HALF-WAWE RESONANCE OF BACTERIA DNA IRRADIATED FROM 4 TO 8 GHz

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INTRODUCTION

A new theoretical concept is presented to explain the disruptive effects on some bacteria irradiated by an electromagnetic field. We suppose a half-wave resonance of their DNA. Proof-of-concept experiments by two electronic devices associated with various gas plasma antennas is given.

METHODS

It has been shown that AC conductivity of DNA in the millimetre range is largely ascribed to relaxational losses of the water dipoles in surrounding hydratation layers. The total number of water molecules per nucleotide has to be correlated with the relative humidity. For instance the adsorption of water molecules per nucleotide is equal to 13 for a rate of humidity (R.H) equal to 84%, and 4 for R.H of 60%. For an R.H of 0% there are 3 water molecules per nucleotide which cannot be removed from the helix. The DNA conductivity of calf thymus at 100 GHz is equal to 25 S/m for a R.H of 84%. For a R.H equal to 0% the DNA conductivity is only of 1 S/m [1].

We suppose the DNA half-wave resonance at a frequency F such as:

$$F=c/2L\ [\varepsilon_r(F)]^{1/2} =c/[\varepsilon_r(F)]^{1/2}2.\ N_{PB}\ .l_0 \qquad (1)$$

N_{PB} is the base-pairs number, l_0 the distance between two consecutive bases counted along the helix strand, c is the light speed in the vacuum, ε_r is the relative permittivity of the water at the frequency F. The table 1 shows the various parameters for some bacteria.

Bacteria	N_{Pb}	F (GHz) (1)	L (mm) ou $N_{PB}.\ l_0$	A (dB)
Staphylococcus aureus	2845890	7.80	2.32	2.20
Actinomyces	3042856	7.50	2.48	1.92
Enterococcus faecalis	3218000	6.80	2.62	1.90
Mycobacterium leprae	3268203	6.70	2.67	1.86
Proteus mirabilis	4063606	5.10	3 .32	1.59
Mycobacterium tuberculosis	4411532	4.75	3.60	1.44
Salmonella typhi	4830175	4.40	3.94	1.37
Escherichia coli K12	5126377	4.10	4.18	1.25

Table 1: Parameters for some bacteria

A is the wave absorption into the water along the DNA strand. To explain the bacteria

destruction via their DNA, we refer to two enclosed gas plasma antennas lighted with a modulated RF electronic discharge. Plasma oscillation frequencies are generated very near of the ionic plasma frequency equal to:

$$f_i = (e/2\pi)(\Delta n_f / \varepsilon_0 m_i)^{1/2} \quad (2)$$

m_i is the ion mass, Δn_f the ion density related to the non linear behaviour of the plasma which depends on the modulation frequency, e the elementary electric charge and ε_0 the vacuum permittivity.

RESULTS

1) For the Rife-Bare device recalled in [2], the cylindrical plasma antenna is filled with argon gas at a pressure of 50 mm. The ion density /m^3 is equal to:

$$\Delta n_f = 9.51.10^{27}/(f_m)^2 \quad (3)$$

f_m is the pulsed modulation frequency of the carrier of 27 MHz. With (2) and (3) we deduced with $m_i = 6.6310^{-26}$ Kg:

$$f_i = 3.24.10^{12}/f_m \quad (4)$$

When f_m is increasing from 405 to 810 Hz, f_i is decreasing from 8 to 4 GHz. The correlation between F on table 1 and f_i is right and shows that the Rife-Bare device is able to destroy the bacteria at the mortal modulation frequency f_i.

2) For the Rife device (1939) recalled in [3], a spherical tube called phanotron filled with helium gas at 12 mm, radiates a carrier of 4.6 MHz modulated by a pure sinusoidal frequency. The neutral helium atom density n_0 is given in terms of the pressure P_0 by:

$$n_0 = P_0/kT_0 \quad (5)$$

With T_0=300K and an ionization degree of 1/100, the helium ion density is:
$\Delta n = 3.8.10^{21}/m^3$.With $m_i = 6.64.10^{-27}$ Kg, the maximum ionic plasma frequency was with (2): $(f_i)_M = 6.5.10^9$ Hz. This value is a right amount in comparison with the half-wave bacteria resonance frequencies F.
On the table 2 we present the mortal frequencies measured by Rife (1939), and the theoretical mortal frequencies deduced from (2) and (3) related to the Rife-Bare with f_i#F.

Bacteria	Theoretical mortal frequencies f_m (Hz)	Measured mortal frequencies by Rife (Hz)
Staphylococcus aureus	515	727
Actinomyces	520	784
Enterococcus faecalis	530	757
Mycobacterium leprae	540	783
Proteus mirabilis	650	767
Microbacterium tuberculosis	700	803

Salmonella typhi	745	712
Escherichia coli K12	785	803

Table 2: Theoretical and measured mortal frequencies

From the high accuracy of the modulation frequency measured by Rife(1Hz) we deduced from(4): $df_i/f_i=-df_m/f_{m,}$ and then the high selectivity of the DNA bacteria at resonance.

CONCLUSIONS

The DNA half-wave resonance hypothesis of bacteria irradiated by frequencies between 4 and 8 GHz has been justified by experiments. It was necessary to know the base-pair numbers of the DNA bacteria surrounding by several hydratation layers.

REFERENCES

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