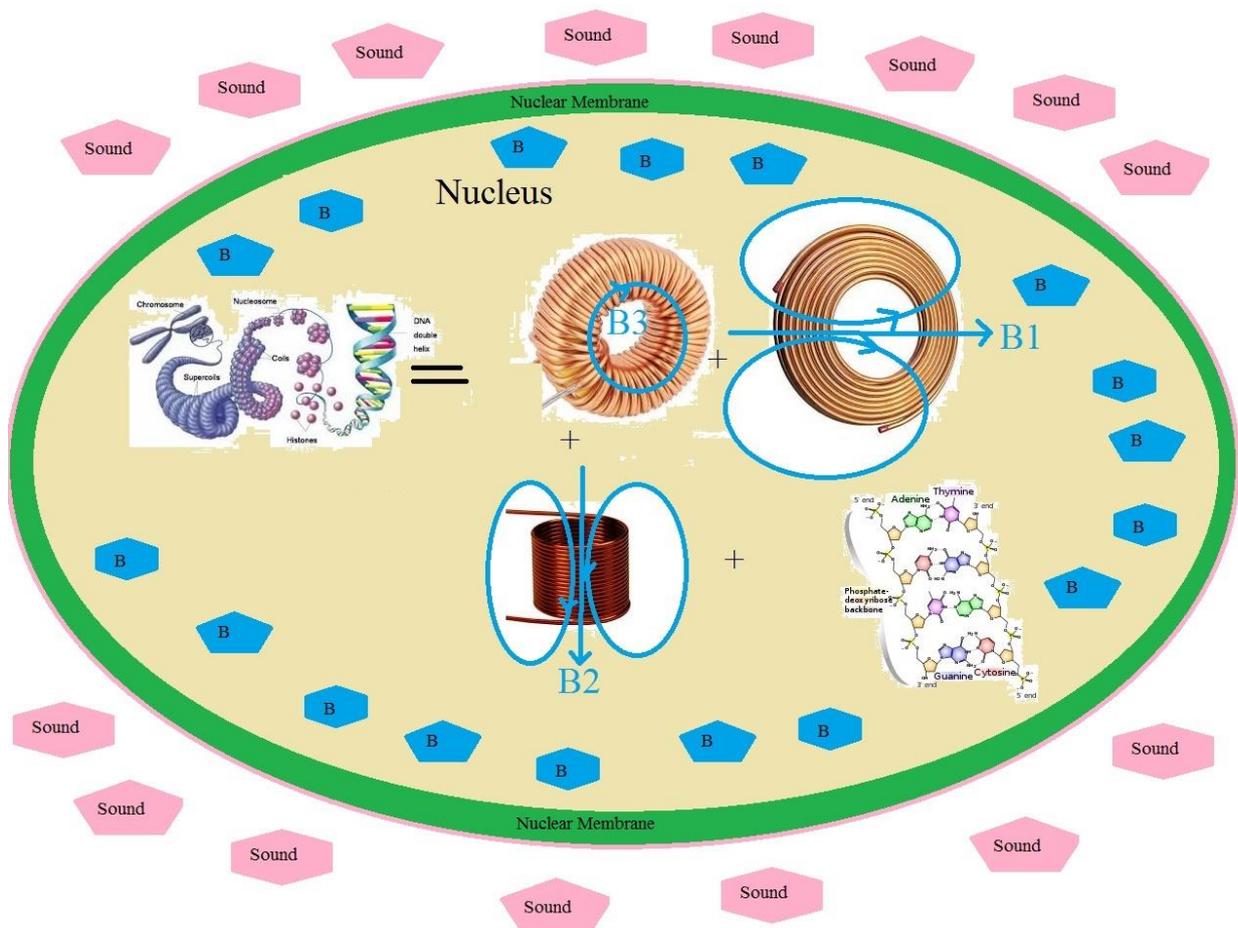


Fig 3: A DNA within a nucleus emits linear and curved magnetic and sound waves

Similar to nucleus within cells, viruses like Corona virus act like the speaker/microphone. Viral RNAs within a corona virus is very similar to a round inductor and coils several time around the viral axis. This viral inductor is formed from charged particles and by its motion, these charges move. According to laws of physics, by motion of charges, some electromagnetic fields are emerged. These waves interact with viral membranes and vibrate them. By vibration of viral membranes, viral sound waves are emerged (See figure 4)

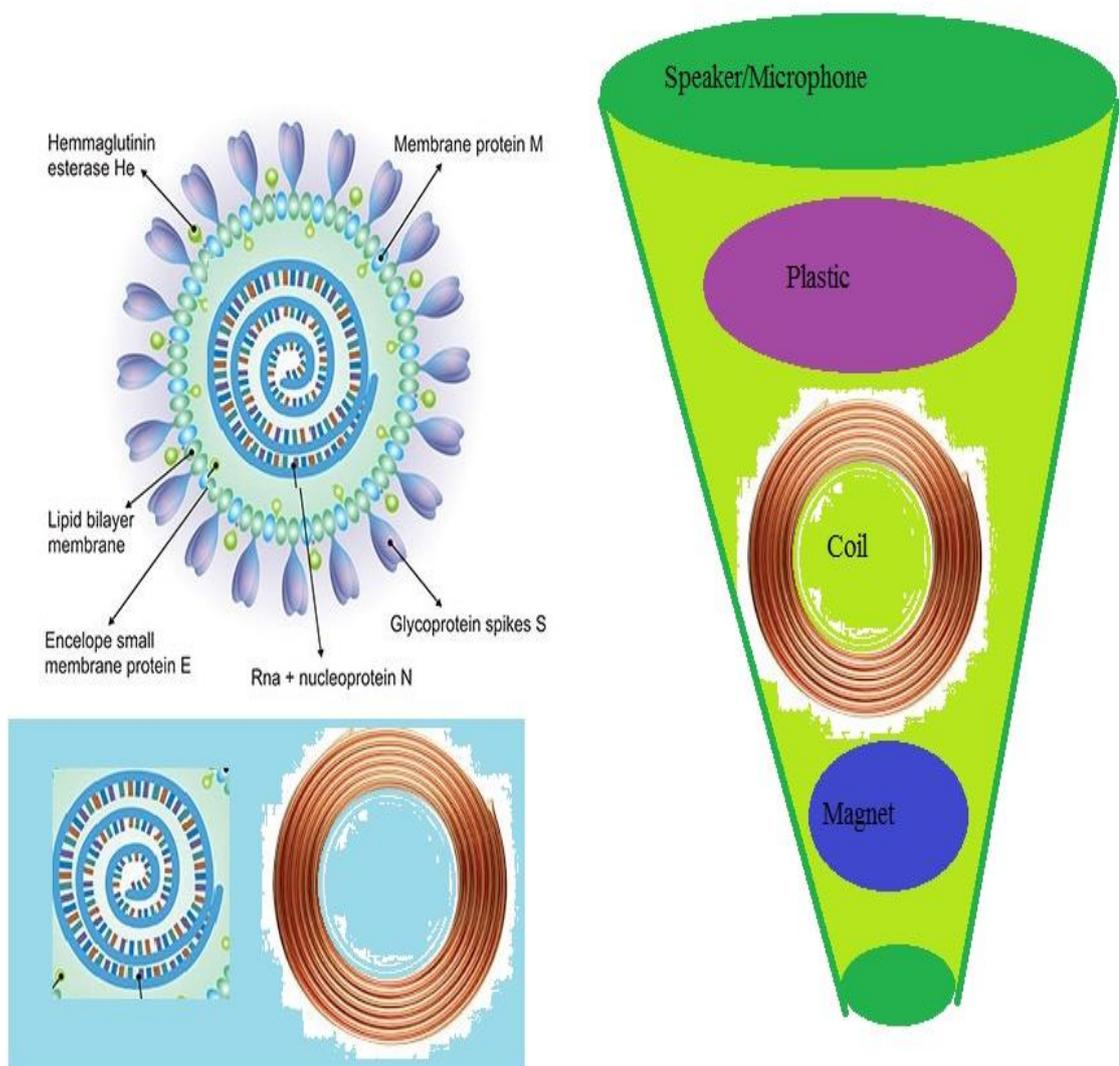


Fig 4: A coronal RNA could act like a round inductor within a viral speaker/microphone

Similar to a DNA, a RNA is built from hexagonal and pentagonal bases. By motion of viral RNAs within a Corona virus, its bases move and emit hexagonal/pentagonal magnetic waves. These waves interact with charges around the viral membrane, move them and produce a current. In these conditions, the viral membrane plays the role of a magnet and emits some magnetic waves. These waves interact with the viral RNA, move it and produce some extra waves. These fields interact with charges on the viral membrane, vibrate it and produce viral hexagonal/pentagonal linear/curved sound waves (See figure 5).

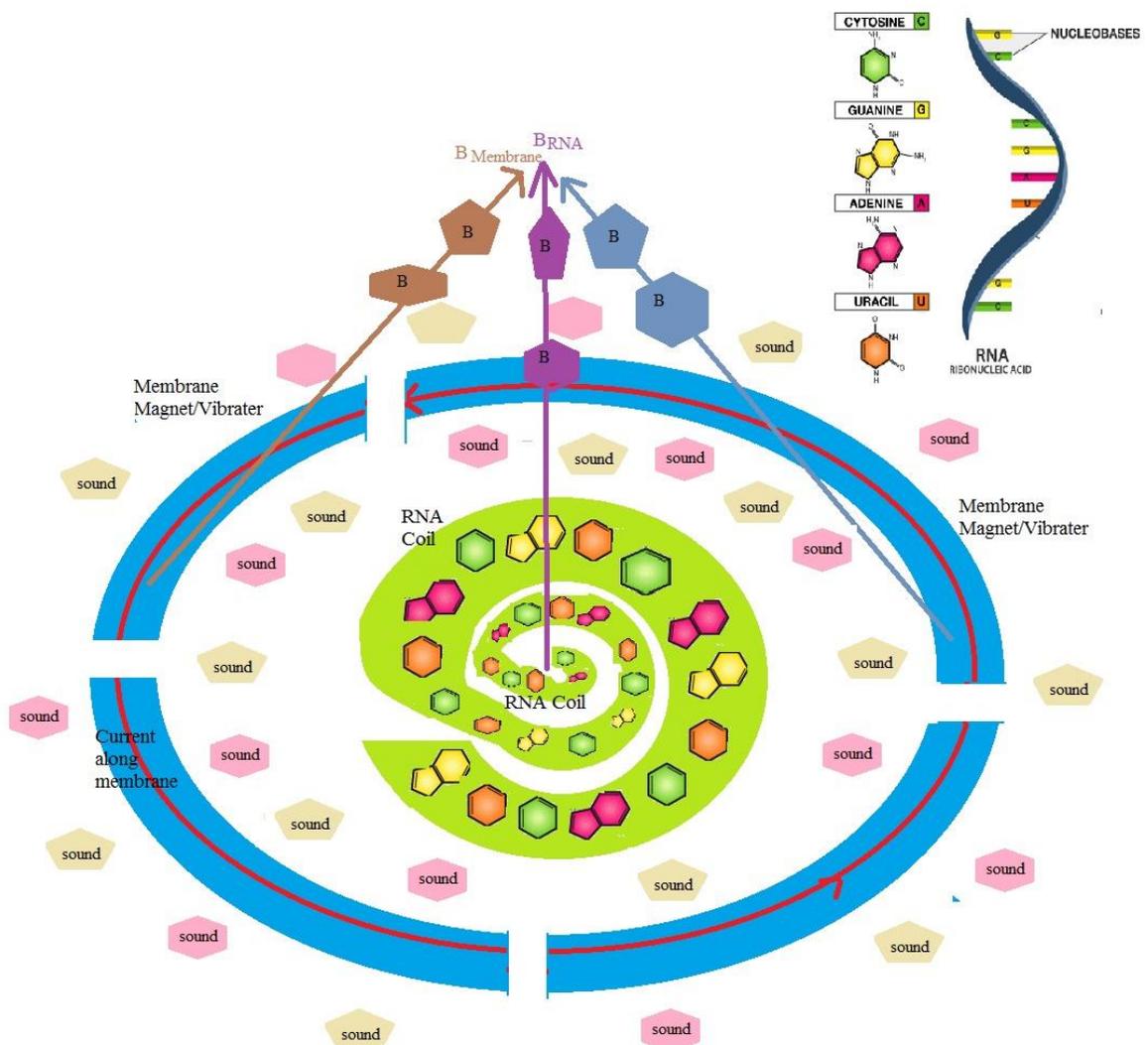


Fig 5: viral RNA and viral membrane within a corona virus interacts with each other and produce sound waves.

Both of cells and corona viruses emit some linear and curved sound waves. If frequency and shapes of these waves be the same and their signs be opposite, attract with each other. In these conditions, virus could be absorbed by cell membrane, enter into the cell and a viral disease like Corona is emerged (See figure 6.)

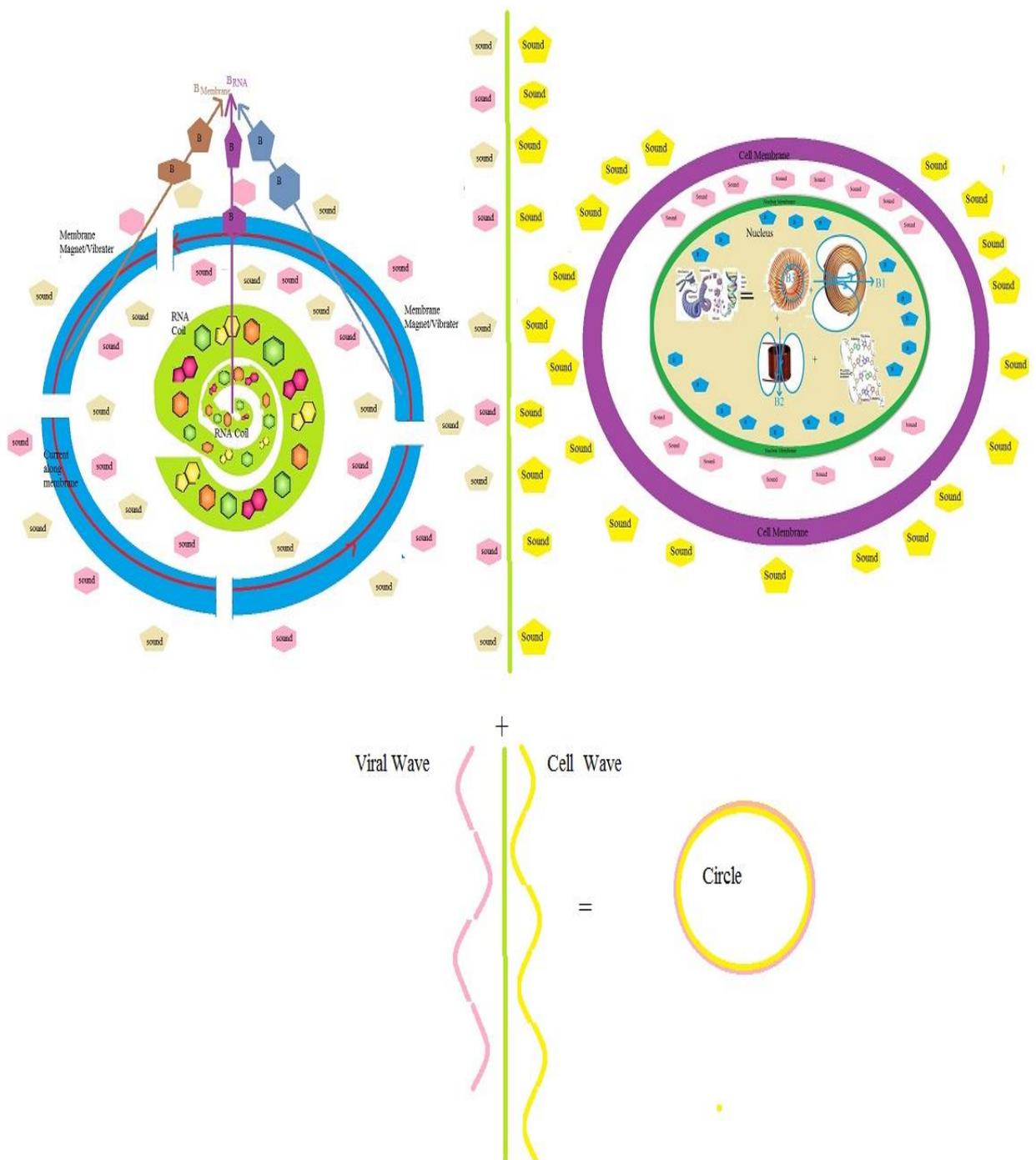


Fig 6: Corona viral waves could interact with DNA waves

III. The resonance frequency for Corona-cell system

Until now, we have found that a DNA could be divided into linear and curved inductors. Also, each group could emit pentagonal or hexagonal waves. To obtain frequencies of these inductors, we could use of equations for harmonic force for linear inductors and harmonic torque for curved inductors. For linear inductors, we write:

$$\mathbf{F}_5 = \mathbf{M}_5 \mathbf{a} = \mathbf{K}_5 \mathbf{x} \quad (1)$$

$$\mathbf{F}_6 = \mathbf{M}_6 \mathbf{a} = \mathbf{K}_6 \mathbf{x} \quad (2)$$

Where F_5/ F_6 are the forces on pentagonal/hexagonal molecules, K_5/K_6 are the inductor's constants for pentagonal/hexagonal molecules and M_5/M_6 are their masses. For these oscillations, frequencies could be obtained from below equations:

$$v_{5,linear} = (1/ 2\pi)\omega_5 = (1/ 2\pi) [K_5/M_5]^{1/2} \quad (3)$$

$$v_{6,linear} = (1/ 2\pi)\omega_6 = (1/ 2\pi) [K_6/M_6]^{1/2} \quad (4)$$

where v_5/ v_6 are the frequencies of pentagonal/hexagonal molecules and ω_5/ ω_6 are their angular velocities.

For curved inductors, we can write:

$$\boldsymbol{\tau}_5 = \mathbf{I}_{05} \boldsymbol{\alpha}_5 = \mathbf{K}_{05} \boldsymbol{\theta} \quad (5)$$

$$\boldsymbol{\tau}_6 = \mathbf{I}_{06} \boldsymbol{\alpha}_6 = \mathbf{K}_{06} \boldsymbol{\theta} \quad (6)$$

where τ_5/ τ_6 are torques of pentagonal/hexagonal molecules, I_{05} ($I_{05} = 5M_{DNA/Penta} r^2 \cos(\pi/5) \sin(\pi/5)$) is the rotational inertia of pentagonal molecules, I_{06} ($I_{06} = 6M_{DNA/Hexa} r^2 \cos(\pi/6) \sin(\pi/6)$) is the rotational inertia of hexagonal molecules, K_{05}/ K_{06} are constants and α_5/ α_6 are the rotating accelerations of pentagonal/hexagonal molecules. For these inductors, the frequencies can be obtained from below equation:

$$v_{5,curved} = (1/2\pi)\omega_5 = (1/2\pi) [K_{05} / I_{05}]^{1/2} \quad (7)$$

$$v_{6,curved} = (1/2\pi)\omega_6 = (1/2\pi) [K_{05} / I_{05}]^{1/2} \quad (8)$$

To calculate above frequencies, we should obtain constants and masses. We assume that a DNA acts like an inductor and thus, we write below equation for its magnetic fields:

$$\text{For linear inductor: } B_{DNA, linear,5/6} = \mu_0 n_{gene5/6} I_{gene,5/6} \quad (9)$$

$$\text{For curved inductor: } B_{DNA, curved,5/6} = \mu_0 n_{gene5/6} I_{gene,5/6} / 2\pi r_{histone} \quad (10)$$

$$\text{For supercoils: } B_{DNA, curved,5/6} = \mu_0 n_{gene5/6} I_{gene,5/6} / [4\pi^2 r_{histone} r_{supercoil}] \quad (11)$$

Where $n_{gene5/6}$ is the density of genes including hexagonal and pentagonal molecules [13] within DNAs, $r_{histone}$ is the size of histone (3×10^{-10}) [14], $r_{supercoil}$ is the radius of supercoil ($\sim 10^{-9}$) and $I_{gene,5/6}$ is 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 50000 or more gene (N_{gene}) [13] and each gene has around 10^{-12} meter long (L_{gene}) within a cell. Thus, we can calculate density of genes (n_{gene}):

$$n_{gene, 5/6} = N_{gene} / L_{gene5/6} \quad (12)$$

$$N_{gene} = 50000 [13] \quad (13)$$

$$L_{gene} = 10^{-12} \text{ m} [15,16] \quad (14)$$

$$L_{gene, 5/6} = 2 \times 10^{-12} \text{ m} [15,16] \quad (15)$$

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

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

$$I_{gene,5/6} = Q_{gene,5/6} V_{gene,5/6} \quad (17)$$

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:

$$Q_{\text{gene},5/6} = N_{\text{gene},5/6} q_{\text{gene},5/6} \quad (18)$$

Where $N_{\text{gene},5/6} = 2 N_{\text{gene}}$ is the number of genes including pentagonal/hexagonal molecules and $q_{\text{gene},5/6}$ 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:

$$q_{\text{gene},5/6} = 4N_{\text{base}} q_{\text{base}} \quad (19)$$

where N_{base} is the number of base pairs within a gene [13,14] and q_{base} is the effective electrical charge of a base. We can put approximate numbers and obtain the effective charge of all genes:

$$N_{\text{base}} = 10^9 \text{ [17,18]} \quad (20)$$

$$q_{\text{base}} = (10-20) q_{\text{electron}} = (10-20) \times 1/6 \times 10^{-19} \quad (21)$$

$$Q_{\text{gene},5/6} = 4 \times 10^{-4} \quad (22)$$

Now, we calculate the effective velocity of genes:

$$V_{\text{gene},5/6} = L_{\text{gene},5/6} \omega_{\text{gene},5/6} \quad (23)$$

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

$$L_{\text{gene},5/6} = 2 \times 10^{-12} \text{ m [15,16]} \quad (24)$$

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

$$\omega_{\text{gene},5/6} = n_{\text{charge},5/6} \omega_{\text{charge},5/6} \quad (25)$$

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

$$n_{\text{charge},5/6} = 2N_{\text{base}} N_{\text{atom}} \quad (26)$$

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

$$N_{\text{base}} = 10^9 \text{ [17,18]} \quad (27)$$

$$N_{\text{atom}} = 10 \quad (28)$$

$$n_{\text{charge},5/6} = 2 \times 10^{10} \quad (29)$$

$$\omega_{\text{charge},5/6} = 2\pi/T_{\text{charge},5/6} \quad (30)$$

$$\mathbf{T}_{\text{charge, 5/6}} = .1 \quad (31)$$

$$\mathbf{\omega}_{\text{charge, 5/6}} = 6.28 \times 10 \quad (32)$$

$$\mathbf{V}_{\text{gene, 5/6}} = 2.516 \times 10^0 \quad (33)$$

Substituting values of velocity from equation (33) and charges from equation (22) in equation (17), we can obtain the current of genes:

$$\mathbf{I}_{\text{gene, 5/6}} \sim 10^{-3} \quad (34)$$

Putting the current from above equation (34) and density of genes from equation (16) in equations (9,10,11), we calculate magnetic fields of a DNA within a cell.

$$\mathbf{B}_{\text{DNA, linear, 5/6}} \sim 10^7 \quad (35)$$

$$\mathbf{B}_{\text{DNA, curved, 5/6}} \sim 10^{16} \quad (36)$$

$$\mathbf{B}_{\text{DNA, supercoil, 5/6}} \sim 10^{25} \quad (37)$$

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

$$\mu_0 = 4\pi \times 10^{-7} \quad (38)$$

$$\mathbf{U}_{\text{B, linear, 5/6}} = ([\mathbf{B}_{\text{DNA, linear, 5/6}}]^2 / 2 \mu_0) \sim 10^{21} \quad (39)$$

$$\mathbf{U}_{\text{B, curved, 5/6}} = ([\mathbf{B}_{\text{DNA, curved, 5/6}}]^2 / 2 \mu_0) \sim 10^{38} \quad (40)$$

$$\mathbf{U}_{\text{B, supercoil, 5/6}} = ([\mathbf{B}_{\text{DNA, supercoil, 5/6}}]^2 / 2 \mu_0) \sim 10^{56} \quad (41)$$

At this stage, we assume that a DNA is similar to an inductor and calculate total energy of magnetic field around a DNA.

$$\mathbf{E}_{\text{B, linear, 5/6}} = \mathbf{U}_{\text{B, linear, 5/6}} \mathbf{V}_{\text{DNA, linear, 5/6}} \quad (42)$$

$$\mathbf{E}_{\text{B, curved, 5/6}} = \mathbf{U}_{\text{B, curved, 5/6}} \mathbf{V}_{\text{DNA, curved, 5/6}} \quad (43)$$

$$\mathbf{E}_{\text{B, supercoil, 5/6}} = \mathbf{U}_{\text{B, supercoil, 5/6}} \mathbf{V}_{\text{DNA, supercoil, 5/6}} \quad (44)$$

With below areas:

$$\mathbf{V}_{\text{DNA, linear, 5/6}} = 2\pi [\mathbf{R}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}][\mathbf{L}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}] \quad (45)$$

$$\mathbf{V}_{\text{DNA, curved, 5/6}} = 2\pi [\mathbf{R}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}][\mathbf{L}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}] / 2\pi r_{\text{histone}} \quad (46)$$

$$\mathbf{V}_{\text{DNA, supercoil, 5/6}} = 2\pi [\mathbf{R}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}][\mathbf{L}_{\text{DNA}} + \mathbf{x}_{\text{DNA}}] / [4\pi^2 r_{\text{histone}}^2 r_{\text{supercoil}}] \quad (47)$$

Where R_{DNA} is the radius of DNA inductor, L_{DNA} is the length of DNA inductor and x_{DNA} is a distance that a DNA oscillates, goes ahead and goes back. We obtain:

$$E_{B, linear,5/6} = ([B_{DNA, linear,5/6}]^2 / 2 \mu_0) [2\pi [R_{DNA} + x_{DNA}][L_{DNA} + x_{DNA}]] \quad (48)$$

$$E_{B, curved,5/6} = ([B_{DNA, curved,5/6}]^2 / 2 \mu_0) [2\pi [R_{DNA} + x_{DNA}][L_{DNA} + x_{DNA}] / 2\pi r_{histone}] \quad (49)$$

$$E_{B, supercoil,5/6} = ([B_{DNA, supercoil,5/6}]^2 / 2 \mu_0) [2\pi [R_{DNA} + x_{DNA}][L_{DNA} + x_{DNA}] / [4\pi^2 r_{histone} r_{supercoil}]] \quad (50)$$

Using this energy, we can obtain forces (F_{DNA}) which are created by vibrations of a DNA inductor:

$$\begin{aligned} F_{DNA, linear,5/6} &= d E_{B, linear,5/6} / dx_{DNA} \\ &= [([B_{DNA, linear,5/6}]^2 / 2 \mu_0) 2\pi] x_{DNA} + [(([B_{DNA, linear,5/6}]^2 / 2 \mu_0) 2\pi) [R_{DNA} + L_{DNA, linear,5/6}] \end{aligned} \quad (51)$$

$$\begin{aligned} F_{DNA, curved,5/6} &= d E_{B, curved,5/6} / dx_{DNA} \\ &= [([B_{DNA, curved,5/6}]^2 / 2 \mu_0) 2\pi] x_{DNA} + [(([B_{DNA, curved,5/6}]^2 / 2 \mu_0) 2\pi) [R_{DNA} + L_{DNA, curved,5/6}] \end{aligned} \quad (52)$$

$$\begin{aligned} F_{DNA, supercoil,5/6} &= d E_{B, supercoil,5/6} / dx_{DNA} \\ &= [([B_{DNA, supercoil,5/6}]^2 / 2 \mu_0) 2\pi] x_{DNA} + [(([B_{DNA, supercoil,5/6}]^2 / 2 \mu_0) 2\pi) [R_{DNA} + L_{DNA, supercoil,5/6}] \end{aligned} \quad (53)$$

We can rewrite above equations as follows

$$F_{DNA, linear,5/6} = K_{DNA, linear} x_{DNA} + \text{constant} \quad (54)$$

$$F_{DNA, curved,5/6} = K_{DNA, curved,5/6} x_{DNA} + \text{constant} \quad (55)$$

$$F_{DNA, supercoil,5/6} = K_{DNA, supercoil,5/6} x_{DNA} + \text{constant} \quad (56)$$

Where

$$K_{DNA, linear,5/6} = [([B_{DNA, linear,5/6}]^2 / 2 \mu_0) 2\pi] \sim 10^{22} \quad (57)$$

$$K_{DNA, curved,5/6} = [([B_{DNA, curved,5/6}]^2 / 2 \mu_0) 2\pi] \sim 10^{39} \quad (58)$$

$$K_{DNA, supercoil,5/6} = [([B_{DNA, supercoil,5/6}]^2 / 2 \mu_0) 2\pi] \sim 10^{57} \quad (59)$$

To obtain torque for curved and supercoiled inductors, we should multiply above force to radius of histones:

$$\tau_{\text{DNA, curved,5/6}} = r_{\text{histone}} \mathbf{F}_{\text{DNA, curved,5/6}} = \mathbf{K}_{\theta, \text{DNA, curved,5/6}} \theta \quad (60)$$

$$\tau_{\text{DNA, supercoil,5/6}} = r_{\text{supercoil}} \mathbf{F}_{\text{DNA, supercoil,5/6}} = \mathbf{K}_{\theta, \text{DNA, supercoil,5/6}} \theta \quad (61)$$

where

$$\mathbf{K}_{\theta, \text{DNA, curved,5/6}} = [r_{\text{histone}}]^2 [(\mathbf{B}_{\text{DNA, curved,5/6}})^2 / 2 \mu_0] 2\pi \sim 10^{19} \quad (62)$$

$$\mathbf{K}_{\theta, \text{DNA, supercoil,5/6}} = [r_{\text{supercoil}}]^2 [(\mathbf{B}_{\text{DNA, supercoil,5/6}})^2 / 2 \mu_0] 2\pi \sim 10^{21} \quad (63)$$

Putting above constants DNA mass ($M_{\text{DNA}} = 3.59 \times 10^{-15} \text{ c}^{-2}$ [19]) and rotating mass ($I_{\theta} = m [r_{\text{histone/supercoil}}]^2$) in equations (3,4,7,8), we can obtain frequencies of DNAs:

$$\begin{aligned} \nu_{\text{DNA, ultrasound, linear,5/6}} &= (1/2\pi) [\mathbf{K}_{\text{DNA, linear,5/6}} / M_{\text{DNA}}]^{1/2} \\ &\sim 10^{23} \text{ c} \sim 10^{31} \end{aligned} \quad (64)$$

$$\begin{aligned} \nu_{\text{DNA, ultrasound, curved,5/6}} &= (1/2\pi) [\mathbf{K}_{\theta, \text{DNA, curved,5/6}} / I_{\theta, \text{DNA, curved,5/6}}]^{1/2} \\ &\sim 10^{27} \text{ c} \sim 10^{35} \end{aligned} \quad (65)$$

$$\begin{aligned} \nu_{\text{DNA, ultrasound, supercoil,5/6}} &= (1/2\pi) [\mathbf{K}_{\theta, \text{DNA, supercoil,5/6}} / I_{\theta, \text{DNA, supercoil,5/6}}]^{1/2} \\ &\sim 10^{36} \text{ c} \sim 10^{44} \end{aligned} \quad (66)$$

Where c is the velocity of light. Frequencies of waves have reverse relation with their wavelengths.

$$\lambda_{\text{DNA ultrasound, linear,5/6}} = c / \nu_{\text{DNA ultrasound, linear}} \sim 10^{-23} \quad (67)$$

$$\lambda_{\text{DNA, ultrasound, curved,5/6}} = c / \nu_{\text{DNA, ultrasound, curved,5/6}} \sim 10^{-27} \quad (68)$$

$$\lambda_{\text{DNA, ultrasound, supercoil,5/6}} = c / \nu_{\text{DNA, ultrasound, supercoil,5/6}} \sim 10^{-36} \quad (69)$$

Above frequencies and wavelengths have been calculated for an empty vacuum. However, liquid and other biological matters within nucleus and cell produce a resistance in front of wavelength. We can write below equations between frequencies in the empty and full vacuum within nucleus.

$$\mathbf{P}_{\text{Full}} / \mathbf{P}_{\text{Empty}} = [\mathbf{N} \mathbf{h} \nu_{\text{DNA, Full}}] / [\mathbf{N} \mathbf{h} \nu_{\text{DNA, Empty}}] \quad (70)$$

$$\sim [\mathbf{R}_{\text{resistance, Full}} \mathbf{I}^2] / [\mathbf{R}_{\text{resistance, Empty}} \mathbf{I}^2]$$

$$\sim [\mathbf{R}_{\text{resistance,Full}}]/[\mathbf{R}_{\text{resistance,Empty}}]$$

$$\sim [\rho_{\text{resistance,Full}} \mathbf{L}_{\text{resistance,Full}}/\mathbf{A}_{\text{resistance,Full}}]/[\rho_{\text{resistance,Empty}} \mathbf{L}_{\text{resistance,Empty}}/\mathbf{A}_{\text{resistance,Empty}}]$$

Where N is the number of sound packages, h is the Plank constant, $\mathbf{L}_{\text{resistance,Full/Empty}}$ is the length of current in full and empty space, $\mathbf{A}_{\text{resistance,Full}}$ is the area in full and empty space and $\rho_{\text{resistance,Full}}$ is the density in full and empty space. We have below relations between density and area with the length:

$$\mathbf{A}_{\text{resistance,Full/Empty}} \sim [\mathbf{L}_{\text{resistance,Full/Empty}}]^2 \quad (71)$$

$$\rho_{\text{resistance,Full/Empty}} \sim [\mathbf{L}_{\text{resistance,Full/Empty}}]^{-3} \quad (72)$$

Substituting above equations (71, 72) in equation (70), we obtain:

$$\mathbf{P}_{\text{Full}}/\mathbf{P}_{\text{Empty}} = [\mathbf{v}_{\text{DNA,Full}}]/[\mathbf{v}_{\text{DNA,Empty}}] \quad (73)$$

$$\sim [\mathbf{L}_{\text{resistance,Full}}/\mathbf{L}_{\text{resistance,Empty}}]^{-4} \sim [r_{\text{nucleus}}/r_{\text{DNA}}]^{-4}$$

Where length of the full medium could be the size of a nucleus filled by a nuclear liquid ($\mathbf{L}_{\text{resistance,Full}} \sim r_{\text{nucleus}} \sim 10^{-6}$) and length of the empty medium could be the size of a DNA ($\mathbf{L}_{\text{resistance,Empty}} \sim r_{\text{DNA}} \sim 10^{-9}$). Thus, we could obtain:

$$[\mathbf{v}_{\text{DNA,Full}}]/[\mathbf{v}_{\text{DNA,Empty}}] \sim 10^{-12} \quad (74)$$

$$\mathbf{v}_{\text{DNA, ultrasound, linear, 5/6, nucleus}} = \mathbf{v}_{\text{DNA, ultrasound, linear, 5/6, Full}} \sim 10^{19} \quad (76)$$

$$\mathbf{v}_{\text{DNA, ultrasound, curved, 5/6, nucleus}} = \mathbf{v}_{\text{DNA, ultrasound, curved, 5/6, full}} \sim 10^{23} \quad (77)$$

$$\mathbf{v}_{\text{DNA, ultrasound, supercoil, 5/6, nucleus}} = \mathbf{v}_{\text{DNA, ultrasound, supercoil, 5/6, full}} \sim 10^{32} \quad (78)$$

When these waves pass the space between nuclear and cell membrane, confront by a resistance of a liquid and other biological matters within cells. We can rewrite equation (73) and obtain changes in frequencies:

$$\mathbf{P}_{\text{Cell}}/\mathbf{P}_{\text{nucleus}} = [\mathbf{v}_{\text{cell}}]/[\mathbf{v}_{\text{nucleus}}] \quad (79)$$

$$\sim [\mathbf{L}_{\text{resistance,cell}}/\mathbf{L}_{\text{resistance,nucleus}}]^{-4} \sim [r_{\text{cell}}/r_{\text{nucleus}}]^{-4} \sim 10^{-12}$$

Thus, we can obtain below frequencies:

$$\mathbf{v}_{\text{DNA, ultrasound, linear, 5/6, cell}} \sim 10^7 \quad (80)$$

$$\mathbf{v}_{\text{DNA, ultrasound, curved, 5/6, cell}} \sim 10^{11} \quad (81)$$

$$\mathbf{v}_{\text{DNA, ultrasound, supercoil, 5/6, cell}} \sim 10^{20} \quad (82)$$

Some of these frequencies are less than frequency of visible light and some are more. Thus, some of these waves are very smaller than size of air molecules and pass them. This means that some of sound waves don't need to matter and propagate in an empty vacuum.

To obtain frequency of a virus like corona, we should replace number of DNA bases with viral ones and radius of cell by the radius of virus. We can write:

$$P_{\text{Virus}}/P_{\text{DNA-cell}} = [v_{\text{virus}}]/[v_{\text{DNA}}] \quad (83)$$

$$\sim [R_{\text{Virus}}I_{\text{Virus}}^2]/[R_{\text{DNA-cell}}I_{\text{DNA-cell}}^2]$$

$$\sim [\rho_{\text{Virus}}L_{\text{Virus}}/A_{\text{Virus}}]/[\rho_{\text{DNA-cell}}L_{\text{DNA-cell}}/A_{\text{DNA-cell}}] ([B_{\text{virus}}/B_{\text{DNA-cell}}]^2)$$

$$\sim [K_{\text{Virus}} / K_{\text{Cell}}] [r_{\text{virus}} / r_{\text{cell}}]^{-4} ([B_{\text{virus}}/B_{\text{DNA-cell}}]^2)$$

$$\sim [K_{\text{Virus}} / K_{\text{Cell}}] [r_{\text{virus}} / r_{\text{cell}}]^{-4} ([n_{\text{virus}}/n_{\text{DNA-cell}}]^2)$$

Where we have used of :

$$I_{\text{Virus}} \sim B_{\text{virus}} \quad (84)$$

$$I_{\text{Virus}} \sim n_{\text{virus}} Q_{\text{virus}} V_{\text{virus}} \quad (85)$$

$$A_{\text{Virus}} \sim [r_{\text{Virus}}]^2 \quad (86)$$

$$P_{\text{Virus}} \sim K_{\text{Virus}} [r_{\text{Virus}}]^{-3} \quad (87)$$

Where K_{Virus} and K_{Cell} are some constants depending on the genus of liquids and biological matters within the virus and Cell membranes respectively.

Substituting ($r_{\text{Virus}} \sim 10^{-6}$, $r_{\text{cell}} \sim 10^{-3}$) and ($n_{\text{virus}} \sim 10^3$, $n_{\text{DNA-cell}} \sim 10^9$) and also frequencies of equations (80,81 and 82) in equations (83), we obtain:

$$v_{\text{virus, ultrasound, linear, 5/6}} \sim 10^7 [K_{\text{Virus}} / K_{\text{Cell}}] \quad (88)$$

$$v_{\text{virus, ultrasound, curved, 5/6}} \sim 10^{11} [K_{\text{Virus}} / K_{\text{Cell}}] \quad (89)$$

If the genus of the liquid within the virus's membrane is different from the genus of liquid and matters within a cell, their waves couldn't remove the effect of each other and virus could be repelled. However, in some conditions, for some special cells, the genus of materials within cell and viral membranes become the same and virus could be attracted by a cell.

Conclusion:

In this paper, we have proposed a model to determine the frequency and shape of exchanged sound waves between Corona viruses and cells. In this model,

DNAs and viral RNAs act like the inductors and nuclear membranes and viral membranes play the role of magnets and vibraters within biological speaker/microphones. By motion of cellular DNAs and viral RNAs, their electrons and atoms emit some electromagnetic waves. These waves interact with charges along membranes and produce some currents. These currents emit some waves which interact with DNA/RNA inductors and cause to their motions. These motions produce extra magnetic fields which interact with nuclear/viral membranes and vibrate them, these vibrations produce some sound waves. RNAs and DNAs are built from hexagonal and pentagonal bases and emit multi-gonal sound waves. Also, these objects coil several times and could be divided into linear and curved inductors. These inductors produce linear and curved waves. Frequency of DNA sound waves changes between between $10^7 - 10^{20}$. Also, frequency of viral sound waves changes between $10^7 - 10^{11}$ [$K_{\text{Virus}} / K_{\text{Cell}}$] where K_{Virus} , K_{Cell} are some constants. These constants are related to the genus of liquids and other biological matters within viral and cell membranes. In some conditions, these constants become equal and frequencies of viral RNAs become equal to the frequencies of DNAs and viruses are dissolved into cell membranes.

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