

Bacterial Magnetic Particles as a Novel and Efficient Gene Vaccine Delivery System – A Spiritual Insight

By MATSATI - May 21, 2021



As everyone knows, DNA vaccination was recently decided upon as the chosen method for eliciting antigen-specific immunity for COVID-19. This is not a new concept, as one research paper [1] reports on using such a delivery system as far back as 2011. This study investigated the ability of a DNA vaccine to decrease and eliminate tumor growth. The researchers used magnetosomes (bacterial magnetic particles, BMPs) as the delivery system of recombinant DNA composed of secondary lymphoid tissue chemokine, human papillomavirus type E7 (HPV-E7), and Ig-Fc fragment (pSLC-E7-Fc) to develop a gene vaccine (BMP-V) for tumor immunotherapy. The mice treated with BMP-V did not show any toxic side effects indicated by examination of their internal organs. The major conclusions from the paper, based upon the results and inhibition of tumor growth coupled with the no-toxic effects, the researchers believe BMP may be used as a gene carrier to elicit a systemic immune response for this application.

REFERENCES

1. *Y-S Tang, D Wang, C Zhou, W Ma, Y-Q Zhang, Liu, and S Zhang*, "**Bacterial magnetic particles as a novel and efficient gene vaccine delivery system**," *Gene Ther.* 2012 Dec; 19(12): 1187-1195. Published online 2011 Dec 15. doi: 10.1038/gt.2011.197
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DNA vaccines as demonstrated in this paper have been shown to be attractive for producing a specific tailored immunity against pathogens. Because of this, various strategies have been investigated to achieve this goal. Some papers have reported (*J Virol.* 2008 Jul; 82(13):6458-69) that direct intramuscular injection results in suboptimal immunogenicity. Some methods that have been utilized for delivery systems include a gene gun (*Int J*

Parasitol. 2003 May; 33(5-6):457-67) and electroporation. The electroporation method uses a buffer solution, electric pulses, etc. These methods however have not become standard delivery methods in clinical trials. Because of this the identification of a delivery system, as far as 2011, was still a critical topic to resolve. According to this paper [1] these MBPs (bacterial magnetic nanoparticles) may function as carriers of therapeutic drugs or genes for targeting cancer because of their properties, such as paramagnetism, nanoscale size (40-120 nm) and high dispersal quality. (*Nat Rev Microbiol. 2004 Mar; 2(3):217-30*)

Researchers studied these new BMP + DNA complexes using transmission electron microscopy and found the complexes were homogeneous, in addition to the size and morphology of the complexes being very uniform, similar to the uncomplexed BMPs. In addition to this, in order to improve the transfection efficiency, the researchers studied the magnetic field strength and duration times. It was determined the maximum transfection efficiency occurs when the magnetic field is 600 mT. Note that "transfection" is a verb defined as "*to infect a cell with free nucleic acid,*" or "*to introduce (genetic material) by transfection.*" The researchers used a luminescent imaging technique to verify the gene transfer mechanism. Using luminescent imaging, Figure 4 in the paper, showed BMP agglomeration at the tumor site when the magnetic field was applied. Imaging the agglomeration at the tumor site validated the results of the studies showing evidence for the magnetic field being crucial for successful in vivo transfection. When the magnetic field was applied, this led to an increase in tumor inhibition as compared with other BMP-V administration methods. Researchers have been interested in bacterial magnetic particles as far back as 1975. An interesting finding is that it has been demonstrated that a magnetic field causes many changes in cellular gene expression in cells (*Biomaterials. 2010 May; 31(15):4392-400*). Therefore it has been recommended more studies are needed to understand how this affects DNA delivery systems as each cell in the body responds differently. This is why much more testing is currently needed for the COVID vaccines prior to its release and why it remains an experimental vaccine approved only for emergency use by the FDA. This is why it is not wise to take this type of vaccine at this time! The researchers from 2011 say this is the first paper which demonstrates the effect of tumor gene vaccine delivery by BMPs in an animal model and that BMPs could be used as a promising vehicle for DNA delivery in gene vaccinations.

The Spiritual Insights that we receive from this type of research is related to the magnetic field and transfection rate enhancement effect. A magnetic field is defined as an invisible vector field that describes the magnetic influence on moving electric charges, electric currents, and magnetic materials. Now we note that it is possible to visualize a magnetic vector field using ferric particles such as iron particles for example (magnetite). A permanent magnet's magnetic field pulls on ferromagnetic materials such as iron, and attracts or repels other magnets. This is the phenomenon that we see taking place in the sense of the magnetic field activating the bacterial magnetic nanoparticles attacking the tumor cells. This also parallels how various things work in our lives in this world as pertaining to the way of the world, or the way of God, as faith influences what kind of effect God has on us and our lives. The effects can be seen in those who are God's people as opposed to those who do not have the Lord God of Israel in their lives.

When considering the magnetic field effect in scientific research, we function in a similar manner to that of the ferric particles. Modern science has revealed a moving charge in a

magnetic field experiences a force perpendicular to its own velocity and to the magnetic field. This is what happens when we become rooted in our culture, being programmed to walk in cultural norms and ideologies, customs, and ceremonies, routines, patterns of speech and thought which are sinful according to the Torah. Whether one believes this or not, when we watch television, movies, listen to music, etc, we subconsciously inherit some of the cultural norms that are portrayed in these things. The point is that we are creatures of habit, we like to do things in a repetitive nature, this is a natural God given property, a form of psychological ritualizing of everything we do in life. The basic conclusion is that we are to a greater or lesser extent products of our culture, and the media, news agencies, and even military scientists have determined these things to be true and is why it is so important where we get our news from! These are the reasons why traditions are so difficult to escape from because these things are a natural product of our way of life, it is what we like to do in a habitual way.

Traditions are not all bad, as for example the traditions on the transmission of the Scriptures and what text is considered the inspired word of God, these things come from earlier peoples and traditions. Some traditions which are preserved in the Scriptures are those that preserve the name of God in the text using a circumlocution, we can see this in most all English translations of the bible. The original Hebrew did not have vowel markings or other punctuations, therefore the tradition of the Masoretes, the scribal tradition known as the Masorah (מסורה) have helped us to pronounce the Hebrew text and its proper interpretation. We understand the truth of our faith through historical continuity, tradition, and dialog which has taken place through the centuries. This is true even in Yeshua's day concerning the Torah, Neviim, Ketuvim (Torah, Prophets, Writings), in the first century, much of the dialog was dependent upon Jewish tradition to teach great truths, where Yeshua raised the bar to the Torah command applying both a spiritual and physical principle. These things again illustrate how we are made, and the way in which truth is transmitted through the Word of God. As we noted earlier, modern science reveals a moving charge in a magnetic field experiences a force perpendicular to its velocity and to the magnetic field and how we may function similarly as being influenced by the culture around us. The Lord God Almighty who created us knows all of these things, and this is why He commanded the Shalosh Regalim to be performed by all of his people both Jew and Gentile in the Torah. The Shalosh Regalim is the three festivals men were to present themselves in Jerusalem before the Lord (Passover, Shavuot, and Sukkot). This explains what we are reading according to [Devarim / Deuteronomy 16](#), the Lord spoke through Moshe on both Shavuot and Sukkot and repeating on the festival of Sukkot what was written about Shavuot. This is what was written according to [Devarim / Deuteronomy 16:9-11](#), ט שָׁבֹעַ שְׁבַע
שָׁבֹעַת תִּסְפָּר-לְךָ מִהַחֵל חַרְמוֹשׁ בַּקֶּמֶחַ תַּחֲל לְסַפֵּר שָׁבֹעַת שְׁבַעוֹת: י וְעִשִׂית חַג שְׁבֻעוֹת לַיהוָה אֱלֹהֶיךָ מִסֵּת
נִדְבַת יָדְךָ אֲשֶׁר תִּתֵּן כְּאֲשֶׁר יִבְרַכְךָ יְהוָה אֱלֹהֶיךָ: יא וְשִׂמַּחְתָּ לִפְנֵי | יְהוָה אֱלֹהֶיךָ אַתָּה וּבִנְךָ וּבִתְךָ וְעַבְדְּךָ וְאִמְתְּךָ
וְהַלְוִי אֲשֶׁר בְּשַׁעְרֶיךָ וְהַגֵּר וְהַיְתוּם וְהָאֲלֻמְנָה אֲשֶׁר בְּקִרְבְּךָ בְּמִקוֹם אֲשֶׁר יִבְחַר יְהוָה אֱלֹהֶיךָ לְשָׂכֵן שְׁמוֹ שָׁם: **16:9**
'You shall count seven weeks for yourself; you shall begin to count seven weeks from the time you begin to put the sickle to the standing grain. 16:10 'Then you shall celebrate the Feast of Weeks to the Lord your God with a tribute of a freewill offering of your hand, which you shall give just as the Lord your God blesses you; 16:11 and you shall rejoice before the Lord your God, you and your son and your daughter and your male and female servants and the Levite who is in your town, and the stranger and the orphan and the widow who are in your midst, in the place where the Lord your God chooses to establish His name. (NASB)
Now according to [Devarim / Deuteronomy 16:11](#), Moshe writes that we are to rejoice before

the Lord our God (יְהוָה אֱלֹהֵינוּ | יְהוָה אֱלֹהֵינוּ) celebrating with our sons and daughters (בָּנֵינוּ וּבָנוֹתֵינוּ) with our male and female slaves (עַבְדֵינוּ וְעַמְּבֹדֵינוּ), with the Levite (לֵוִי), the stranger (זָרָב), the orphan (יָתוֹם) and the widow (אַלְמָנָה), that are in your gates (בְּשַׁעְרֵינוּ). It is interesting how this is written and who it is that is being targeted as being responsible for these festivals. This is a significant observation as there are several points that we can make concerning what was going on in relation to all of these peoples celebrating before the Lord these festivals that traditional Christianity calls *"for the Jews only."*

First, we must take a historical perspective of the Scriptures, reading through both the Torah and the book of Joshua we learn how God commanded Israel to drive out the inhabitants from the Land. We are told God is merciful and allowed time for these peoples currently living in the Land of Canaan to repent and turn from their sins. The people however did not and would not repent and so God's judgment came through Israel. We read however Israel made a covenant with some of these people against the command of God so they became permanent slaves. So the mention of עַבְדֵינוּ וְעַמְּבֹדֵינוּ (male and female slaves) includes both the Jew and the non-Jew (the permanent slave). Because the Torah explicitly states this, it cannot be argued these commands are only for the Jews as modern Christianity claims. The idea here is that the people of Canaan should either be dead or gone. So someone from the nations coming back into the Land, the price would be slavery, if for no other reason than to force them to depart from idolatry. This is the primary issue that is related to what this research paper and modern science reveals, i.e. a moving charge in a magnetic field experiences a force perpendicular to its velocity and to the magnetic field and how we may function similarly as being influenced by the culture around us as these people were to cease their idolatrous traditions. This issue of idolatry is a serious issue, problematic for Israel as idolatry has heavily relied upon tradition and in this situation tradition leads to death. Idolatry is to not be found among God's people and if one had once served idols one is to permanently depart from idolatry! This is because there is only one God and there are no others! The idea of becoming a bondservant coupled with scientific research and the Torah command, the slave is required to leave their idolatry. Also, we have the command to treat the slave as a hired hand, coupled with the Torah centric principle of "do unto others as you would have them do unto you." These two things would quantify exactly how one was to be treated as a slave. These things are illustrated by the repetition of the command for Sukkot where all who have joined themselves with Israel are to rejoice before God (יְהוָה אֱלֹהֵינוּ | יְהוָה אֱלֹהֵינוּ) celebrating with our sons and daughters (בָּנֵינוּ וּבָנוֹתֵינוּ) with our male and female slaves (עַבְדֵינוּ וְעַמְּבֹדֵינוּ), with the Levite (לֵוִי), the stranger (זָרָב), the orphan (יָתוֹם) and the widow (אַלְמָנָה), that are in your gates (בְּשַׁעְרֵינוּ). Notice all of these types of people, this includes everyone, who are to participate and take part in the tradition of shalosh regalim, God's holy festivals. This suggests a certain kind of treatment of slaves, as removing them from their idolatry, and showing mercy and love towards all!

Coming back to the scientific research, note again how a magnetic field can polarize ferromagnetic materials, and in a parallel fashion, we too can become polarized towards righteousness and truth as we remain in God's presence and walk in the footsteps of the Messiah, or become polarized towards sin if we walk in the way of our culture, the nations, the world. Note also how the scientific research draws these concepts out of the Scriptures and illustrates for us how important it is to walk in God's Ways, to have faith in God's Messiah, to follow in the footsteps of the Messiah! If we do not draw near to the Lord in His

word, we will become strongly polarized towards sin and sinful living. This is because of the world's confusion on sin, right and wrong, woke liberal ideologies, sexual preference, etc. The Torah speaks to us what happened when Israel stood at the foot of the Mountain of Sinai. God's Word was given to His people, and the people entered into a covenant relationship with God. Because of these things, the Torah is representative of the covenant between the bride (God's people) and the bridegroom (God). The exodus from Egypt was intended to lead to this revelation at Sinai, the giving of God's word to His people, and the filling of God's people with His life giving Spirit. This was why it was at this time (Shavuot) that God gave His Spirit to His people in the Apostolic Writings. These things together reveal to us how the Lord God Almighty is bringing us out of this world, delivering us from bondage to sin, and making us His own treasured people (am segola), holy and separated from the pagan cultures around us. This was the point and the purpose of Yeshua doing what He did upon the cross paying the penalty of sin on our behalf. According to the NT text, these things are given to us by faith in Yeshua the Messiah, the power of God, the Holy Spirit, God's presence, and freedom from the things that would bring us under bondage and sin!

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Dr. Duane D. Miller received his Ph.D., M.S., and B.S. Degree in Chemical Engineering from The University of Akron Ohio. He is currently a Chemical Engineering Researcher. Duane's research expertise has focused upon functional materials development for the control, conversion, and release of process gases in Energy production technologies. His R&D interests include computational chemistry, developing novel technologies for converting biomass to fuels and studying their fundamental interactions during the chemical conversion process. His past experience includes sorbent development for pre- and post-combustion CO₂ and SO₂ capture, selective absorption of H₂S from methane streams, O₂ capture for oxy-fuel combustion, photocatalytic reduction of alcohols, NO_x reduction catalysis, the development of oxygen carriers to combust fossil fuels (CH₄ and coal) for the chemical looping combustion processes, and the extraction of rare earth elements using patent pending sorbents. His research expertise has focused on operando-characterization using Infrared, Raman, and UV-Vis spectroscopy to observe the nature of the catalytic active sites and reaction intermediates under realistic reaction conditions, allowing direct correlation of molecular/electronic structures with catalyst performance during Gas-Solid / Liquid-Solid Adsorption and Photocatalytic Processes with real time online analysis of reaction products using ICP-MS and mass spectrometry. His current work involves a multi-disciplinary approach to developing, understanding, and improving the catalytic gasification of coal and methane, high temperature chemical looping combustion, and the catalytic decomposition and gasification of biomass and coal using novel microwave reactor. He has been studying the Hebrew Scriptures and the Torah for 20+ years and sharing what he has learned. The studies developed for MATSATI.COM are freely to be used by everyone, to God be the Glory!