

# Nonlocal Effects of Chemical Substances on the Brain Produced through Quantum Entanglement

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Photons are intrinsically quantum objects and natural long-distance carriers of information. Since brain functions involve information and many experiments have shown that quantum entanglement is physically real, we have contemplated from the perspective of our recent hypothesis on the possibility of entangling the quantum entities inside the brain with those in an external chemical substance and carried out experiments toward that end. Here we report that applying magnetic pulses to the brain when an anesthetic or pain medication was placed in between caused the brain to feel the effect of the said substance for several hours after the treatment as if the test subject had actually inhaled the same. The said effect is consistently reproducible. We further found that drinking water exposed to magnetic pulses, laser light or microwave when a chemical substance was placed in between also causes consistently reproducible brain effects in various degrees. Further, through additional experiments we have verified that the said brain effect is the consequence of quantum entanglement between quantum entities inside the brain and those of the chemical substance under study, induced by the photons of the magnetic pulses or applied lights. We suggest that the said quantum entities inside the brain are nuclear and/or electron spins and discuss the profound implications of these results.

## 1 Introduction

Quantum entanglement is ubiquitous in the microscopic world and manifests itself macroscopically under some circumstances [1, 3, 4]. Further, quantum spins of electrons and photons have now been successfully entangled in various ways for the purposes of quantum computation, memory and communication [5, 6]. In the field of neuroscience, we have recently suggested that nuclear and/or electronic spins inside the brain may play important roles in certain aspects of brain functions such as perception [2]. Arguably, we could test our hypothesis by first attempting to entangle these spins with those of a chemical substance such as a general anaesthetic and then observing the resulting brain effects such an attempt may produce, if any. Indeed, instead of armchair debate on how the suggested experiments might not work, we just went ahead and carried out the experiments over a period of more than a year. Here, we report our results. We point out from the outset that although it is commonly believed that quantum entanglement alone cannot be used to transmit classical information, the function of the brain may not be totally based on classical information [2].

## 2 Methods, test subjects and materials

Figure 1A (see end sheet) illustrates a typical setup for the first set of experiments. It includes a magnetic coil with an estimated 20 W output placed at one inch above the right side of a test subject's forehead, a small flat glass-container

inserted between the magnetic coil and the forehead, and an audio system with adjustable power output and frequency spectrum controls connected to the magnetic coil. When music is played on the audio system, the said magnetic coil produces magnetic pulses with frequencies in the range of 5 Hz to 10 kHz. Experiments were conducted with said container being filled with different general anaesthetics, medications, or nothing/water as control, and the test subject being exposed to the magnetic pulses for 10 min and not being told the content in the container or details of the experiments.

The indicators used to measure the brain effect of the treatment were the first-person experiences of any unusual sensations such as numbness, drowsiness and/or euphoria which the subject felt after the treatment and the relative degrees of these unusual sensations on a scale of 10 with 0 = nothing, 1 = weak, 2 = light moderate, 3 = moderate, 4 = light strong, 5 = strong, 6 = heavily strong, 7 = very strong, 8 = intensely strong, 9 = extremely strong and 10 = intolerable. The durations of the unusual sensations and other symptoms after the treatment, such as nausea or headache, were also recorded.

Figure 1B illustrates a typical setup for the second set of experiments. It includes the magnetic coil connected to the audio system, a large flat glass-container filled with 200 ml fresh tap water and the small flat glass-container inserted between the magnetic coil and larger glass-container. Figure 1C illustrates a typical setup for the second set of experiments when a red laser with a 50 mW output and wavelengths of

635 nm–675 nm was used. All Experiments were conducted in the dark with the small flat glass-container being filled with different general anaesthetics, medications, or nothing/water as control, the large glass-container being filled with 200 ml of fresh tap water and exposed to the magnetic pulses or laser light for 30 min and the test subject consuming the treated tap water but not being told the content in the small container or details of the experiments. The indicators used for measuring the brain effects were the same as those used in the first set of experiments. Experiments were also carried out respectively with a 1200 W microwave oven and a flashlight powered by two size-D batteries. When the microwave oven was used, a glass tube containing 20 ml of fresh tap water was submerged into a larger glass tube containing 50 ml of general anaesthetic and exposed to microwave radiation for 5 sec. The said procedure was repeated numerous times, to collect a total of 200 ml of treated tap water for consumption. When the flashlight was used, the magnetic coil shown in Figure 1B was replaced with the flashlight.

To verify that the brain effects experienced by the test subjects were the consequences of quantum entanglement between quantum entities inside the brain and those in the chemical substances under study, the following additional experiments were carried out. Figure 1D shows a typical setup of the entanglement verification experiments. The setup is the reverse of the setup shown in Figure 1C. In addition, the small flat glass-container with a chemical substance or nothing/water as control was positioned with an angle to the incoming laser light to prevent reflected laser light from re-entering the large glass-container.

In the first set of entanglement verification experiments, the laser light from the red laser first passed through the large glass-container with 200 ml of fresh tap water and then through the small flat glass-container filled with a chemical substance or nothing/water as control located about 300 cm away. After 30 min of exposure to the laser light, a test subject consumed the exposed tap water without being told the content in the small container or details of the experiments and reported the brain effects felt for the next several hours.

In the second set of entanglement verification experiments, 400 ml of fresh tap water in a glass-container was first exposed to the radiation of the magnetic coil for 30 min or that of the 1500W microwave oven for 2 min. Then the test subject immediately consumed one-half of the water so exposed. After 30 min from the time of consumption the other half was exposed to magnetic pulses or laser light for 30 minutes using the setup shown in Figure 1B and Figure 1D respectively. The test subject reported, without being told the content in the small container or details of the experiments, the brain effects felt for the whole period from the time of consumption to several hours after the exposure had stopped. In the third set of entanglement verification experiments, one-half of 400 ml Poland Spring water with a shelf time of at least three months was immediately consumed by the test

subject. After 30 min from the time of consumption the other half was exposed to the magnetic pulses or laser light for 30 min using the setup shown in Figure 1B and Figure 1D respectively. Test subject reported, without being told the content in the small container or details of the experiments, the brain effects felt for the whole period from the time of consumption to several hours after the exposure had stopped.

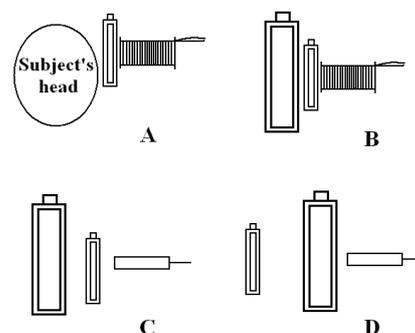


Fig. 1: Schematic view of typical experimental setups used in our study

In the fourth set of entanglement verification experiments, the test subject would take one-half of the 400 ml fresh tap water exposed to microwave for 2 min or magnetic pulses for 30 min to his/her workplace located more than 50 miles away (in one case to Beijing located more than 6,500 miles away) and consumed the same at the workplace at a specified time. After 30 min from the time of consumption, the other half was exposed to magnetic pulses or laser light for 30 min at the original location using the setup shown in Figure 1B and Figure 1D respectively. The test subject reported the brain effects felt without being told the content in the small container or details of the experiments for the whole period from the time of consumption to several hours after the exposure had stopped.

With respect to the test subjects, Subject A and C are respectively the first author and co-author of this paper and Subject B and C are respectively the father and mother of the first author. All four test subjects voluntarily consented to the proposed experiments. To ensure safety, all initial experiments were conducted on Subject A by himself. Further, all general anaesthetics used in the study were properly obtained for research purposes and all medications were either leftover items originally prescribed to Subject C's late mother or items available over the counter. To achieve proper control, repeating experiments on Subject A were carried out by either Subject B or C in blind settings, that is, he was not told whether or what general anaesthetic or medication were applied before the end of the experiments. Further, all experiments on Subject B, C and D were also carried out in blind settings, that is, these test subjects were not told about the details of the experiments on them or whether or what general anaesthetic or medication were applied.

	1st Set: Magn. Coil		2nd Set: Magn. Coil		Red laser		Flashlight		Microwave	
	Test #	Effect	Test #	Effect	Test #	Effect	Test #	Effect	Test #	Effect
<b>Anaesthetics</b>										
Subject A	13	yes	16	yes	22	yes	8	yes	3	yes
Subject B	2	yes	2	yes	3	yes	0	n/a	1	yes
Subject C	2	yes	6	yes	6	yes	0	n/a	1	yes
Subject D	2	yes	1	yes	5	yes	0	n/a	0	n/a
<b>Medications</b>										
Subject A	17	yes	14	yes	16	yes	1	yes	3	yes
Subject B	1	yes	1	yes	3	yes	0	n/a	2	yes
Subject C	3	yes	1	yes	4	yes	0	n/a	1	yes
Subject D	0	n/a	0	n/a	3	yes	0	n/a	1	yes
<b>Control</b>										
Subject A	12	no	5	no	11	no				
Subject B	3	no	0	n/a	1	no				
Subject C	1	no	2	no	4	no				
Subject D	0	n/a	0	n/a	1	no				

Table 1: Summary of results obtained from the first two sets of experiments

### 3 Results

Table 1 summarizes the results obtained from the first two sets of experiments described above and Table 2 details the summary into each general anaesthetic studied plus morphine in the case of medications. In the control studies for the first set of experiments, all test subjects did not feel anything unusual from the exposure to magnetic pulses except vague or weak local sensation near the site of exposure. In contrast, all general anaesthetics studied produced clear and completely reproducible brain effects in various degrees and durations as if the test subjects had actually inhaled the same. These brain effects were first localized near the site of treatment and then spread over the whole brain and faded away within several hours. But residual brain effects (hangover) lingered on for more than 12 hours in most cases. Among the general anaesthetics studied, chloroform and deuterated chloroform (chloroform D) produced the most pronounced and potent brain effects in strength and duration followed by isoflurane and diethyl ether. Tribromoethanol dissolved in water (1:50 by weight) and ethanol also produced noticeable effects but they are not summarized in the table.

As also shown in Table 1, while the test subjects did not feel anything unusual from consuming the tap water treated in the control experiments with magnetic pulses or laser light, all the general anaesthetics studied produced clear and completely reproducible brain effects in various degrees and durations respectively similar to the observations in the first set of experiments. These effects were over the whole brain, intensified within the first half hour after the test subjects consumed the treated water and then faded away within the next few hours. But residual brain effects lingered on

for more than 12 hours as in the first set of experiments. Among the general anaesthetics studied, again chloroform and deuterated chloroform produced the most pronounced and potent effect in strength and duration followed by isoflurane and diethyl ether as illustrated in Figure 2. Tribromoethanol dissolved in water (1:50 by weight) and ethanol also produced noticeable effects but they are not summarized in the table.

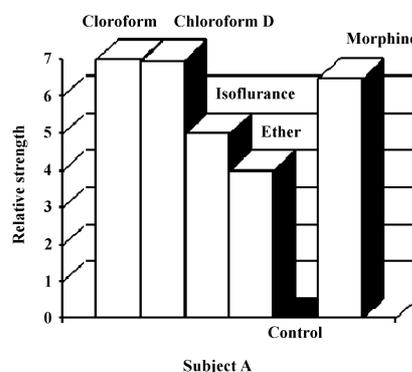


Fig. 2: Illustration of relative strengths of brain effects of several anesthetics and morphine

In addition, available results with flashlight and microwave as photon sources are also summarized in Table 1 respectively. In both cases general anaesthetics studied produced clear and reproducible brain effects. But the brain effects produced with microwave exposure were much stronger than those by flashlight.

Table 1 also summarizes results obtained with several medications including morphine, fentanyl, oxycodone, nicotine and caffeine in first and second sets of experiments. We

found that they all produced clear and completely reproducible brain effects such as euphoria or hastened alertness in various degrees and durations respectively. For example, in the case of morphine in the first set of experiments the brain effect was first localized near the site of treatment and then spread over the whole brain and faded away within several hours. In the case of morphine in the second set of experiments the brain effect was over the whole brain, first intensified within the first half hour after the test subjects consumed the treated water and then faded away within the next a few hours as illustrated in Figure 3.

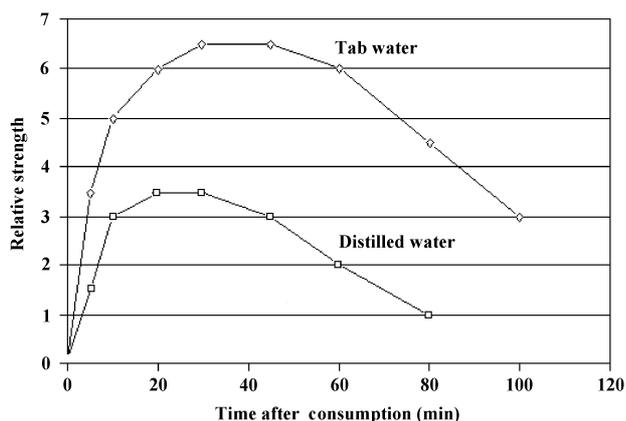


Fig. 3: Illustration of dynamics of brain effects produced by two types of water exposed to morphine

Comparative experiments were also done on Subject A and C with chloroform and diethyl ether by asking them to inhale the vapours of chloroform and diethyl respectively for 5 sec and compare the brain effect felt with those in the two sets of experiments described above. The brain effects induced in these comparative experiments were qualitatively similar to those produced in various experiments described above when chloroform and diethyl ether were respectively used for the exposure to photons of various sources.

Furthermore, through additional experiments we also made the following preliminary observations. First, the brain effects in the first set of experiments could not be induced by a permanent magnet in the place of the magnetic coil. Nor could these effects be produced by a third magnetic coil placed directly above the head of the test subject and connected to a second magnetic coil through an amplifier with the second magnetic coil receiving magnetic pulses from a first magnetic coil after the said magnetic pulses first passed through the anaesthetic sample. That is, the brain effects could not be transmitted through an electric wire. Second, in the second set of experiments the water exposed to magnetic pulses, laser light, microwave and flashlight when a chemical substance was present tasted about the same as that before the exposure. Third, heating tap water exposed to magnetic pulses or laser light in the presence of a chemical substance diminished the brain effect of the said substance. Fourth,

when distilled water was used instead of fresh tap water the observed brain effects were markedly reduced as illustrated in Figure 6 in the case of morphine.

Table 3 summarizes the results obtained with the entanglement verification experiments carried out so far with chloroform, deuterated chloroform, diethyl ether and morphine. With all four sets of experiments, clear and consistently reproducible brain effects were experienced by the test subjects above and beyond what were noticeable in the control portions of the experiments under blind settings. More specifically, in the first set of entanglement verification experiments, the brain effects experienced by the test subjects were the same as those in which the setup shown in Figure 1C was used. In the second, third and fourth sets of these experiments, all test subjects did not feel anything unusual in the first half hour after consuming the first half of the water either exposed to microwave/magnetic pulses or just sit on the shelf for more than 3 months. But within minutes after the second half of the same water was exposed to the laser light or magnetic pulses in the presence of general anaesthetics, the test subjects would experience clear and completely reproducible brain effect of various intensities as if they have actually inhaled the general anaesthetic used in the exposure of the second half of the water. The said brain effects were over the whole brain, first intensified within minutes after the exposure began and persisted for the duration of the said exposure and for the next several hours after the exposure had stopped. Further, all other conditions being the same, magnetic coil produced more intense brain effects than the red laser. Furthermore, all other conditions being the same, the water exposed to microwave or magnetic pulses before consumption produced more intense brain effects than water just sitting on the shelves for more than 3 months before consumption.

#### 4 Discussion

With respect to the second, third and fourth sets of entanglement verification experiments, the only possible explanation for the brain effects experienced by the test subjects are that they were the consequences of quantum entanglement because the water consumed by the test subjects was never directly exposed to the magnetic pulses or the laser lights in the presence of the chemical substances. There are other indications that quantum entanglement was the cause of the brain effects experienced by the test subjects. First, the brain effect inducing means could not be transmitted through an electrical wire as already reported above. Second, the said inducing means did not depend on the wavelengths of the photons generated. Thus, mere interactions among the photons, a chemical substance and water will induce brain effects after a test subject consumes the water so interacted.

While designing and conducting the herein described experiments, the first author became aware of the claims

	1st Set: Magn. Coil		2nd Set: Magn. Coil		Red laser		Flashlight		Microwave	
	Test #	Effect	Test #	Effect	Test #	Effect	Test #	Effect	Test #	Effect
Chloroform										
Subject A	2	yes	2	yes	5	yes	2	yes	3	yes
Subject B	0	n/a	0	n/a	1	yes	0	n/a	1	yes
Subject C	1	yes	2	yes	3	yes	0	n/a	1	yes
Subject D	1	yes	0	n/a	2	yes	0	n/a	0	n/a
Chloroform D										
Subject A	3	yes	2	yes	2	yes	1	yes		
Subject B	1	yes	0	n/a	1	yes	0	n/a		
Subject C	0	n/a	0	n/a	1	yes	0	n/a		
Subject D	0	n/a	0	n/s	0	n/a	0	n/a		
Isoflurane										
Subject A	3	yes	6	yes	5	yes	4	yes		
Subject B	0	n/a	1	yes	0	n/a	0	0		
Subject C	0	n/a	1	yes	1	n/a	0	0		
Subject D	1	yes	1	yes	1	n/a	0	0		
Diethyl Ether										
Subject A	5	yes	6	yes	10	yes	1	yes		
Subject B	1	yes	1	yes	1	yes	0	n/a		
Subject C	1	yes	3	yes	1	yes	0	n/a		
Subject D	0	n/a	0	n/a	2	yes	0	n/a		
Morphine										
Subject A	5	yes	7	yes	5	yes				
Subject B	0	n/a	1	yes	2	yes				
Subject C	0	n/a	1	yes	2	yes				
Subject D	0	n/a	0	n/a	2	yes				
Other Medications										
Subject A	7	yes	4	yes						
Subject B	1	yes	0	n/a						
Subject C	3	yes	0	n/a						
Subject D	0	n/a	0	n/a						

Table 2: Breakdown of the summary in Table 1 into each general anesthetic studied plus morphine in the case of medications

	First Set		Second Set		Third Set		Fourth Set	
	Test #	Effect	Test #	Effect	Test #	Effect	Test #	Effect
Subject A	8	yes	8	yes	3	yes	3	yes
Subject B	2	yes	3	yes	2	yes	1	yes
Subject C	3	yes	2	yes	1	yes	1	yes
Control								
Subject A	2	no	8	no	3	no	3	no
Subject B	0	n/a	3	no	2	no	1	no
Subject C	1	no	2	no	1	no	1	no

Table 3: Summary of the results obtained with the entanglement verification experiments carried out so far with chloroform, deuterated chloroform, diethyl ether and morphine

related to the so called “water memory” [7]. However, since these claims were said to be non-reproducible, we do not wish to discuss them further here except to say that we currently do not subscribe to any of the existing views on the subject and readers are encouraged to read our recent online paper on quantum entanglement [8].

We would like to point out that although the indicators used to measure the brain effects were qualitative and subjective, they reflect the first-person experiences of the qualities, intensities and durations of these effects by the test subjects since their brains were directly used as experimental probes. Further, these effects are completely reproducible under blind experimental settings so that possible placebo effects were excluded. However, as with many other important new results, replications by others are the key to independently confirm our results reported here. Our experiments may appear simple and even “primitive” but the results and implications are profound.

We first chose general anaesthetics in our experiments because they are among the most powerful brain-influencing substances. Our expectation was that, if nuclear and/or electronic spins inside the brain are involved in brain functions such as perception as recently hypothesized by us, the brain may be able to sense the effect of an external anaesthetic sample through quantum entanglement between these spins inside the brain and those of the said anaesthetic sample induced by the photons of the magnetic pulses by first interacting with the nuclear and/or electronic spins inside the said anaesthetic sample, thus carrying quantum information about the anaesthetic molecules, and then interacting with the nuclear and/or electronic spins inside the brain.

We suggest here that the said quantum entities inside the brains are likely nuclear and/or electronic spins for the reasons discussed below. Neural membranes and proteins contain vast numbers of nuclear spins such as  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{31}\text{P}$  and  $^{15}\text{N}$ . These nuclear spins and unpaired electronic spins are the natural targets of interaction with the photons of the magnetic pulses or other sources. These spins form complex intra- and inter-molecular networks through various intra-molecular J- and dipolar couplings and both short- and long-range intermolecular dipolar couplings. Further, nuclear spins have relatively long relaxation times after excitations [9]. Thus, when a nematic liquid crystal is irradiated with multi-frequency pulse magnetic fields, its  $^1\text{H}$  spins can form long-lived intra-molecular quantum coherence with entanglement for information storage [10]. Long-lived (0.05 ms) entanglement of two macroscopic electron spin ensembles at room temperature has also been achieved [3]. Furthermore, spin is a fundamental quantum process with intrinsic connection to the structure of space-time [11] and was shown to be responsible for the quantum effects in both Hestenes and Bohmian quantum mechanics [12, 13]. Thus, we have recently suggested that these spins could be involved in brain functions at a more fundamental level [2].

## 5 Conclusions

In light of the results from the entanglement verification experiments, we conclude that the brain effects experienced by the test subjects were the consequences of quantum entanglement between quantum entities inside the brains and those of the chemical substances under study induced by the entangling photons of the magnetic pulses or applied lights. More specifically, the results obtained in the first set of experiments can be interpreted as the consequence of quantum entanglement between the quantum entities in the brain and those in the chemical substances induced by the photons of the magnetic pulses. Similarly, the results obtained from the second sets of experiments can be explained as quantum entanglement between the quantum entities in the chemical substance and those in the water induced by the photons of the magnetic pulses, laser light, microwave or flashlight and the subsequent physical transport of the water entangled with the said chemical substance to the brain after consumption by the test subject which, in turn, produced the observed brain effects through the entanglement of the quantum entities inside the brain with those in the consumed water.

Several important conclusions and implications can be drawn from our findings. First, biologically and chemically meaningful information can be communicated via quantum entanglement from one place to another by photons and possibly other quantum objects such as electrons, atoms and even molecules. Second, both classical and quantum information can be transmitted between locations of arbitrary distances through quantum entanglement alone. Third, instantaneous signalling is physically real which implies that Einstein’s theory of relativity is in real (not just superficial) conflict with quantum theory. Fourth, brain processes such as perception and other biological processes likely involve quantum information and nuclear and/or electronic spins may play important roles in these processes. Further, our findings provide important new insights into the essence and implications of the mysterious quantum entanglement and clues for solving the long-standing measurement problem in quantum theory including the roles of the observer and/or consciousness. Very importantly, our findings also provide a unified scientific framework for explaining many paranormal and/or anomalous effects such as telepathy, telekinesis and homeopathy, if they do indeed exist, thus transforming these paranormal and anomalous effects into the domains of conventional sciences.

Finally, with respect to applications, our findings enable various quantum entanglement technologies be developed. Some of these technologies can be used to deliver the therapeutic effects of many drugs to various biological systems such as human bodies without physically administering the same to the said systems. This will dramatically reduce waste and increase productivity because the same drugs can be

repeatedly used to deliver their therapeutic effects to the mass on site or from remote locations of arbitrary distances. Further, many substances of nutritional and recreational values can be repeatedly administrated to desired biological systems such as human bodies through the said technologies either on site or from remote locations. Other such technologies can be used for instantaneous communications between remote locations of arbitrary distances in various ways. Potentially, these technologies can also be used to entangle two or more human minds for legitimate and beneficial purposes.

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