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.

Wednesday, October 6, 2021

Identification of patterns in c0r0n @ v | rus vaccines: nano-octopuses and carbon-graphene nanotubes

The appearance of new microscopy images of the c0r0n @ v | rus vaccines raises alarm and doubts about the new objects, patterns and unidentified elements, of which the Fifth Column in its program 147 (Delgado, R .; Sevillano, JL 2021) and Dr. Carrie Madej in the program of (Peters, S. 2021) have echoed. From C0r0n @ 2Inspect the images have been analyzed to find similarities in the scientific literature, in order to locate the patterns already noticed and an explanation in the context of the research being carried out. The images provided by Dr. Carrie Madej on the Stew Peters show are as follows, see Figures 1, 2 and 3.

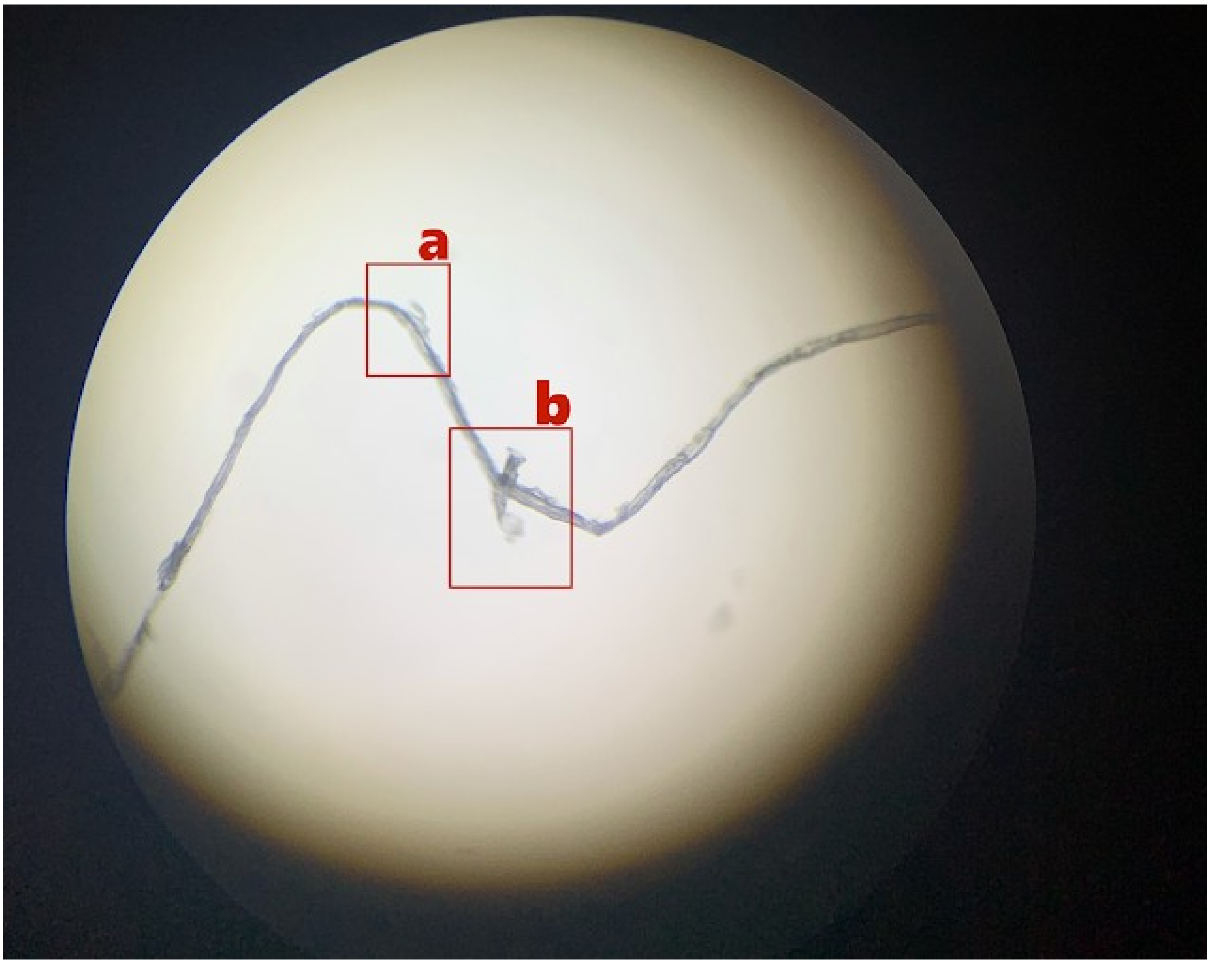


Fig. 1. Note a multi-walled carbon nanotube, known in English as "Multi-Walled Carbon Nanotube MWNT" that runs through the entire visual spectrum. It is also observed in table a) and b) bonds for the connection with other carbon nanotubes. Image obtained from the program of (Peters, S. 2021)

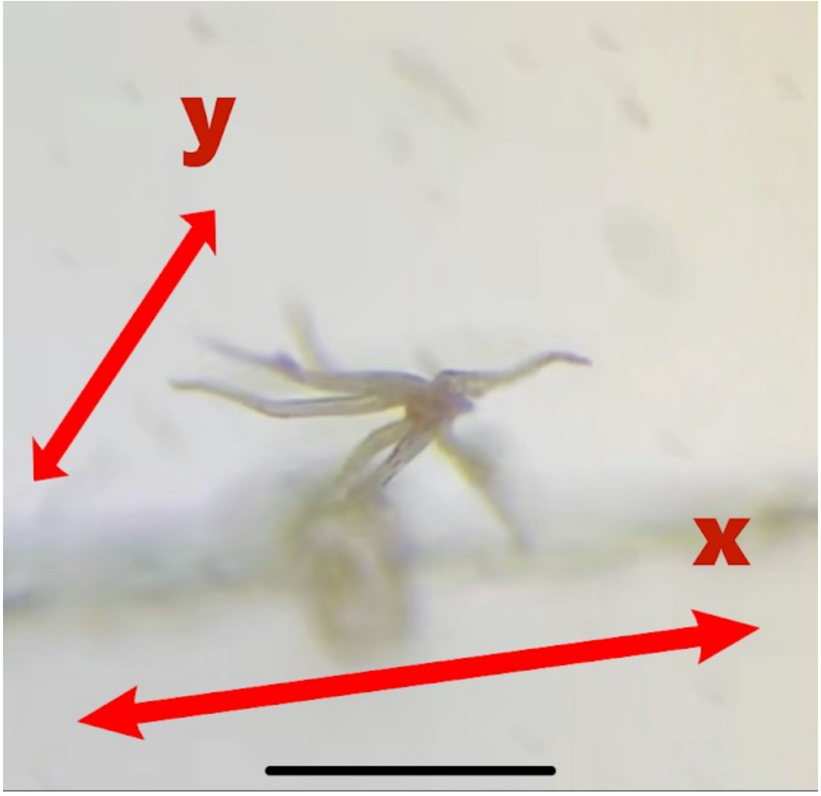


Fig. 2. Note the carbon nanotube on the x-axis on which a kind of polyp of carbon nanotubules is attached on the y-axis. Image obtained from the program of (Peters, S. 2021)

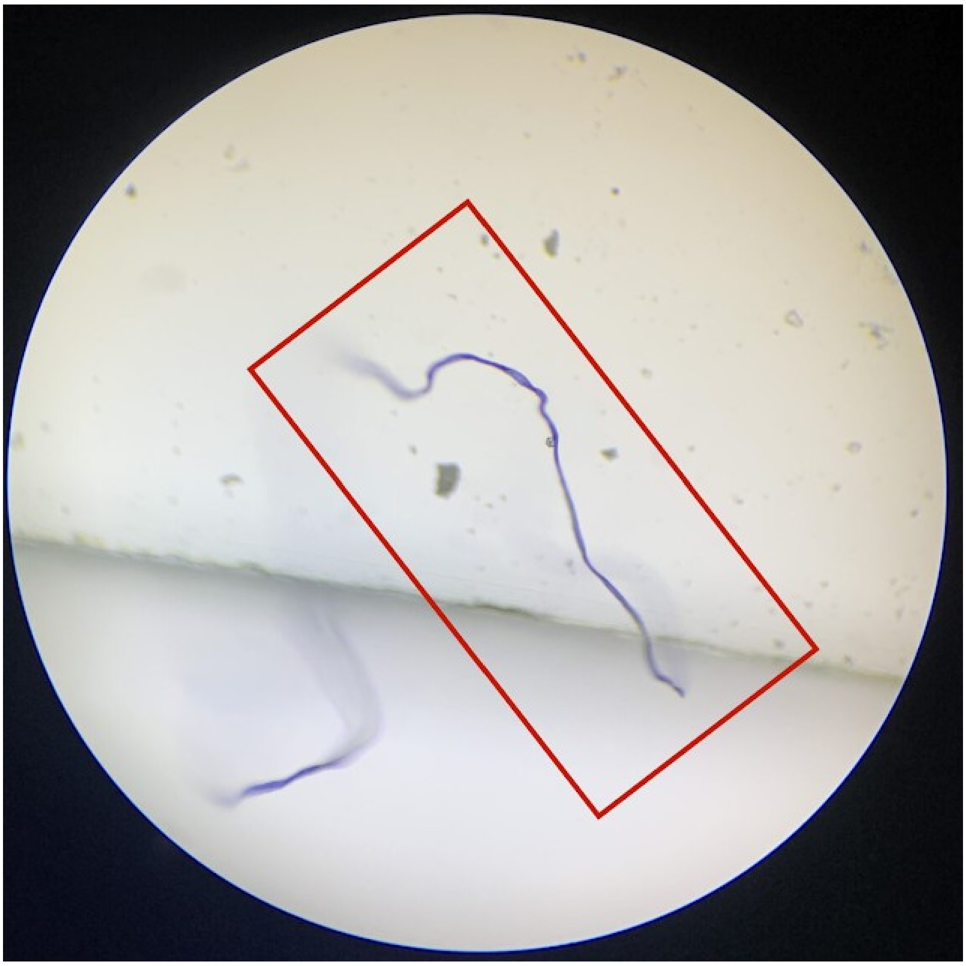


Fig. 3. Carbon nanofibers or multi-walled nanotubes. Image obtained from the program of (Peters, S. 2021)

The images provided in La Quinta Columna program 147 are as follows, see Figures 4, 5 and 6. Motifs and patterns similar to those exposed by Dr. Carrie Madej in the Stew Peters program will be appreciated.

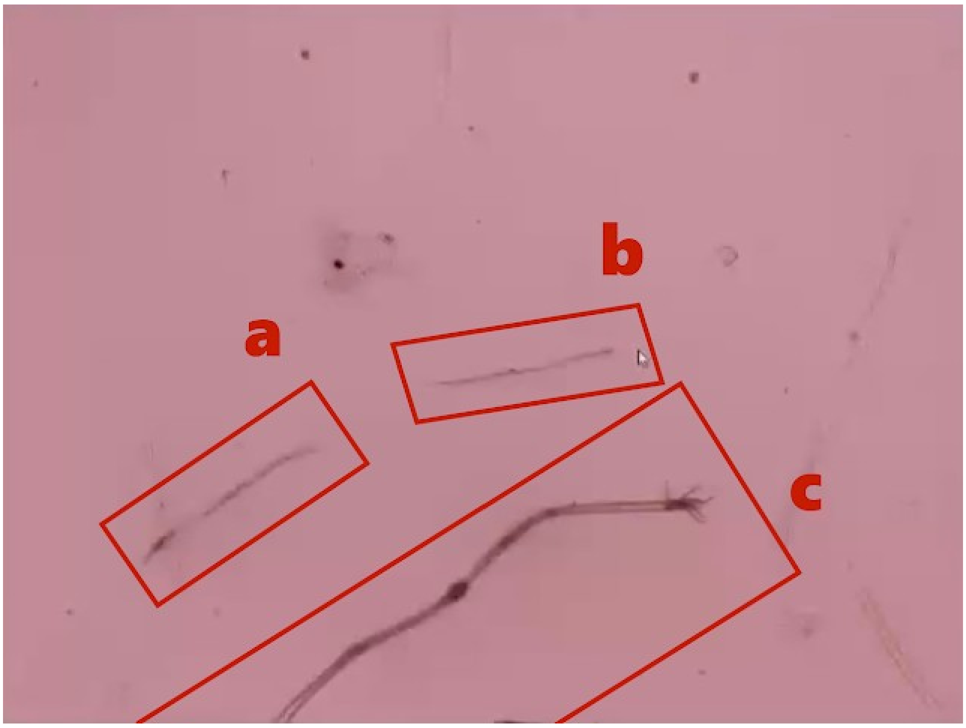


Fig. 4. Note the simple carbon nanotubes in tables a) and b), also known as (Single-wall carbon nanotubes SWNTs). The multi-walled carbon nanotubes (Multi Walled Carbon Nanotubes MWNTs) can be seen in figure c) in which ganglia or nanotubules are also seen at their right end, coinciding with those seen in figure 2. Image presented in program 147 of La Quinta Columna, obtained by the doctor (Campra, P. 2021)

Fig. 5. This image shows in greater detail a single-wall carbon nanotube (Single-wall carbon nanotubes SWNTs), the content of which could be pharmacological in nature. This is better appreciated in figure 6. Image presented in program 147 of La Quinta Columna, obtained by the doctor (Campra, P. 2021)

Fig. 6. Detailed image of the multi-walled carbon nanotube (darker) showing a slightly greenish nucleus that could be a pharmacological product to be released in the target organs for which it is intended. Note the polyp-shaped end of the ganglia / flagella. To the right of the image is a single-walled carbon nanotube (lighter). Image presented in the program 147 of La Quinta Columna, obtained by the doctor (Campra, P. 2021)

Graphene octopuses

The most striking object in the c0r0n @ v | rus vaccine samples is the one seen in figures 2 and 6, which resemble the shape of a polyp with its tentacles (such as hydra attenuata or hydra vulgaris). It is actually a carbon octopus, as has been verified in the references of (Dasgupta, K .; Joshi, JB; Paul, B .; Sen, D .; Banerjee, S. 2013) and (Sharon, M .; Sharon, M. 2006) in Figures 7 and 9. The shape of the tentacles is very similar and their conformation is derived from carbon nanotubes.

(Dasgupta, K.; Joshi, J.B.; Paul, B.; Sen, D.; Banerjee, S. 2013)

Fig. 7. Identification of graphene octopuses that can be developed from carbon nanotubes or linked. The images from the scientific literature are found in the study of (Dasgupta, K .; Joshi, JB; Paul, B .; Sen, D .; Banerjee, S. 2013). The high resolution image can be obtained in this link

It should not be forgotten that single and multiple walled carbon nanotubes are essentially graphene or graphene oxide cylinders, as shown in figure 8. The single-walled carbon nanotube (SWCNTs) does not present other cylinders inside, which would be the case of multi-walled carbon nanotubes (multi-walled carbon nanotubes MWCNTs). These objects are well documented in the scientific literature, both in their characterization, functionalization, but above all for their toxicity and damage, see (Bottini, M .; Bruckner, S .; Nika, K .; Bottini, N .; Bellucci, S .; Magrini, A .; Mustelin, T. 2006 | Muller, J .; Decordier, I .; Hoet, PH; Lombaert, N .; Thomassen, L .; Huaux, F .; Kirsch-Volders, M. 2008 | Pulskamp, K .; Diabaté, S .; Krug, HF 2007 | Brown, DM; Kinloch, IA;Bangert, U .; Windle, AH; Walter, DM; Walker, GS; Stone, VICKI 2007 | Tian, F .; Cui, D .; Schwarz, H .; Estrada, GG; Kobayashi, H. 2006 | Shvedova, AA; Kisin, ER; Mercer, R .; Murray, AR; Johnson, VJ; Potapovich, AI; Baron, P. 2005 | Lam, CW; James, JT; McCluskey, R .; Hunter, RL 2004 | Davoren, M .; Herzog, E .; Casey, A .; Cottineau, B .; Chambers, G .; Byrne, HJ; Lyng, FM 2007 | Zhu, L .; Chang, DW; Dai, L .; Hong, Y. 2007 | Manna, SK; Sarkar, S .; Barr, J .; Wise, K .; Barrera, EV; Jejelowo, O .; Ramesh, GT 2005 | Jia, G .; Wang, H .; Yan, L .; Wang, X .; Pei, R .; Yan, T .; Guo, X. 2005 | Cui, D .; Tian, F .; Ozkan, CS; Wang, M .; Gao, H. 2005 | Warheit, DB 2006 | Ghosh, M .; Chakraborty, A .; Bandyopadhyay, M .; Mukherjee, A. 2011).

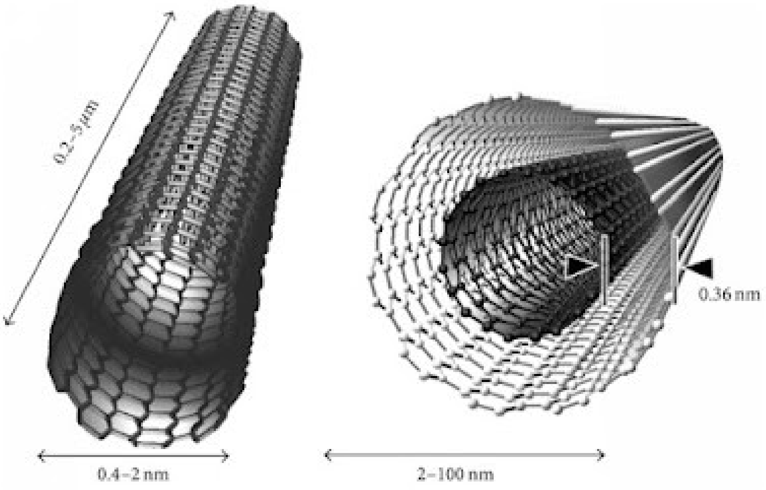
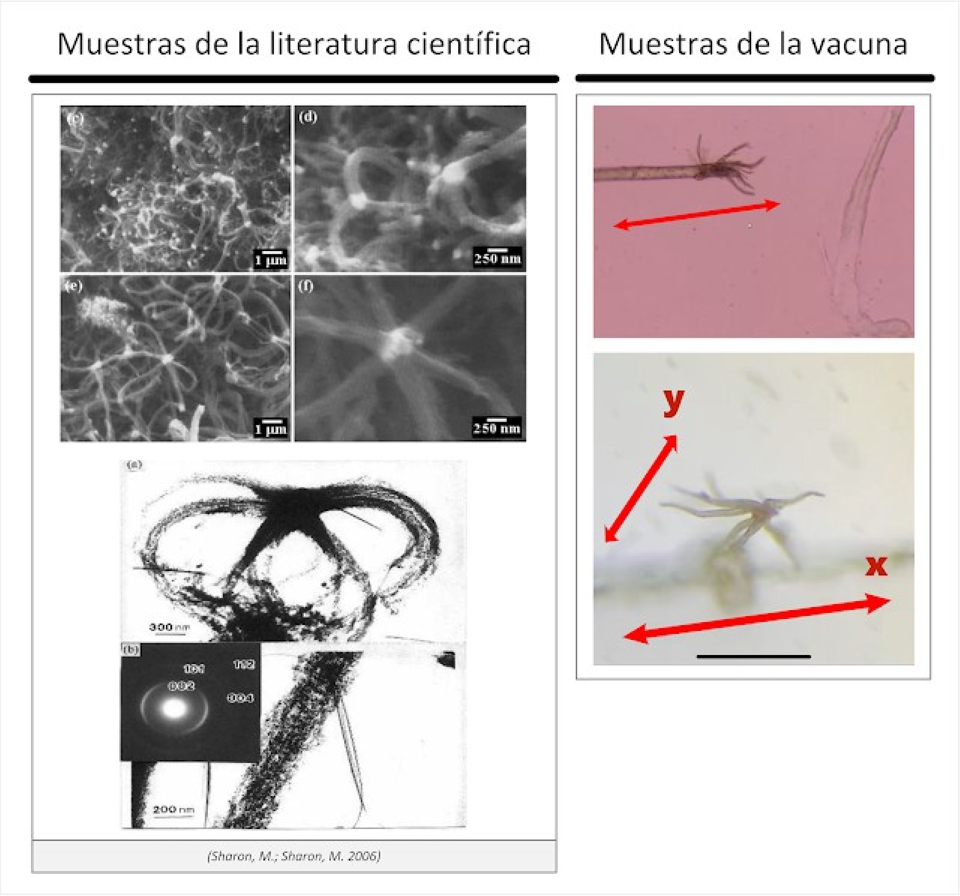


Fig. 8. Conceptual illustration of single and multi-walled carbon nanotubes. Image obtained from the work of (Tan, JM; Arulselvan, P .; Fakurazi, S .; Ithnin, H .; Hussein, MZ 2014)

Returning to the analysis of figure 7 and its comparison with the work of (Dasgupta, K .; Joshi, JB; Paul, B .; Sen, D .; Banerjee, S. 2013), the authors explain that in the development of their Research to achieve an economic method for the production of CNT (Carbon Nanotubes) from carbon (cited in the article as "black carbon"), observed that in its synthesis in " *fluidized bed* " (fluidization phenomenon - nanoparticulate process and mixed), the graphene " *became octopus-like structures of carbon*" As confirmed by the researchers, the nanofibers that form the carbon octopus could be useful to create connections or contacts of supercapacitors. These octopuses can be produced" *either separately or together with nanotubes grown from an Fe catalyst (ferrocene organometallic compound) and acetylene*". It should be noted that the carbon nanotubes referred to in the article, to make these octopuses are multi-walled (MWCNT), occurring at temperatures between 700 and 1000ºC. In the first two tables on the left of figure 7, it is shown observe how the octopus develops after 15 minutes, with a slightly variable diameter and length of legs and a rough surface. Among the statements of the researchers, the following stand out: " *the legs of the octopus are carbon nanofibers that are not ordered structures ... for the transformation of carbon black into an octopus-like structure, the presence of acetylene together with ferrocene was* *necessary. If there was no supply of acetylene, there was no transformation*" And in the same way, in the absence of ferrocene, no transformation occurred either. In the authors' opinion, octopuses are formed when a carbon nanotube rupture occurs, from which primary acetylene and ferrocene nanoparticles agglomerate. , where the carbon molecules are deposited or precipitated, thus forming the tentacles of the octopus. The octopus's shape " *depends on the size of the catalyst. When the particle size of Fe is less than 50 nm, it catalyzes MWCNT. When Fe nanoparticles fuse to a larger size within the fluidized bed, multiple nucleations of a single catalyst lead to an octopus-like structure*." This means that graphene octopuses are an inherent part of the manufacture of multi-walled carbon nanotubes, as the researchers demonstrate. Furthermore, they reflect the possibilities offered by this superconducting structure, from a commercial and applied technique point of view. , as reflected in their conclusions.

Continuing with the review, figure 9 shows another example of a carbon octopus, this time presented by (Sharon, M .; Sharon, M. 2006). Although the article aims to develop a method to produce carbon nanomaterials, based on the carbon of the organic material of plants, in order to avoid the use of fossil fuels and favor mass production, the images should be highlighted obtained in the pyrolytic experimentation of carbon at 750ºC, where the carbon branches are obtained, qualified by (Dasgupta, K .; Joshi, JB; Paul, B .; Sen, D .; Banerjee, S. 2013) as an octopus of carbon, also characterized in the doctoral thesis of (Saavedra, MS 2014). This type of octopus was obtained in the " *camphor pyrolysis using nickel-plated copper* ", which allows us to infer that there are many ways and possible combinations to obtain the carbon octopuses observed in the vaccine samples.



(Sharon, M.; Sharon, M. 2006)

Fig. 9. Images showing in 2006 the experimentation and development of carbon-graphene octopuses and their relationship with carbon nanotubes. (Sharon, M .; Sharon, M. 2006) .

Another reference that addresses the formation of carbon octopuses is that of (Lobo, LS 2016) that confirms the scientific advance in the production of carbon nanotubes and with it the manufacture of nano-octopuses, since " *now there is a good base using kinetics, thermodynamics, solid-state chemistry, and geometry together, allowing for a better understanding of alternative pathways for carbon growth leading to various geometries and structures. Understanding octopus carbon growth provides an excellent basis for detailed analysis of the role of nano-geometry in kinetics* ". Specifically, it refers to the catalysis of the formation of the carbon octopus, in which the geometry of the catalyst becomes one of the key pieces for its configuration, in fact it is stated that "*the upper nanoplane surface of a spheroid catalyst particle has the same crystalline orientation as the base (metal-substrate contact). The size of that upper nano surface is the basis of the diameter of the nanotube that grows from the initial flat graphene after rotating 90 degrees due to the formation of 6 carbon pentagons. The growth of octopus carbon is an excellent demonstration of a growth process and the roles of kinetics and geometry combined to obtain an easy route for nucleation and growth of CNT at low temperatures (below 1000ºC)* " .

Single and multi-walled carbon-graphene nanofibers and nanotubes

Another recurring object in the images taken from the samples of the c0r0n @ v | rus vaccines are filaments of variable length, thickness, density and color, with a certain flexibility in their shapes. As can be seen in figures 1, 4 and 5. These objects have been identified as carbon nanotubes, which means that they are actually graphene tubes, as indicated in figure 8. Carbon nanotubes can be single-walled (single-walled carbon nanotubes SWCNTs) or multi-walled (multi-walled carbon nanotubes MWCNTs). The images in figure 10 show the difference and it is contrasted with the scientific literature.

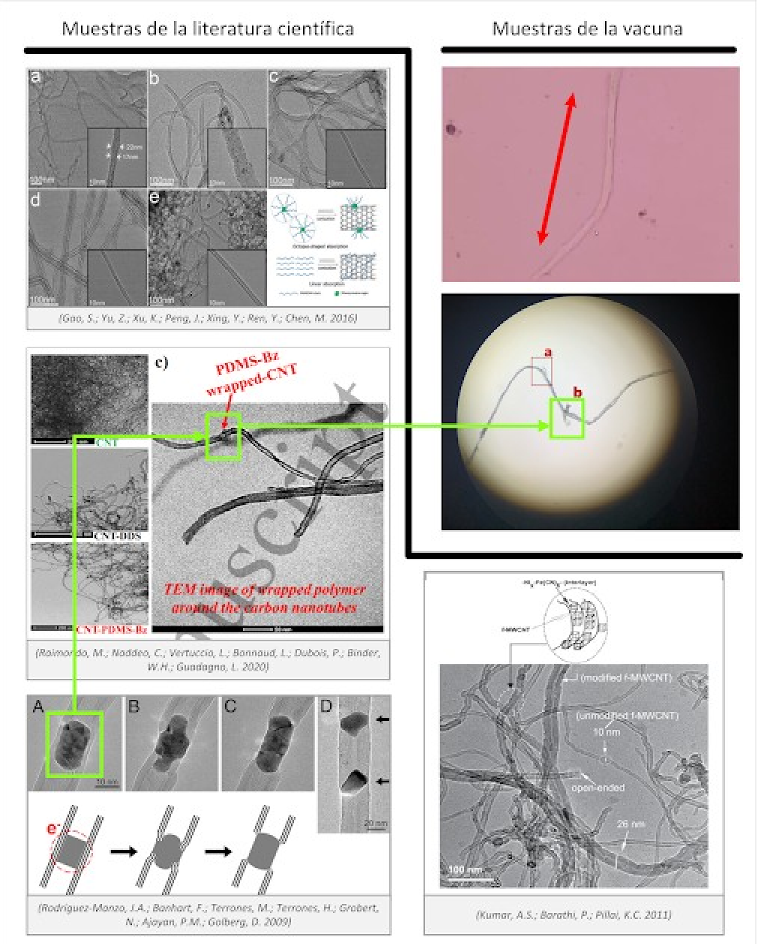
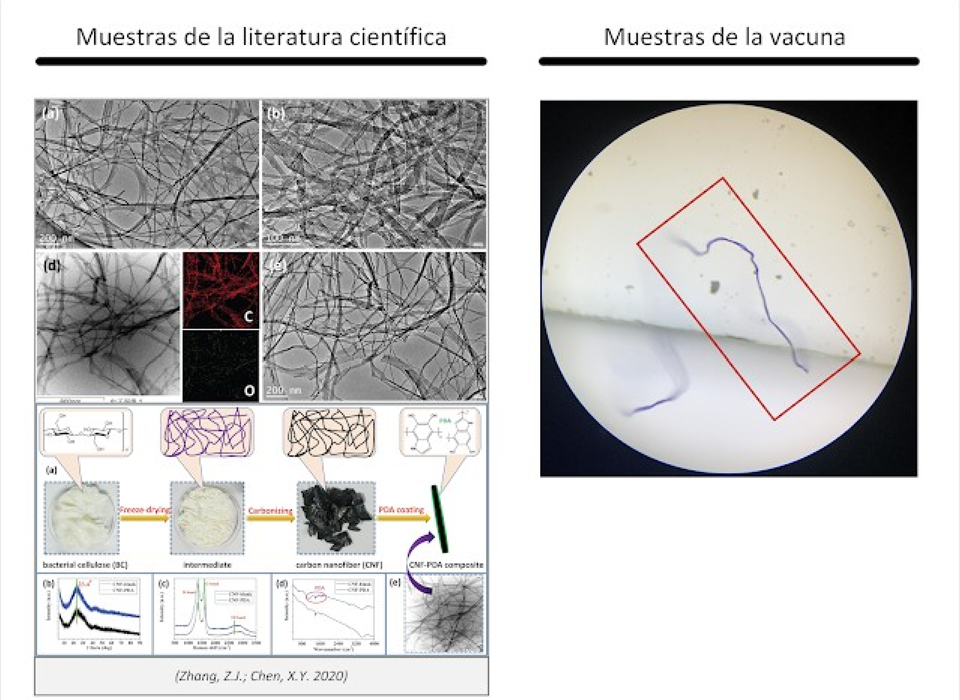


Fig. 10. Identification of single and multiple walled graphene nanotubes in the scientific literature. Its presence is checked in c0r0n @ v | rus vaccines. The envelope of the links or junctions between the nanotubes is also observed (indicated in the green squares).

It can be seen that single-walled carbon nanotubes present greater transparency than multiple-walled carbon nanotubes, due to the fact that the latter contain other concentric nanotubes, inserted inside, which explains a larger section diameter and color. slightly darker. If greater magnification capacity were available, the images would denote the different tubular lines, with which the number of nanotubes of which it is composed could even be distinguished. In the first frame of the vaccine sample in Figure 10 (pink background), a single-walled carbon nanotube is seen. In the next box of the sample, in the same figure 10, a multi-walled carbon nanotube is observed, also characterized by having a nexus or junction point (distinguished by a green box).This attribute can correspond to an envelope of another carbon nanotube, according to (Raimondo, M .; Naddeo, C .; Vertuccio, L .; Bonnaud, L .; Dubois, P .; Binder, WH; Guadagno, L. 2020), from what is known as "*heterojunctions between metals and carbon nanotubes as definitive nanocontacts* "according to the work of (Rodríguez-Manzo, JA; Banhart, F .; Terrones, M .; Terrones, H .; Grobert, N .; Ajayan, PM; Golberg, D . 2009). The heterojunctions act as a link to join the structure of the nanotube, other nanotubes or to functionalize them with other elements, which remain united. Although in the image of the sample it is not observed clearly, it is not an essential element for the bonding of carbon nanotubes, since it is enough to surround the nanotube with a shorter one, or to use carbon nano-octopuses to serve as a bond.

Another of the images identified is the one shown in Figure 11, in what appears to be a multi-walled carbon-graphene nanotube. However, in this case it appears completely opaque, an aspect that may be due to various microscope adjustment factors, incidence of light, and even the scale of the photograph (which is unknown). This opens the possibility of speculation that, if it is not a multi-walled carbon nanotube, it is actually a carbon nanofiber, according to images in the scientific literature (Zhang, ZJ; Chen, XY 2020), because the observed nanotube is not hollow. Carbon nanofibers are characterized by being solid cylinders of carbon or graphene, which could explain the opacity of the filament. Specifically, the article by (Zhang, ZJ; Chen, XY2020) presents a method to create superconducting carbon fibers, functionalized with a polydopamine surface, suitable for increasing the performance of supercapacitors, in a context of application in bioelectronics and biomedicine. This is achieved from "*commercial bacterial cellulose as raw material* ", which allows its mass production.



(Zhang, Z.J.; Chen, X.Y. 2020)

Fig. 11. Identification of carbon nanofibers in the vaccine sample, according to the scientific literature (However, it could be multiple-walled carbon nanotubes, since it is not observed a sufficient scale expansion).

It should also be noted that the dark blue coloration of the filament coincides with that of the fiber transformation scheme in the article by (Zhang, ZJ; Chen, XY 2020), see lower right box of figure 11. It can also be stated that nanofiber has superconducting properties, very similar to carbon nanotubes, given its characterization.

Nanotube growth

As can be seen in the analysis of the vaccine samples and their comparison with the scientific literature, it can be stated that with high probability, the objects observed in the images reviewed are single-walled, multiple-walled and carbon nanotubes. carbon octopuses. However, the growth process of these objects is also relevant, especially carbon nanotubes. In order to better understand this process, the review of the work of (Lobo, LS 2017) is recommended, which outlines it in an exemplary way. First, the researcher clarifies that there are three methods to start the production of carbon nanotubes (CNT). " *Carbon nanotube (CNT) formation pathways can be pyrolytically or catalytically initiated"and also through a hybrid process in the "gas phase of pyrolysis, which affects the surface of a catalyst, which dissolves carbon atoms, nucleating and making the graphite grow in other parts of the surface of said catalyst* ". Figure 12a shows the process of " *pentagon-forming catalysis* ", necessary for the nucleation of the carbon nanotube. This produces a pentagon base from which the nanotube layered growth begins (as shown in Figure 12b). This is called the pentagon rule, and it develops on the 12 carbon molecules seen in the geometry of the nickel carbide nucleus (as shown in Figure 12c).

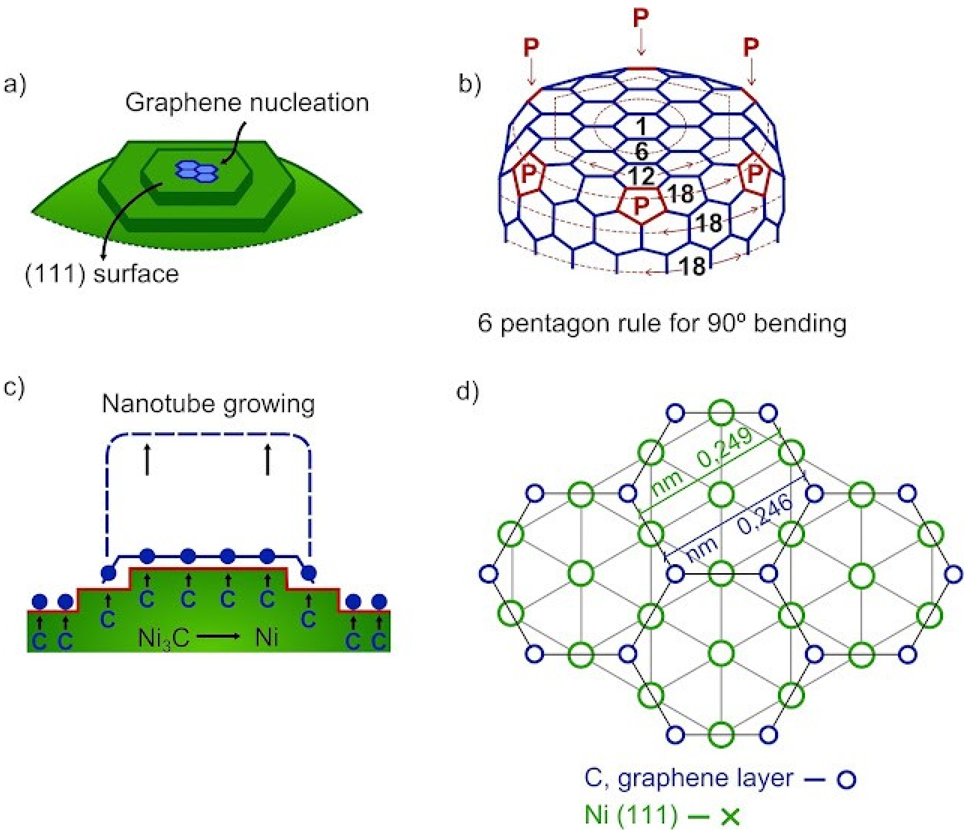


Fig. 12. Diagram of the growth and nucleation process of graphene nanotubes. (Lobo, LS 2017)

The researcher also addresses in an independent section the formation of the carbon octopus, indicating that the most appropriate method for its production is hybrid (catalytic and pyrolytic), explaining that " *when the experimental conditions are such that the nucleation of graphene occurs only in (111) expensive, a tendency to grow nanotubes in approximately 8 zones with octahedral symmetry is explained ... Here we choose to relate the shape of the spheroid to a reference to an imaginary cube to help understand the number of its facets and geometry. With this geometry in mind, when nucleation and growth take place in a particular set of facets, the observed behavior can be better understood. Is there a preferential growth in 6, 8 or 12 legs? This will be a key to confirm the prevailing favored crystal orientation for nucleation*. "This phenomenon can be observed in the following figure 13, where the nickel carbide catalyst is seen in the form of a spheroid particle, which can be contained or wrapped in graphene (for example in a fullerene). Its nucleation and pyrolytic process, causes the reaction of the catalyst on carbon and this favors the growth by deposition of the arms of the graphene octopus.

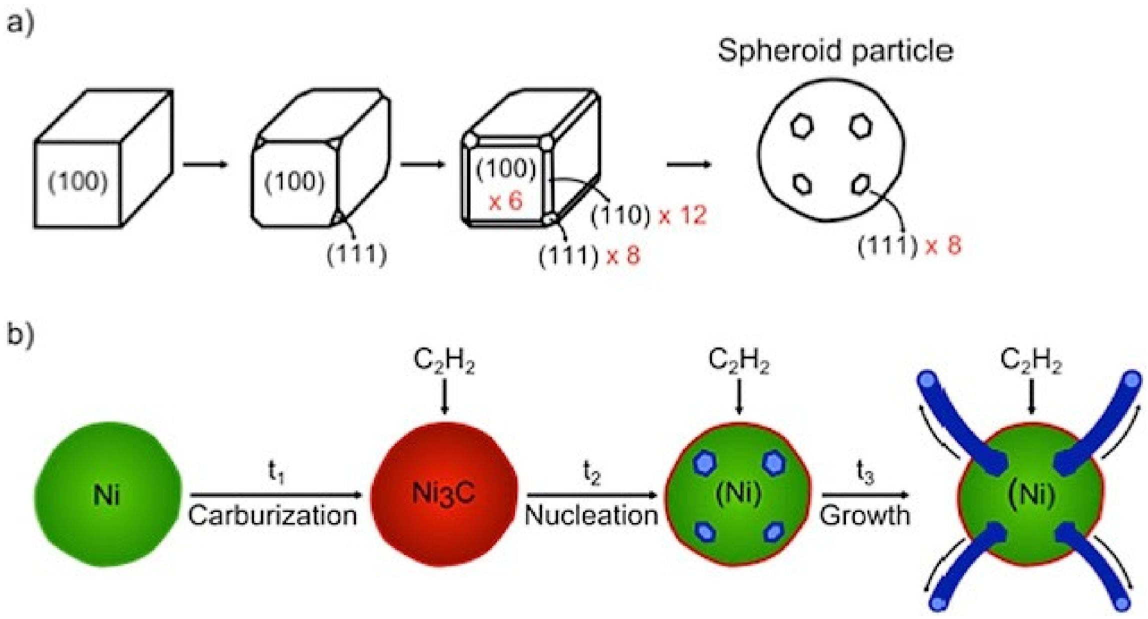


Fig. 13. Carbon octopus growth scheme from a nickel carbide spheroid particle. (Lobo, LS 2017)

In the case of carbon nanotubes (CNT), nucleation can determine the form of deposition and growth of the material. The author (Lobo, LS 2017) describes the method of "flat basal contact" (figure 14a) that occurs when the contact surface between the catalyst nanoparticle and the substrate is flat. This causes the nucleating particle to rise up and its growth continues in successive layers. The growth method " *on the crystalline outer face* " (figure 14b) is considered the simplest, since the nucleating nanoparticle remains attached to the surface, which implies that the deposition of the subsequent layers is carried out by superposition. The method of " *embedded conical inner contact*"(figure 14c) is used to create carbon nanofibers (CNF nanocarbon fibers), its growth occurs when the nucleating nanoparticle is embedded on the base, generating a conical spiral (CNF conic nanofiber), being almost imperceptible under TEM microscopy, except from an overhead (top) view.

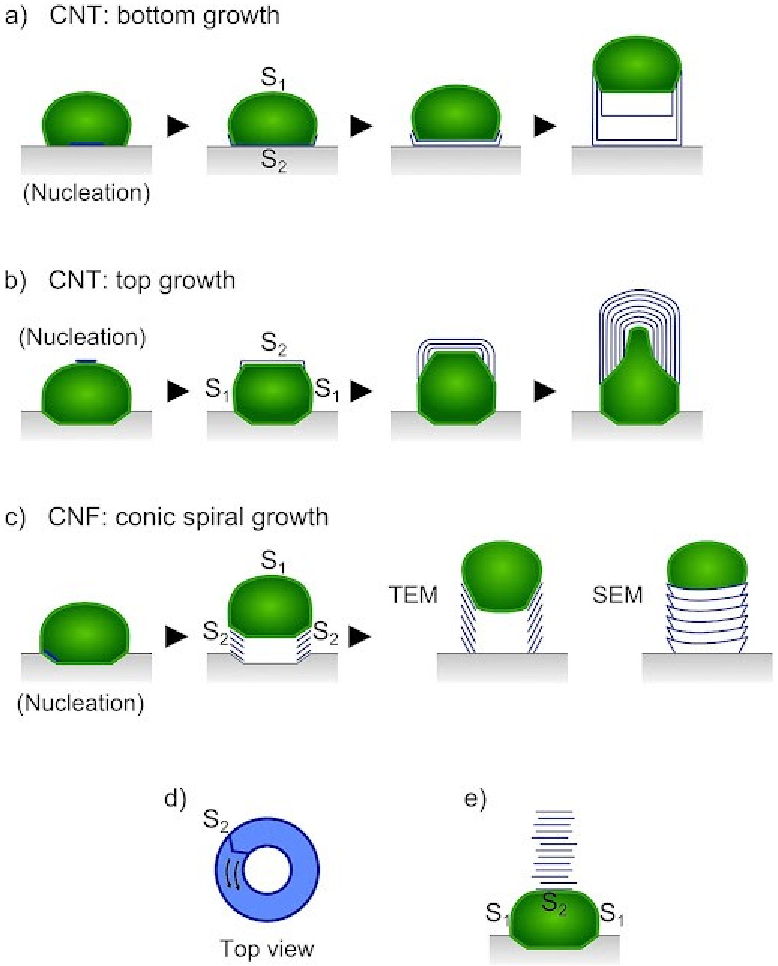


Fig. 14. Growth process of graphene nanotubes, according to their typology, for example in a conical spiral, by deposition of upper and lower layers. (Lobo, LS 2017)

The neuronal interface and neuromodulation: the role of nanotubes

One of the most recurrent ideas in the scientific literature on carbon nanotubes is the creation of a neural interface that favors the purposes of neuromodulation , wireless communication of neuron nanoregrid , biosensors, GQD graphene quantum dots, and (subsidiarily) to design therapies for the treatment of neurodegenerative diseases and even the repair of brain tissues that may be damaged (Fabbro, A .; Prato, M .; Ballerini, L. 2013 | Gaillard, C .; Cellot, G .; Li, S .; Toma, FM; Dumortier, H .; Spalluto, G .; Bianco, A. 2009 | Roman, JA; Niedzielko, TL; Haddon, RC; Parpura, V .; Floyd, CL 2011 | Cellot, G .; Cilia, E .; Cipollone, S .; Rancic, V .; Sucapane, A .; Giordani, S .; Ballerini, L. 2009). To achieve these purposes, graphene nanotubes are used to connect neuronal tissue, specifically glial cells (neuroglia) and neurons that occupy the brain and central nervous system. This is possible through the inoculation of carbon nanotubes into the bloodstream,due to its ability to cross the blood-brain barrier (BBB), shared with graphene oxide and 2D graphene nanosheets, as reflected in the scientific literature (Abbott, NJ 2013 | Shityakov, S .; Salvador, E .; Pastorin, G .; Förster, C. 2015 | Kafa, H .; Wang, JTW; Rubio, N .; Venner, K .; Anderson, G .; Pach, E .; Al-Jamal, KT 2015).

One of the first experiences of neural bonding with carbon-graphene nanotubes is the work of (Gabay, T .; Jakobs, E .; Ben-Jacob, E .; Hanein, Y. 2005) in which he developed a new approach to Geometry of clusters of neural networks using clusters of carbon nanotubes. In this model, neurons migrate from a low-affinity substrate to a high-affinity substrate in a lithographically defined carbon nanotube template. Upon reaching the high affinity substrates, neurons will form interconnected networks sending neurite messages. Figure 15 shows the images of the in-vivo experiment with neurons, their autonomous binding with carbon nanotubes (indicated with arrows) and their complete interconnection in a neuronal macro-network.

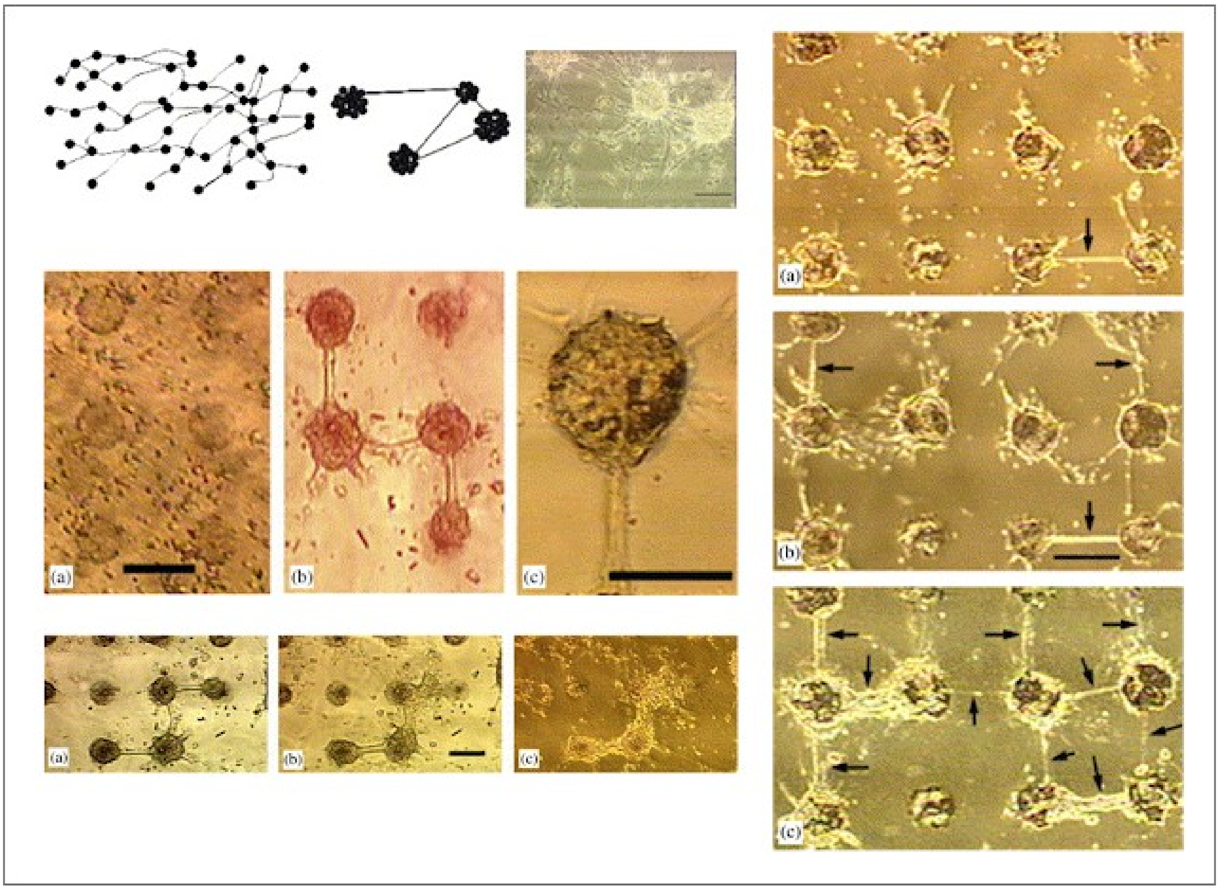


Fig. 15. One of the first experiences in the interconnection of neurons with carbon nanotubes, indicated with arrows in the images (Gabay, T .; Jakobs, E .; Ben-Jacob, E .; Hanein, Y. 2005)

According to the work of (Voge, CM; Stegemann, JP 2011) carbon nanotubes have mechanical, physical and electrical properties that make them suitable to " *study and control the cells of the nervous system. This includes the use of CNTs (carbon nanotubes) as cell culture substrates, to create patterned surfaces, and to study cell-matrix interactions ... with respect to neural applications, perhaps the most promising CNT (carbon nanotubes) property is high electrical conductivity , which offers the potential to directly interact with functional neurons to detect and transmit signals. Therefore, CNT can act as passive and active substrates for use in neural engineering.”* This allows us to infer that the final objective of an important part of the research on carbon nanotubes and their derivatives is neurostimulation / neuromodulation, as explained in the work of (Ménard-Moyon, C. 2018). Figure 16 shows, again, how carbon nanotubes connect the ends of neuronal cells with other neurons and brain tissues, allowing electricity and signals to be conducted in a more interconnected neural network. This configuration is called " *neural interface* " And it is possible due to the properties of carbon nanotubes to overcome the blood-brain barrier and deposit in organs with electrical activity, including the brain and the central nervous system. It seems obvious that a way to seat, connect and hold the Carbon nanotubes at the ends of neurons and glia are the aforementioned carbon octopuses. The tentacles of carbon octopuses have flexibility, length and superconducting capabilities, ideal for establishing the link with neuronal cells, thereby improving their integration This vision is shared by other authors such as (Won, SM; Song, E .; Reeder, JT; Rogers, JA 2020) where the electromagnetic neurostimulation approach using microwaves,It is made using porous graphene fibers and other nanoscale forms of carbon, such as carbon nanotubes, due to their chemical stability, mechanical strength, and conductive surface.

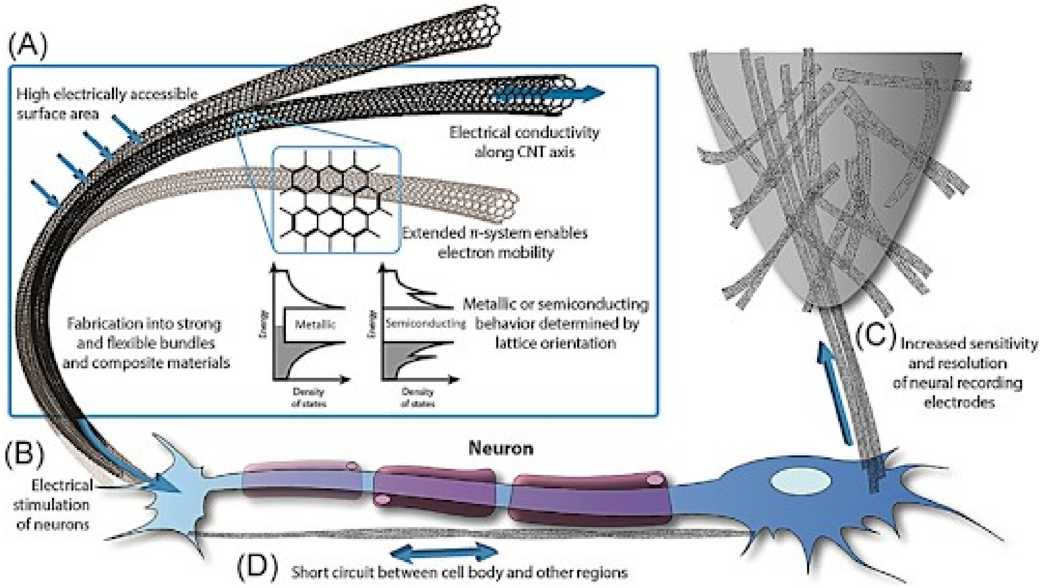


Fig. 16. Diagram of the neural interface with carbon nanotubes. (Ménard-Moyon, C. 2018)

It is also pointed out that carbon nanotubes can contribute to the development and growth of neuronal tissue (Oprych, KM; Whitby, RL; Mikhalovsky, SV; Tomlins, P .; Adu, J. 2016), since "*they act as scaffolds for the neurological tissue engineering* ".

The race to understand neural circuits and their electrochemical signaling system has been a constant since the carbon nanotubes were produced, as reflected in the article by (Mazzatenta, A .; Giugliano, M .; Campidelli, S. ; Gambazzi, L .; Businaro, L .; Markram, H .; Ballerini, L. 2007) in which the introduction of single-walled carbon nanotubes (SWCNT) for the stimulation of brain cells is experimented, proposing a model of Neural coupling, which was able to stimulate the single and multiple synaptic pathways of the network. The authors stated that "*Cultured brain circuits provide a simple in-vitro model of a neural network. Hippocampal neurons grew and developed functional circuits on SWCNT surfaces, indicating, as detailed above, the overall biocompatibility of purified SWCNT (Hu, H .; Ni, Y .; Mandal, SK; Montana, V .; Zhao, B .; Haddon, RC; Parpura, V. 2005). Compared with abiotic control surfaces, SWNT boosted neural network activity under chronic growth conditions (Lovat, V .; Pantarotto, D .; Lagostena, L .; Cacciari, B .; Grandolfo, M .; Righi, M .; Ballerini, L. 2005). This effect has been described previously and is not attributable to differences in neuronal survival, morphology, or passive membrane properties, but possibly represents a consequence of the properties of the SWNT substrate*." In fact, evidence of growth from carbon nanotubes can be seen in Figure 17.

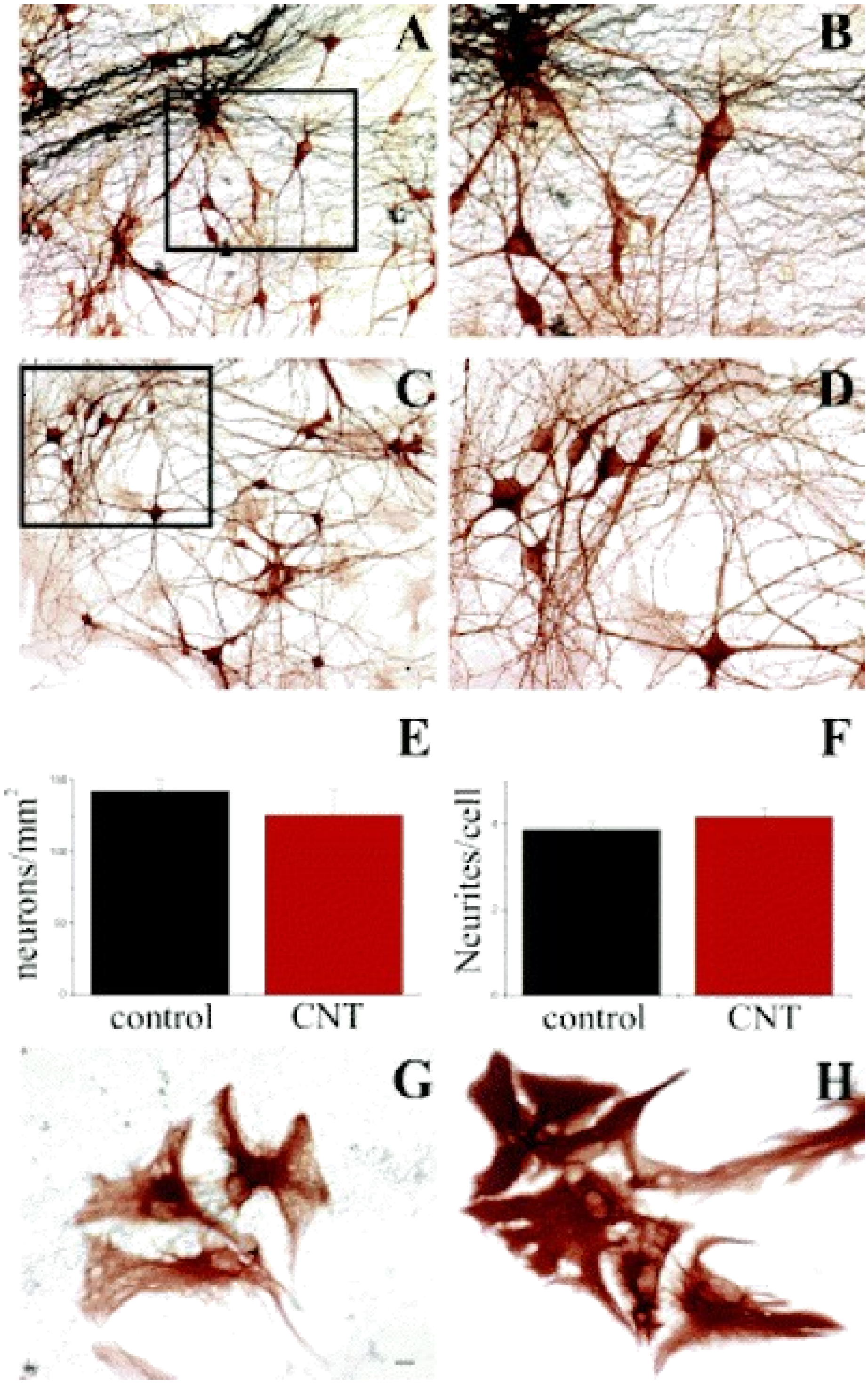


Fig. 17. Note the interconnection and growth of neurons in the boxes on the left, compared to the boxes on the right, where carbon nanotubes (CNT) are applied. Image from the study of (Lovat, V .; Pantarotto, D .; Lagostena, L .; Cacciari, B .; Grandolfo, M .; Righi, M .; Ballerini, L. 2005)

In fact, it can be considered that polymer functionalized carbon nanotubes can promote the growth of dendrites in neuronal cells and thereby increase their synaptic capacity (Hu, H .; Ni, Y .; Mandal, SK; Montana, V .; Zhao, B .; Haddon, RC; Parpura, V. 2005). As a corroboration of everything explained so far, it is worth highlighting the review work by (Rauti, R .; Musto, M .; Bosi, S .; Prato, M .; Ballerini, L. 2019) in which some of the most important advances in carbon nanotubes " *Due to their peculiar characteristics, they appear to be suitable for interaction with electrically active tissues, such as neuronal and cardiac tissues ... Furthermore, CNTs are attractive as neuronal electrodes both in-vitro and in-vivo due to the high surface area ratio.*

electrochemistry inherent in the geometry of nanotubes, which results in a large electrical charge capacity. In the context of neural stimulation, charge injection capacities of 1–1.6 μC / cm − 2 have been found with vertically aligned nanotube electrodes, assuming the development of nanotube and nanofiber neural interfaces. These properties allowed the engineering of electrodes based on CNT (carbon nanotubes) used in the interconnection of neuronal activity in-vitro and in-vivo, which are summarized in the following milestones: a) stimulation of action potentials / excitability of Ca2 + in a small group of neurons in culture through multiple electrode arrays, b) stimulation and recording of neurons in cultures of organotypic sections of the hippocampus and also in the whole of the retina in mice, c) stimulation and recording of cortices brain in rats and monkeys, d) human electroencephalogram (EEG) recording" This review includes abundant documentary evidence of the experimentation of carbon nanotubes in brain tissue, with special emphasis on their implementation in the human brain. Therefore, the most relevant are analyzed below:

- The work of (Lee, W .; Parpura, V. 2010) demonstrates how nanotubes " *can be used as neural interfaces / electrodes due to their superconducting properties with the brain, in particular with neurons ... they offer advantages over metallic electrodes. standard in terms of monitoring and stimulating neuronal activity ... One of the challenges for the interconnection of the brain and the machine is the biocompatibility of the materials used for the construction of electrodes. have not been established so far. Appropriate international norms / standards for the use of CNT need to be established before CNT-based electrodes / devices can be used in humans* . "
- The " *neuronal stimulation with a carbon nanotube microelectrode array* " proposed by (Wang, K .; Fishman, HA; Dai, H .; Harris, JS 2006) presents an experimental neuronal interface oriented to the development of neuronal prostheses, where the " *neuronal interconnection* " based on multi-walled carbon nanotubes (MWCNT) is studied, vertically aligned as microelectrodes, which confirms that they can be used for this purpose. Their work is relevant for being the first demonstration of " *electrical stimulation of primary neurons* " corresponding to the hippocampus, to which they add that "*neurons can grow and differentiate on the nanotube device (which acts as electrodes) and can be repeatedly excited even with unbalanced charge stimulation protocols. We also show that CNT microelectrodes have superior electrochemical properties, which can be further improved by surface modification. CNT electrodes work predominantly with capacitive current (ideal for neural stimulation), while offering high charge injection capacity. Therefore, small electrodes can be used without electrochemical risks* . "
- The stimulation of neuronal cells through lateral electrical currents has been studied by (Gheith, MK; Pappas, TC; Liopo, AV; Sinani, VA; Shim, BS; Motamedi, M .; Kotov, NA 2006). A layer / film of single-walled carbon nanotubes (SWCNT) was experimented with, incorporating a culture of neuronal cells. Subsequently, an electric current was applied that ran through the ends of the carbon nanotube film. This "*did not alter the key electrophysiological characteristics of the NG108-15 cells, confirming previous observations with a different nanotube material ... The current passes through the cell lining, which is identical to traditional means of neuronal excitation and can be associated with the opening of voltage-gated cation channels. Crucially, this is important evidence of electrical coupling between single-walled carbon nanotube (SWCNT) -based neuronal culture films and NG108-15-like neuronal cells in the lateral electrical configuration* . "
- The research of (Vitale, F .; Summerson, SR; Aazhang, B .; Kemere, C .; Pasquali, M. 2015) is relevant for applying carbon nanotubes in-vivo in the brain of rats, to experience the capacities

> of neuromodulation. Among its conclusions, the following will be quoted verbatim: "We *present the fabrication, characterization and the first in-vivo evaluation of the performance and biocompatibility of CNT fiber microelectrodes (carbon nanotubes) for neuronal stimulation and recording. We discovered that CNT fibers are the ideal candidate material for the development of small, safe, high charge density, low impedance and flexible microelectrodes capable of establishing stable interfaces to manipulate the activity of neuronal assemblies, without the need for any additional modification. Of the surface. Therefore, in a single device, these electrodes perfectly combine the properties of traditional electrodes of very different shapes and materials optimized for stimulation or recording, while also benefiting from the advantage of the softness of CNT materials.The potential of CNT fibers as interfaces capable of establishing bidirectional interactions with neural activity may have a significant impact on future neuroscientific research ... Furthermore, the technology of CNT fiber microelectrodes can be easily translated into other applications, such as the durable and flexible interface design to monitor and condition peripheral nerves and cardiac activitysuch as the design of flexible and durable interfaces to monitor and condition peripheral nerves and cardiac activitysuch as the design of flexible and durable interfaces to monitor and condition peripheral nerves and cardiac activity*".

Wireless nanocommunication networks in carbon nanotubes

Although carbon nanotubes, in principle, could contribute to improving the synapse and the growth of neuronal cells, as well as better weaving their interconnection network, they present very important risks that have not been sufficiently considered by the scientific community, in addition to the toxicological (already known). Since neuromodulation and neurostimulation is possible through carbon nanotubes (which is actually graphene with a tubular shape), since they act as electrodes activating specific regions of the brain, they also represent a de facto neural interface capable of linking with the wireless nanocommunication networks inoculated into the human body , in which GQD graphene quantum dots, graphene nanoantennas and other identified objects are part of the hardware of this network. A network for which there is simulation software , routing and MAC protocols , and a complex and extensive specialized bibliography that documents its implementation in the human body.

With these precedents, it is not surprising to find research papers that address integrated molecular communication with carbon nanotubes with the ability to interact in neuronal sensor nanowires, administered wirelessly, as reflected (Abd-El-atty, SM; Lizos, KA; Gharsseldien, ZM; Tolba, A .; Makhadmeh, ZA 2018) This is confirmed in his introduction by stating that "*Molecular communication (MC) is considered a promising approach for transmitting information in the intrabody nano-network. In this context, the use of nanomachines in the nanoregrid facilitates processing, actuation, logic and detection operations. Furthermore, nanomachines have the ability to exchange information when they are interconnected by the nanoregrid. A simple intracorporeal nanoregrid can be achieved by connecting a group of artificial / synthetic or biological nanomachines to perform complex tasks and functions in the human body, such as biomedical diagnosis and treatment, or neural signal transduction and neural control ... carbon nanotubes (CNTs) facilitate molecular interaction between living cells, including neurons,by means of a stable switch-based interconnection for the coupling molecules ... Carbon nanotubes (CNTs) have the ability to recognize the release of neurotransmitter molecules in the nervous system of the nanowire*". All the aforementioned is possible because the neurons emit voltage peaks (electrical) that are the action potentials that release the neurotransmitter molecules that propagate through the axon. Therefore, by stimulating the neurons, an effect is achieved on the segregation of neurotransmitters and with it neuromodulation. This has consequences on the plasticity, synapse and neuronal correlation of the brain. It also allows the measurement of neurotransmitters, dopamine, electrophysiological responses, synaptic activities, information processing in the neural network (coming from the nervous system). In addition, the researchers confirm the existence of "*transmission programming protocols and an interface between the bio-nanomachine and neurons to facilitate the initiation of signaling and reduce the possibility of interference in the electrical signals they generate* . "That is, a method to clearly differentiate the signals emitted and propagate them to the communication nanoregrid (Suzuki, J .; Budiman, H .; Carr, TA; DeBlois, JH 2013 | Balasubramaniam, S .; Boyle, NT; Della-Chiesa, A .; Walsh, F .; Mardinoglu, A .; Botvich, D .; Prina-Mello, A. 2011).

Although it has been shown that carbon nanotubes (CNTs) are capable of being linked to the wireless communication nanoregrid, according to the clarifications of (Akyildiz, IF; Jornet, JM 2010), its neural application implies neuronal communication protocols , which are different from electromagnetic communication. It is also true that " *it is not necessary to insert carbon nanotubes into neurons for nanomachines to activate signaling. Nanomachines can use a neurointerface based on chemical agents*"According to (Suzuki, J .; Budiman, H .; Carr, TA; DeBlois, JH 2013), however, this represents operational and toxicity difficulties, which result in greater inconveniences. In order to overcome this problem, the scientific community proposed the " *hybrid nanocommunication* " that allows electromagnetic and molecular interaction, uniting the control of both nanowires, as reflected in the review work of (Yang, K .; Bi, D .; Deng, Y .; Zhang, R .; Rahman, MMU; Ali, NA; Alomainy, A. 2020), of which the most important points are summarized:

- In the first place, it should be noted that there is already a framework protocol for intra-extra-body nano-network communications, under the name IEEE P1906.1, which represents an important part of the implementation of nanotechnological applications in the human body. However, the communication of data and parameters between electromagnetic nanogrids and based on molecular communication has been a fundamental challenge for biomedical applications, as referred to in the following paragraph "*However, the goal of the IEEE P1906.1 standard is to highlight the minimum required components and their corresponding functions required to deploy a nanogrid. This requires a hybrid communication paradigm that is adopted within the human body and outside of people, which serves as an interface to transmit parameters* ".
- The authors are aware of the limitations of electromagnetic communication for the monitoring of the central nervous system and especially of neuronal tissue, for which it is necessary to link molecular and electromagnetic communication with a hybrid approach, if the wireless transmission of parameters, requests , responses and operations in the architecture of the nanogrid. In other words, the monitoring of the brain and its regions depends on the presence of nano-networks based on electromagnetic communication, since they have the nano-antennas with which the signals, orders, requests and data obtained through nanosensors and nanodevices enabled throughout the body, including carbon nanotubes that are located in neuronal tissue. Nevertheless,Obtaining the registration of sensed information through nanotubes requires a molecular communication method, which requires the development of hybrid communication models. This perception is collected in the following paragraph: " *Apparently, all the above schemes can allow the connection between the Intra-body Network and the Body-Area Network using electromagnetic paradigms or molecular paradigms, but there are some factors that make them less practical. First, nanodes (such as GQD graphene*

quantum dots, among others) and nanodevices, are not biological and can intervene in other physiological activities, since nanodes must be injected into blood vessels or enter the human body by drinking a solution containing them ... In addition , the public may not accept the injection or insertion of numerous nanodes into the human body, and some countries have published national laws to strictly regulate the production and marketing of such devices". From this explanation it follows and takes for granted the premeditation of vaccination, and massive inoculation of the entire population, with nanotechnology or nano-network hardware, for which the researchers note some drawbacks. A relevant detail is also addressed, and it is that the network's nanonodes can be introduced into the human body, not only through injection into blood vessels, but also through aqueous solutions that can be drunk. This is especially serious, since it opens up a new range possibilities for contamination and intoxication of people, which would help to explain the phenomenon of c0r0n @ v | rus, with another approach complementary to those already known.

- Researchers (Yang, K .; Bi, D .; Deng, Y .; Zhang, R .; Rahman, MMU; Ali, NA; Alomainy, A. 2020) attach special relevance to the role of carbon nanotubes in the interpretation of neuronal signals, in the form of neurotransmitters secreted for their recording and interpretation with molecular communication protocols. In fact, it is explained that " *a physiological process that occurs naturally is the transmission of neurotransmitters between the presynaptic part and the postsynaptic terminal.. In response to an excitation of a nerve fiber, the generated action potential moves along the presynaptic part and triggers the release of neurotransmitters (signaling particles) contained in the vesicles. The information molecules released diffuse into the environment and can bind to the ion channel located in the membrane of the postsynaptic terminal. The bound ion channel then becomes permeable to some ions, the influx of which eventually leads to a depolarization of the cell membrane that subsequently spreads as a new action potential throughout the cell. Undoubtedly, the delivery of neurotransmitters establishes a molecular communication link (MC) and is much more biological,biocompatible and less invasive than nanodevice-based nanoregrid systems (which use the electromagnetic paradigm), since spontaneously existing molecular paradigms eliminate the risk of injection or ingestion of nanodevices.”* Despite the advantages that the molecular communication model represents, the authors obviate that it is not possible to interact, modulate or stimulate brain regions, without the presence of nanodes based on carbon nanotubes that, as has already been shown, act as sensors, junctions and electrodes of neurons, glia and dendrites It is a fact that the content observed in vaccines is being inoculated and clearly presents this objective, which again leads to the need for a hybrid approach of two-way communication.
- Furthermore, the controlled information transfer through an in-vivo nervous system (Abbasi, NA; Lafci, D .; Akan, OB 2018) " *further demonstrates the feasibility that some physiological processes can be interpreted as molecular communication systems (In this type of communication model, the information is generally modulated by the concentration of molecules, while the information is generally transmitted outside the human body through electromagnetic waves, so a concentration converter or interface is needed. chemistry / electromagnetic wave. Fortunately, some nanodes with chemical nanosensors integrated in CNTs or GNRs can assume this responsibility* ", corroborated by the following studies and scientific works:
    - (Roman, C .; Ciontu, F .; Courtois, B. 2004) under the title " *Detection of a single molecule and macromolecular weighting by a nanoelectromechanical sensor of carbon nanotubes* ". Note in this case, the fundamental-necessary implication of carbon nanotubes. As indicated by its authors " *we propose and simulate a high sensitivity carbon nanotube sensor,*

    capable of transducing protein-ligand binding, or more generally, macromolecular recognition in a frequency variation of an electric current." This is the fundamental piece on which the hybrid model of molecular-electromagnetic communication is built, demonstrating that its interaction, transduction or, if preferred, translation of molecular signals into frequencies and electric current impulses is possible.

    - (Georgakilas, V .; Otyepka, M .; Bourlinos, AB; Chandra, V .; Kim, N .; Kemp, KC; Kim, KS 2012), with the work entitled " *Functionalization of graphene: approaches, derivatives and covalent applications and non-covalent* "in which it is shown that graphene nanoplates have the capacity to act as biosensors, including doping with other materials (polymers, metals ...). Therefore, graphene biosensors act as data inputs that are potentially transmitted through the nanoregrid.
    - (Lazar, P .; Karlicky, F .; Jurecka, P .; Kocman, M .; Otyepková, E .; Šafářová, K .; Otyepka, M. 2013), whose research entitled " *Adsorption of small organic molecules in graphene* " clearly explains the purpose of using this nanomaterial in order to interpret molecular communication. Specifically, it addresses " *the combined experimental and theoretical quantification of the enthalpies of adsorption of seven organic molecules (acetone, acetonitrile, dichloromethane, ethanol, ethyl acetate, hexane and toluene) in graphene* ", which demonstrates beyond any doubt the Graphene's ability to be used for the purposes of molecular communication and therefore electromagnetic communication, since it is the material with which the nanodes of the intra-body nano-network are formed.

- To all the above, it must be added that (Yang, K .; Bi, D .; Deng, Y .; Zhang, R .; Rahman, MMU; Ali, NA; Alomainy, A. 2020) also propose a model of hybrid communication that combines molecular paradigm and electromagnetic paradigm for nanoregrid systems shown in figure 18, which clarifies the ultimate goal of vaccination operations, that is, the inoculation of the hardware of nannodes, nanorouters, nanosensors and graphene nanotubes, to to be able to monitor all the biological, vital and neuronal activity of people, of each individual.

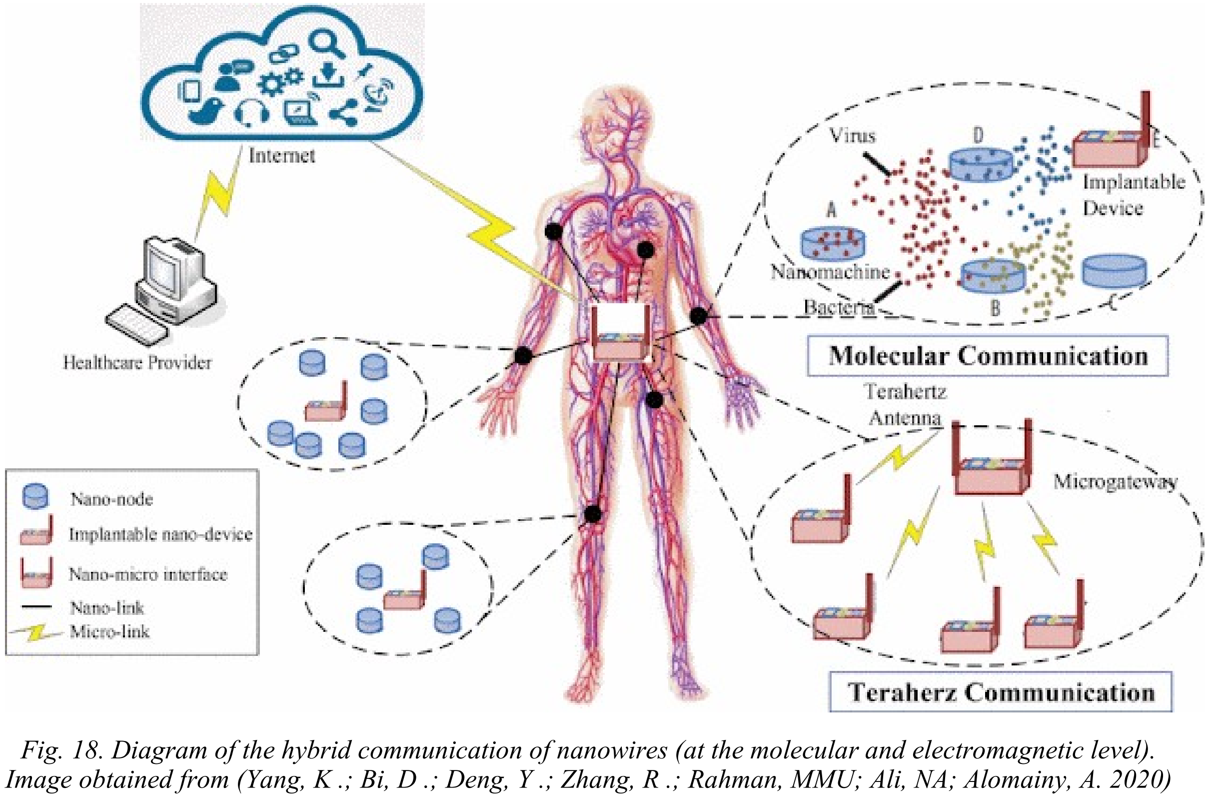


Fig. 18. Diagram of the hybrid communication of nanowires (at the molecular and electromagnetic level). Image obtained from (Yang, K .; Bi, D .; Deng, Y .; Zhang, R .; Rahman, MMU; Ali, NA; Alomainy, A. 2020)

The authors of this proposal explain that "*Molecular communication is used in the human body because it shows superiority over other communication schemes in terms of biocompatibility and non-invasiveness ... Molecular nano-networks are made up of multiple MC transmitters and receivers or an MC transmitter, MC receiver and multiple transceivers that perform the relay function. A biological transmitter first collects health parameters and then modulates and transmits the collected information between the molecular nano-networks. To successfully send the information to the outside of the human body, a graphene-based nanodevice is implanted in the human body. This device is mainly composed of a chemical nanosensor, a transceiver and the battery.The built-in chemical nanosensor is capable of detecting the concentration information coming from the molecular nano-grids, and converting it into an electrical signal. The electromagnetic signal THz is also transmitted to a nano-micro interface. This interface can be a dermal display device or a gateway to connect to the Internet. The nano-micro interface is generally equipped with two types of antennas: THz antenna and micro / macro antenna. The proposed hybrid communication architecture not only does everything possible to avoid the use of non-biological nanodes inside the body, but also makes the healthy parameters of the body easily detected outside.This interface can be a dermal display device or a gateway to connect to the Internet. The nano-micro interface is generally equipped with two types of antennas: THz antenna and micro / macro antenna. The proposed hybrid communication architecture not only makes every effort to avoid the use of non-biological nanodes inside the body, but also makes the healthy parameters of the body easily detected outside.This interface can be a dermal display device or a gateway to connect to the Internet. The nano-micro interface is generally equipped with two types of antennas: THz antenna and micro / macro antenna. The proposed hybrid communication architecture not only does everything possible to avoid the use of non-biological nanodes inside the body, but also makes the healthy parameters of the body easily detected outside.It also makes the healthy parameters of the body easily detected outsideIt also makes the healthy parameters of the body easily detected outside*". Although the objective of the researchers is to reduce the invasive effect of the nanoregrid, the unfortunate praxis of vaccination of c0r0n @ v | rus proves their mistake. It has been shown that in the samples of vaccines and the blood of vaccinated people , there are not only graphene nanodes in the form of GQD quantum dots, fibers, single and multi-walled carbon nanotubes, graphene nanofilts, graphene ribbons, graphene fractal nano-antennas, graphene hydrogel swimmers, octopuses of carbon, and other elements that remain to be identified Therefore, there can be no doubt that hybrid, electromagnetic and molecular communication is key in this model, as can be seen from the specialized bibliography on this subject (Ahmadzadeh, A .; Noel, A .; Schober, R. 2015 | Ahmadzadeh, A .; Noel, A .;Burkovski, A .; Schober, R. 2015 | Wang, X .; Higgins, MD; Leeson, MS 2015 | Nakano, T .; Moore, MJ; Wei, F .; Vasilakos, AV; Shuai, J. 2012 | Abbasi, QH; El-Sallabi, H .; Chopra, N .; Yang, K .; Qaraqe, KA; Alomainy, A. 2016 | Zhang, R .; Yang, K .; Abbasi, QH; Qaraqe, KA; Alomainy, A. 2017).

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