27 - ACTION OF MAGNETISM ON GROWTH OF SOME BACTERIA AND SOME FUNGI

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INTRODUCTION

The Hall effect known in physics, describes the ability of the magnetic energy must change the electron flow of ions from the plasma membrane (Gerber, 2000) influencing existing bioelectric a delicate balance. Through a realignment of the electron flow resulting in changes in the conformation of the molecules and can modify the rate of enzymatic processes and cause changes in that body (Heneine, 2000). Magnetic field is the space around the magnet where its magnetic power and influence can be detected and filled with lines of magnetic force (SOUZA, 2005). The action of static magnetic fields on biological systems are linked to the ability of the plasma membrane excitability and its property of diamagnetic anisotropy, to be influenced by the magnetic field, due to its modification of ion channels (DINI, ABRRO, 2005) may occur. The orientation of the spins of electrons and protons can be altered by the magnetic field, which changes your energy level, modifying biological molecules (Ikehata ET AL, 1999).

Gram negative bacteria have outer cell membrane containing LPS (lipopolysaccharide) and proteins that control the permeability of substances through their channels porin into the periplasmic space and then into the cell through the cytoplasmic membrane (VISA, 2014). Gram positive bacteria have a larger amount of its wall peptilglicano, polymeric compound is thicker layer Gram negative (Pelczar, 2012). Fungi are non-photosynthetic eukaryotic organisms, food gets its absorption, lack chlorophyll and have rigid cell wall composed of chitin (Fukuda, 2009).Depending on the intensity and duration of exposure to the magnetic field, the changes may be reversible or irreversible, intra- or extracellular (Saffer; PHILLIPS, 1996). The action of the south pole behind a type of energy that accelerates the activity, increasing reaction with hydrogen. Since the action of the north pole behind a negative type of energy that slows cellular activity, decreasing the reaction with hydrogen (Gerber, 2000).

METHODOLOGY

Cultures were performed according to the criteria of safety due, according to ANVISA's manual, with monitoring of the purity of growing some bacteria and some fungi for growth assessment for colony counts (CFU). Permanent magnets with magnetic energy potency of 740 gauss, the magnets being fixed 5 out of the Petri dish were used. The north pole and the south pole were applied separately, ie, in different plates. 3 permanent magnets 4000 Gauss Power fixed the same way were also used. For standardization of microbial suspension, five colonies of micro-organism isolated in selective medium, and inoculated into 10 ml of sterile saline were captured. Regarding the bacteria by depletion after sowing surface or chocolate blood agar, the plates were incubated in aerobic bacteriological incubator 35 to 37 ° C for 48 hours. Regarding fungi, we proceeded in the same way as the type of seeding, with different incubation occurred at room temperature. The agar chosen for the seeding of fungi was Saboureau dextrose agar with chloramphenicol.

With respect to the bacteria Streptococcus pneumoniae, due to their mucoid consistency (ease of spreading on the surface of the agar), standardized bacterial suspension was held with only two colonies so that no trouble occurred in the count. This situation troubled count of CFUs was observed when added five colonies, the problem is solved when held with fewer colonies microbial suspension as explained above. The same was done with respect to Penicillium therefore spreads easily. Control cultures (microbial growth without the influence of the magnets) performed on the same type of agar and using the same methodology as the test crop, to serve for comparison in relation to the magnet attached microbial growth were made. The colony count was performed with the naked eye and with a magnifying glass if necessary, the observation is made under reflected light, counting each colony developed. For greater precision in the count, the petri dish was divided into quadrants. The microorganisms tested were: Pseudomonas aeruginosa, Proteus mirabilis, Staphylococcus aureus, coagulase negative Staphylococcus, Streptococcus pneumoniae, Candida spp and Penicillium spp.

RESULTS:

Proteus mirabilis (Plate control = 3,624 CFU)
test:
740 Gauss North Pole: 3036 CFU
4000 Gauss North Pole: 2646 CFU
740 Gauss South Pole: 5066 CFU
4000 Gauss South Pole: 3,800 CFU

Pseudomonasaeruginosa (Plate Control: 1800 CFU)
test:
740 Gauss North Pole: 2185 CFU
4000 Gauss North Pole: 3780 CFU
740 Gauss South Pole: 2430 CFU
4000 Gauss South Pole: 2450 CFU

Streptococcus pneumoniae (Plate control = 2,627 CFU)
test:
740 Gauss North Pole: 5560 CFU
4000 Gauss North Pole: 61 CFU
740 Gauss South Pole: 4203 CFU
4000 Gauss South Pole: 3110 CFU

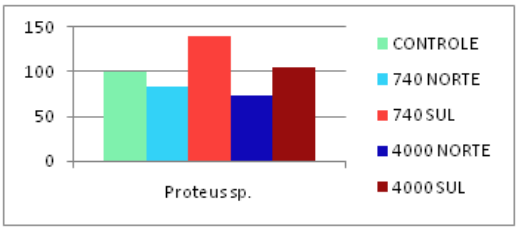
Staphylococcus aureus (Plate control = 7,810 CFU)
test:
740 Gauss North Pole: 4810 CFU
4000 Gauss North Pole 2340 CFU
740 Gauss South Pole: 1530 CFU
4000 Gauss South Pole: 3370 CFU

Coagulase negative Staphylococcus (Plate Control = 12,000 CFU)
test:
740 Gauss North Pole 6980 CFU
4000 Gauss North Pole 4930 CFU
South Pole 740 Gauss 14,000 CFU
Gauss 4000 South Pole 5780 CFU

Candida spp (control = 310= CFU)
test:
740 Gauss North Pole 635 CFU
4000 Gauss North Pole 122 CFU
740 Gauss South Pole 105 CFU
4000 Gauss South Pole 198 CFU

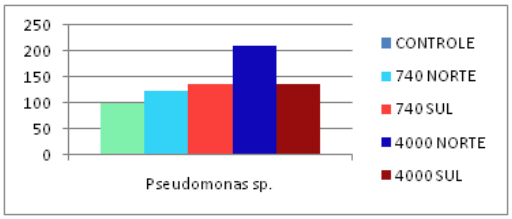
Penicilliumspp (control = 431 UFC)
test:
740 Gauss North Pole: 604 CFU
4000 Gauss North Pole: 427 CFU
740 Gauss South Pole: 770 CFU
4000 Gauss South Pole: 510 CFU

Graphs in percentage growth:



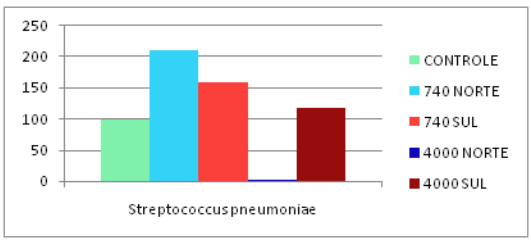
Graph 1 - Proteus spp.

Regarding the control board 100% with the north pole 740 G inhibited 16.23%. The South pole stimulated with 740 G at 39.81% and South pole stimulated with 4000 G in 4.85% growth.



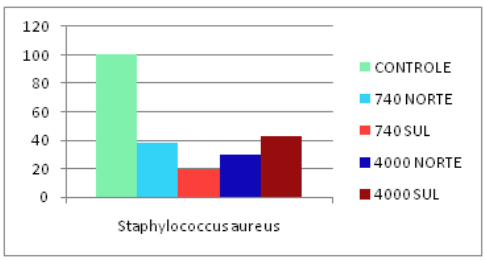
Graph 2 - Pseudomonas aeruginosa

Regarding the control board 100% in both the North Pole and the South Pole showed stimulatory effect on microbial growth with the following percentages: 740 North G: 21.39% North 4000 G: 110%, 740 South G: 35% and 4000 South G: 36.1%



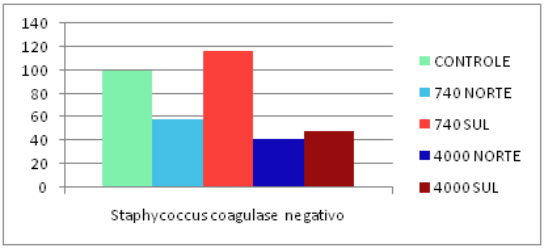
Graph 3 - Streptococcus pneumoniae.

Regarding the control board 100% with the North Pole 4000 G showed inhibitory effect of 97.3%. And indeed the North Pole with stimulatory G 740 showed 111%, with 740 G South Pole: 59.9% and South Pole at 4000 G: 18.4%.



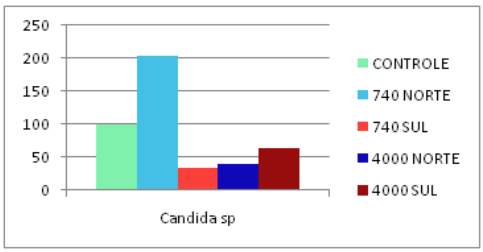
Graph 4 - Staphylococcus aureus.

Regarding the control board 100%, all the poles showed inhibitory effect. The North Pole: 61.6%, South Pole with 740 G: 80.4%, North Pole 4000 G: 70.1% and the South Pole at 4000 G: 56.8% inhibition to the growth of Staphylococcus aureus.



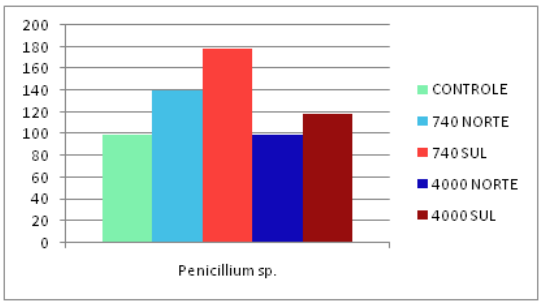
Graph 5 - Staphylococcus coagulase negative.

Regarding the control board 100%, with the South Pole 740 G showed a 17% stimulatory effect and the other poles showed inhibitory effect, and the North Pole with 740 G: 41.83% North Pole with 4,000 G: 59% and the South Pole with G 4000: 52.9%.



Graph 6 - Candida spp

Regarding the control board 100% with the north pole 740 G showed stimulatory effect of 104.9%, and the remaining poles showed inhibitory effect, and South Pole with 740 G: 66.1%, North pole with 4.000 G: 60, 6% and the South Pole at 4000 G: 36.1% inhibition of growth.



Graph 7 - Penicilliumspp

Regarding the control board 100% with the North Pole 4000 G showed inhibitory effect of 60.6% and the remaining poles showed stimulatory effect on growth, with North pole 740 G: 40.1%, 740 South G polo: 78% and the South Pole with G 4000: 18.3%.

CONCLUSION

The magnetic field showed influence on microbial growth, both the stimulus and by inhibiting the growth of micro-organisms tested. Several areas have been using the magnetic field, even as therapy in the repair of bone fractures, acute pain and in industry. These influences caused by the magnetic field indicate that further studies be conducted, as this present work is being continued, performing new tests with other micro-organisms. Such information being widely studied may have future applicability in several important areas, such as infectious diseases or preserving food for example.

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REFERENCES

DINI, L .; ABRO, L., moderate intensity bioeffects of static magnetic fields on cell cultures, Micron, 36, 2005.

GERBER, R., A Practical Guide to Vibrational Medicine, 2nd ed., St. Paul, Cultrix, 2000.

FUKUDA, et al, fungal cell wall polysaccharides:. Purification and characterization, Agricultural Sciences, Londrina, v. 30, no. 1, p. 117-134, January / ocean. 2009.

Heneine, IF, Basic Biophysics, 2nd ed., Atheneu, São Paulo, 2010.

GRISSOM, c. b magnetic fields in Biology effects.A Survey of Possible Mechanisms with Emphasis on Radical-Pair Recombination, Chem. Rev., 95, 1995.

Ikehata, M .; ET AL, Nutagencity of static magnetic fields detected bacterial mutation assay, Mutation Research, 427, 1999.

PANAGAPOULOS, DL, et al, The mechanism of action is ascillating electric fields on cells, Biochemical and Biophysical Research Communications, 272, 2000.

JR Pelczar, M. J .; CHAN, E. C. S .; Krieg NR, Microbiology concepts and applications, vol. 1, 2nd ed., Pearson, São

Paulo, 2012.

Saffer, J .; Phillips, J. L .; Evaluating the biological aspects of in vitro studies in bioeletromagnetics, Bioeletrochemistry and Bioenergetics, 40, 1996.

SOUZA, M. M., Magnetic. A natural way to restore and maintain health.2nd ed., São Paulo, 2005. www.anvisa.gov.br, access to 24.10.1014 16.23 h.

ACTION OF MAGNETISM ON GROWTH OF SOME BACTERIA AND SOME FUNGI

ABSTRACT

The flow of ions from the plasma membrane of fungi and bacteria have bioelectric a delicate balance. The magnetic energy is able to influence that flow through the Hall effect, creating changes in the conformation of the protein molecules and enzymes. Can alter the rate of enzymatic processes (HENEINE, 2000), the speed of the sodium-potassium pump, the calcium pumps GRISSON, 1995) which carry out control over the osmotic ions inside and outside the membrane, including control inlet and outlet water (PAPAGAPOULOS, ET AL, 2000). The stimulation or inhibition of cellular processes performed by magnetic fields are of great interest for cell biology, microbiology and biotechnology industry for its significant potential applications. This paper aims to ascertain whether the magnetic north pole and south power pole causing stimulation or inhibition in the growth of some bacteria and fungi. This study was developed by culturing some bacteria and some fungi developed in appropriate culture media and incubation with control colonies and colonies tests. In tests, the magnets of 740 gauss and 4000 gauss north pole to south pole and set the dish containing the sowing of standardized microbial suspension were used. Control samples not magnetos were added.

KEYWORDS: Magnetism, plasma membrane microbial growth.

ACTION DU MAGN~ETISME ON CROISSANCE DE CERTAINES BACTÉRIES ET CERTAINS CHAMPIGNONS

RÉSUMÉ

Le flux d'ions de la membrane plasmique des champignons et des bactéries ont bioélectrique un équilibre délicat. L'énergie magnétique est capable d'influencer l'écoulement à travers que l'effet Hall, ce qui crée des changements dans la conformation des molécules de protéines et d'enzymes. Peut modifier la vitesse des processus enzymatiques (Heneine, 2000), la vitesse de la pompe sodium-potassium, les pompes de calcium (Grissom, 1995) qui effectuent le contrôle sur les ions osmotiques à l'intérieur et l'extérieur de la membrane, y compris le contrôle entrée et sortie d'eau (PAPAGAPOULOS, et al, 2000). La stimulation ou l'inhibition de processus cellulaires effectuées par les champs magnétiques sont d'un grand intérêt pour la biologie cellulaire, la microbiologie et de l'industrie de la biotechnologie pour ses applications potentielles importantes. Ce document vise à déterminer si le pôle nord magnétique et le pôle de puissance sud provoquant une stimulation ou l'inhibition de la croissance de certaines bactéries et les champignons. Cette étude a été élaborée par la culture des bactéries et certains champignons développés dans les médias et incubation avec des colonies de contrôle et de tests des colonies culture appropriées. Dans les tests, les aimants de 740 gauss et pôle 4000 gauss nord au pôle sud et mettre le plat contenant le semis de suspension microbienne standardisé ont été utilisés. Les échantillons de contrôle ne magnétos ont été ajoutés.

MOTS-CLÉS: magnétisme, la croissance microbienne de la membrane plasmique.

ACCIÓN DE MAGNETISMO EN CRECIMIENTO DE ALGUNAS BACTERIAS Y ALGUNOS HONGOS.

RESUMEN

El flujo de iones a partir de la membrana plasmática de hongos y bacterias bioeléctrica tiene un delicado equilibrio. La energía magnética es capaz de influir en que el flujo a través del efecto Hall, la creación de cambios en la conformación de las moléculas de proteínas y enzimas. Puede alterar la velocidad de los procesos enzimáticos (HENEINE, 2000), la velocidad de la bomba de sodio-potasio, las bombas de calcio (Grissom 1995) que llevan a cabo el control de los iones osmóticos dentro y fuera de la membrana, incluyendo el control entrada y salida de agua (PAPAGAPOULOS, et al, 2000). La estimulación o inhibición de los procesos celulares realizadas por los campos magnéticos son de gran interés para la biología celular, la microbiología y la industria de la biotecnología por sus importantes aplicaciones potenciales. Este trabajo tiene como objetivo determinar si el polo norte magnético y el polo de poder al sur causando la estimulación o inhibición en el crecimiento de algunas bacterias y hongos. Este estudio fue desarrollado por cultivo de algunas bacterias y algunos hongos desarrolladas en medios de cultivo apropiados y la incubación con las colonias de control y pruebas de colonias. En las pruebas, se utilizaron los imanes de 740 gauss y 4000 gauss polo norte al polo sur y establecer el plato que contiene la siembra de suspensión microbiana estandarizado. Las muestras de control no se han añadido magnetos.

PALABRAS CLAVE: Magnetismo, membrana plasmática crecimiento microbiano.

AÇÃO DO MAGNETISMO SOBRE O CRESCIMENTO DE ALGUMAS BACTÉRIAS E ALGUNS FUNGOS.

RESUMO

O fluxo de íons da membrana plasmática de fungos e bactérias possui um delicado equilíbrio bioelétrico. A energia magnética é capaz de influenciar esse fluxo através do efeito Hall, gerando alterações na conformação das moléculas de proteínas e enzimas. Poderá alterar a velocidade dos processos enzimáticos (HENEINE, 2000), a velocidade das bombas de sódio-potássio, das bombas de cálcio (GRISSOM, 1995) as quais realizam o controle osmótico sobre os íons presentes interna e externamente na membrana, inclusive o controle de entrada e saída da água (PAPAGAPOULOS, ET AL, 2000). A estimulação ou inibição de processos celulares realizados por campos magnéticos são de grande interesse para a biologia celular, microbiologia e biotecnologia na indústria por suas aplicações potenciais consideráveis. O presente trabalho tem por objetivo, saber se a energia magnética polo norte e polo sul causam estímulo ou inibição no crescimento de algumas bactérias e fungos. Este estudo foi desenvolvido através da cultura de algumas bactérias e alguns fungos desenvolvidos em meios de culturas e incubação apropriados, com colônias controle e colônias testes. Nos testes, foram utilizados magnetos de 740 Gauss e 4000 Gauss com polo norte e polo sul fixados na placa contendo a semeadura da suspensão microbiana padronizada. Nas amostras controle não foram adicionados magnetos.

PALAVRAS-CHAVES: Magnetismo, membrana plasmática, crescimento microbiano.