C0r0n@ 2 Inspect

Review and analysis of scientific articles related to experimental techniques and methods used in vaccines against c0r0n@v|rus, evidence, damage, hypotheses, opinions and challenges.

Saturday, July 17, 2021

Graphene oxide is able to overcome the blood-brain barrier and directly affect the brain

Reference

Mendonça, MCP; Soares, ES; de Jesus, MB; Ceragioli, HJ; Ferreira, MS; Catharino, RR; da Cruz-Höfling, MA (2015). Reduced graphene oxide induces transient blood-brain barrier opening: an in vivo study. Journal of nanobiotechnology, 13 (1), pp. 1-13.
https://doi.org/10.1186/s12951-015-0143-z

Facts

1. The blood-brain barrier called "BBB" is a barrier that protects the central nervous system from physical and chemical attacks. Researchers want to develop a method to overcome it. The work includes a suitable method to temporarily overcome the BBB barrier with reduced graphene oxide "rGO", since it reduces the paracellular tension of the BBB.
2. The authors state that " *internalization by the brain depends on its physicochemical characteristics, such as morphology, composition, uniformity, size and surface charge* ", so reduced graphene oxide is an ideal nanomaterial to penetrate the "BBB" barrier because its thickness is only 1 atom and the arrangement of its sheets is hexagonal, therefore its structure is 2D.
3. It is also stated that " *rGO was the product of treating graphene oxide under reducing conditions (chemical, thermal, microwave, photochemical, photothermal or microbial / bacterial) in order to reduce its oxygen content* ." This confirms the research of (Chen, Y.; Fu, X.; Liu, L.; Zhang, Y.; Cao, L.; Yuan, D.; Liu, P. 2019) in which it was stated that the application of microwaves on the graphene oxide GO,the analysis of this study
the analysis of this study .
4. Another interesting finding from the study is that " *rGO remained stable in sterile distilled water for more than a month without forming agglomerates or changing its physicochemical characteristics. This relatively stable aqueous suspension of rGO can be attributed to electrostatic repulsion due to charged leaves. Negatively*". This can be very relevant, since it indicates that for 30-40 days the solution of reduced graphene oxide in sterile distilled water can be kept in good condition. It also provides other relevant details about the conditions of the experiment, since the pH of the solution was 7.6 at 25º C. It should be mentioned that the approximate pH of the human body (), specifically that of blood, varies approximately between 7.35 and 7.45. According to (Bai, H.; Li, C.; Wang , X.; Shi, G. 2010) GO graphene oxide is the most suitable nanomaterial for the controlled release of drugs, due to its property to react to pH, as demonstrated in the development of its Nanocomposite hydrogel.

This allows us to infer that the mechanism by which graphene oxide could release its charge (if it had any) is the pH itself.It should be mentioned that pH alterations / imbalances in the brain can cause psychiatric disorders, specifically a low pH, according to (Prasad, H.; Rao, R. 2018). In fact, Prasad indicates that the " *Excessive endosomal acidification in ApoE4 astrocytes* "are behind pH imbalances and beta-amyloid protein suppression problems. Interestingly, graphene particle size and pH value affect hydrophilicity or affinity to aqueous media, according to (Hu, X.; Yu, Y.; Hou, W.; Zhou, J.; Song, L. 2013) being able to operate in variable pH values between 4 and 12, see figure 1, depending on the " *zeta potential* " Or what is the same, the intensity of the static electric field. This electric-static field could be modified by the electromagnetic waves of 5G.

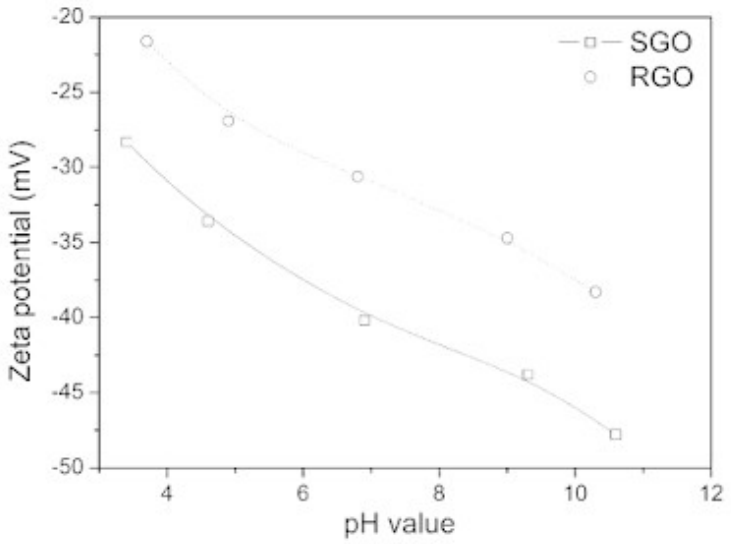

Fig. 1. Modulation of the pH of the reduced graphene oxide rGO as a function of the zeta potential

5. It is also relevant to observe the appearance of the reduced graphene oxide sheet, in the authors' words " *the rGO sheet seen by HRTEM (figure 2b) had a relatively large surface and its morphology resembled a thin curtain* ". This image bears a great resemblance to the image obtained by (Campra, P. 2021) in figure 3.

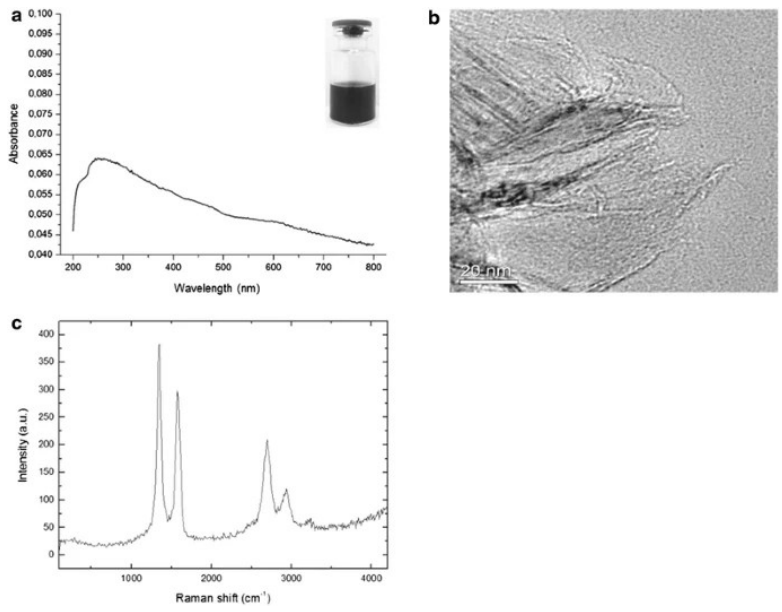

Fig. 2. HRTEM image showing part of rGO morphology

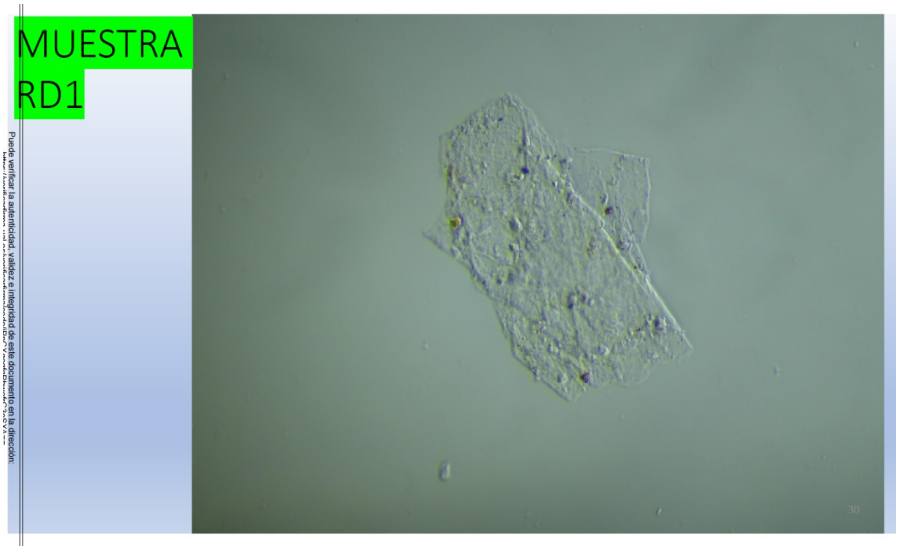

Fig. 3. Optical microscopy of the RD1 sample of the Pfizer vaccine (Campra, P. 2021)

6. In the tests with mice, the MALDI-MSI (MALDI mass spectrometry, an instrument used to map the reduced graphene oxide in the brain) was used and " *the rGO fragmentation pattern was confirmed* " in figure 4. For this " *Composite images were constructed mapping the distribution of rGO throughout the rat brain over time ... the yellow dots represent the abundance of ions with the molecular mass* "which is the definitive proof of this scientific achievement.

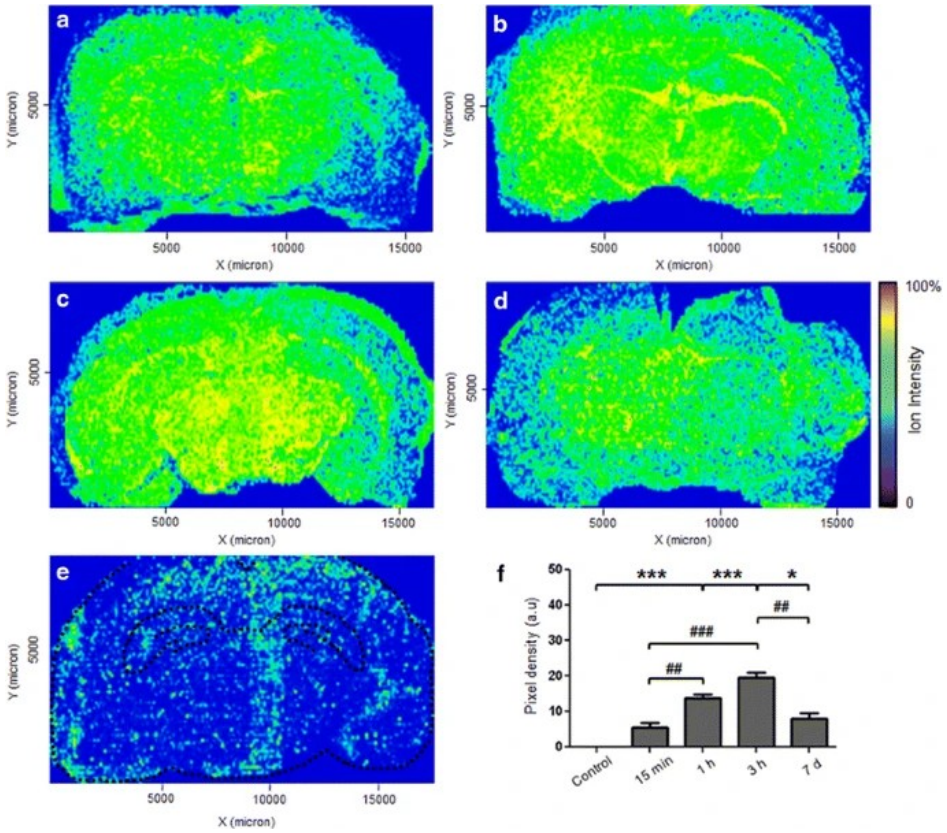

Fig. 4. Coronal section of rat brain tissue and the density of rGO in the brain

7. On the other hand, the " *MALDI-MSI demonstrated its spatial and temporal distribution. At 15 minutes after administration, the rGO was distributed throughout the brain, and the highest concentration was located mainly in two regions of the brain, the thalamus and the hippocampus* ". This is worrying, since neurotoxicity has been demonstrated in these delicate areas (Mendonça, MCP; Soares, ES; de Jesus, MB; Ceragioli, HJ; Batista, Â.G .; Nyúl-Tóth, Á .; da Cruz -Hofling, MA 2016ab | Baldrighi M .; Trusel M .; Tonini R .; Giordani S. 2016 | Le, HT; Sin, WC; Lozinsky, S .; Bechberger, J .; Vega, JL; Guo, XQ; Naus , CC 2014).
8. The following statement is very noteworthy: " *The large size of rGO (342 ± 23.5 nm) apparently was not an obstacle to its entry into the brain. Very few reports have described the presence of large particles (~ 200-400 nm) within of the brain* ".
9. As a final conclusion of the article, the method to overcome the BBB blood-brain barrier is presented, see figure 5. The rGO particles administered intravenously in rats cause paracellular weakening, as described, generating the necessary disruption for the rGO penetrates through the interendothelial / intercellular cleft, commonly used for intercellular communication.

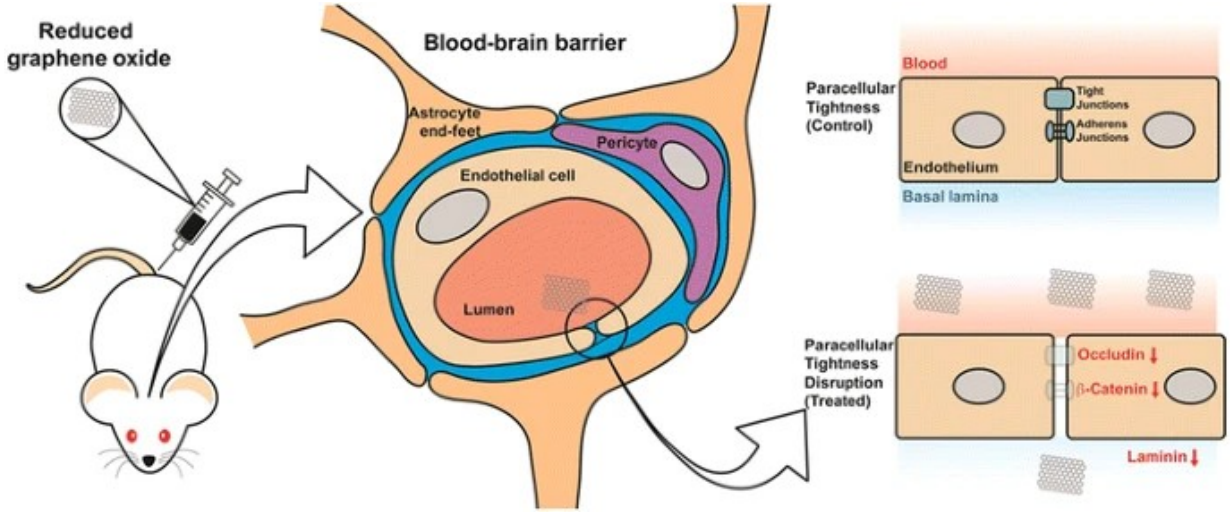

Fig. 5. Experimental methodology to demonstrate the opening of the blood-brain barrier based on reduced graphene oxide nanomaterials rGO

10. The researchers also indicate that " *we have yet to evaluate the toxicological effects of rGO* ." However, they warn of the potential utility for the treatment of " *brain disorders that do not normally respond to conventional treatment due to the impermeability of the BBB* ." In subsequent studies, the authors recognized the toxicity problems generated by rGO, read (Mendonça, MCP; Soares, ES; de Jesus, MB; Ceragioli, HJ; Batista, Â.G.; Nyúl-Tóth, Á.; Da Cruz- Hofling, MA 2016ab).

Reviews

1. Graphene oxide administered intravenously is shown to be able to circulate to the brain through the bloodstream and smoothly overcome the "BBB" blood-brain barrier, causing its adhesion to brain tissue and cells, even if the size of the laminae of reduced graphene oxide " rGO "have a high mean diameter of 23.5 nm nanometers. Being able to handle relatively large sizes of rGO sheets would facilitate mass production of the material, potentially reducing your manufacturing costs.
2. The distribution of "rGO" in the brain is very wide, not focused on a specific point. The article does not address the elimination time of the compound, or its degradation, and in any case, the toxicological aspects were not considered either. This highlights the interest of the scientific current to develop brain invasion methods, justified by the search for treatments against neurodegeneration and neurological diseases. However, the omission of toxicity studies are especially striking, since the literature prior to the publication of the article already warned of the damage and consequences for brain cells in contact with graphene oxide and its derivatives, see (Zhang, Y.; Ali, SF ; Dervishi, E.; Xu, Y.; Li, Z.; Casciano, D.; Biris, AS 2010). Subsequently, the main researcher of the paper referred to in this entry "*Mendonça, MCP* "publishes together with other colleagues an investigation related to the coating of reduced graphene oxide to improve its tolerance, without obtaining positive results, reaching the conclusion that in any case it induces toxicity (Mendonça, MCP; Soares, ES; de Jesus , MB; Ceragioli, HJ; Batista, Â.G.; Nyúl-Tóth, Á.; Da Cruz-Hofling, MA 2016ab)
3. It must be considered that GO graphene oxide and its derivatives, such as rGO, are toxic and dangerous nanomaterials for any person or animal, which can lead to significant adverse effects , especially in the brain (Rauti, R.; Lozano, N.; León, V.; Scaini, D.; Musto, M.; Rago, I.; Ballerini, L. 2016), see the analysis and comments in this regard in " Interaction of graphene oxide with brain cells ".
4. With all the facts that are being reported, there is no reason to justify the use of experimental techniques in the human body, not even vaccination with GO and its derivatives, because of c0r0n @ v | rus, since it can have unpredictable consequences in people's health, even fatal.

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