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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Acknowledgments.—The authors are indebted to the staff of the Departments of Anesthesiology. The authors wish to express our sincere thanks to the staff of our Anesthesiology department for their collaboration.

Authors' contributions.—All authors read and approved the final version of the manuscript.

Comment on: De Cosmo G, Levantesi L. Adjuvant drugs: should they always be utilized in multimodal peripheral nerve blocks? Minerva Anestesiol 2022;88:535-7. DOI: 10.23736/S0375-9393.22.16554-5.

History.—Manuscript accepted: September 22, 2022. - Manuscript received: August 2, 2022.

(*Cite this article as:* Ortiz-Gómez JR, Perepérez-Candel M, Fornet-Ruiz I, Ortiz-Domínguez A, Palacio-Abizanda FJ. Comment on "Adjuvant drugs: should they always be utilized in multimodal peripheral nerve blocks?" Minerva Anestesiol 2023;89:359-60. DOI: 10.23736/S0375-9393.22.16926-9)

Online version at https://www.minervamedica.it
Minerva Anestesiologica 2023 April;89(4):360-1
DOI: 10.23736/S0375-9393.22.16936-1

Fascial plane blocks: time to explore the dark side of the moon

We read with great interest the article from Fusco *et al.* titled "ESP block and chronic pain: the dark side of the moon"[1], and we want to congratulate with the authors for the many insights that their paper brought to us.

From literature, we already know that proposed mechanisms of action of the erector spinae plane (ESP) block include:[2] consistent local anesthetic (LA) action over the posterior rami of the spinal nerves; potential spread into the serratus anterior plane reaching the lateral rami of spinal nerves; potential spread anteriorly toward the paravertebral space involving the ventral rami of spinal nerves together with rami communicantes; consistent blood stream reabsorption with systemic analgesic effects.

In their article, Fusco and colleagues suggested a direct LA action over the intrinsic nerve endings of the fascia as another plausible mechanism of action of the ESP, using sonoelastography as a tool to verify the consequences of the block over the muscles stiffness.

However, those conclusions are not completely new, since the mechanism suggested recalls old techniques used to treat myofascial pain, starting from the historical Janet Travell's first description of myofascial trigger points in 1942 to the most recent article from Omoigui and Fadare,[3] which describe a technique where a paraspinal injection with a short needle would allow the medications to reach the deep perimuscular fascia. This fascial plane is richly innervated by small-diameter fibers whose receptive fields increase in the presence of inflammation. They obtained pain relief and describe ESP block as a myofascial block performed with longer needles inserted to the target point, with large volumes of a diluted LA. Moreover Kongsagul *et al.* demonstrated pain reduction in 72.8% of patients undergoing ultrasound guided interfascial injection of simple saline.[4]

Fusco himself had good results with the dry needling technique, inserting needles into the targeted fascia without injecting medications.[5] All these data suggest how important the intrinsic fascial innervation is, and how the involvement of those intrinsic nerve endings may influence pain outcomes weather a LA is used or not. These considerations introduce a new era of fascial plane blocks where the fascia itself, rather than its content, becomes the anesthetist target and where the fascial mechanical stimulation becomes a relevant component of block success.

Not by chance, muscles stiffness changes detected with sonoelastography had already been described by Wang et Al after their FLuSH technique consisting in a ultrasound guided saline interfascial injection that they called "hydromanipulation."[6] This work confirms the importance of mechanical stimulation and hydrodissection of the fascial sheaths and also reinforces the potentials of sonoelastography as a simple and non-invasive tool to detect and maybe predict block success.

Based on these new insights, it is reasonable to think that LA may have only a partial role in determining analgesia, while targeting the right fascia and properly dissecting it may have a key role. These hypothesis about fascial blocks could also explain why a high volume of LA is usually important in improving their efficacy or why the analgesic effect lasts so long, despite a low concentration of LA.

In the other side of the moon there is also a tool able to detect muscle relaxation and maybe we could use it to predict effectiveness of our fascial plane block before the surgery starts.

Thus we want to thank Fusco et Al for introducing sonoelastography to regional anesthesia community, showing new lands to the astronauts of the future.

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Online version at https://www.minervamedica.it
Minerva Anestesiologica 2023 April;89(4):361-2
DOI: 10.23736/S0375-9393.22.17028-8

Fascial plane blocks: flashes of light on the dark side of the moon

We want to thank Dr. Fabio Costa and the other authors[1] for the interesting reply to our article "Fascial plane blocks: time to explore the dark side of the moon."[2]

The comparison on the still unexplored or unclear mechanism of action of the fascial plane blocks will certainly lead to a more correct use of these techniques.

According to our hypothesis, among the mechanisms of action of the ESP Block, there is the stimulation of the free nerve endings present in this compartment, whose activation enhances the fundamental action of the local anesthetic.

Thanks to the use of elastosonography we can then evaluate the change in the stiffness of the surrounding muscles and consider the reduction of the same as a predictive sign of effectiveness of the ESP block particularly in the follow-up of chronic pain treatment.

Thanks to Carla Stecco' s studies on cadaver dissection, today the fascial system has become an anatomical structure that shines with its own light, with a complex structural organization, and a precise function in the musculoskeletal system.[3, 4]

More than answers, our hypothesis generates new questions in us.

How the relationship between volume and concentration of local anesthetic affects the effectiveness of analgesia and what is the right concentration and the right volume is still a matter of debate.

From a study by De Cassai *et al.* is clear that the number of dermatomes reached by the anesthetic is closely related to the volume infused. Indeed, after an injection of local anesthetic, the volume needed to cover one dermatome widely varies from 2.5 mL to 6.6 mL.[5]

Could an injection of a greater volume at a low concentration therefore create a deeper and more lasting analgesia than the injection of a smaller volume at a higher concentration?

Are we sure that the canonical 25-20 mL of local anesthetic is sufficient?

We think that a greater volume of anesthetic and, the visualization of double V sign, could cause a rupture of a greater number of fibrous septae within the fascia and guarantee a deeper, lasting and homogeneous analgesia. And last but not least, the rupture of the fibrous septae within the fascia could cause a better sliding between them with consequent reduction of muscle rigidity.

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Authors' contributions.—Fabio Costa: conceptualization, writing up of the first draft; Alessandro De Cassai: substantial contribution to conception and design; Giuseppe Pascarella: critical revision and manuscript submission; Alessandro Strumia: language revision; Lorenzo Schiavoni and Alessia Mattei: critical revision; Rita Cataldo: critical revision and editing; Felice E. Agrò: revised the final version of the manuscript; Massimiliano Carassiti: supervision. All authors read and approved the final version of the manuscript.

Commenti in: Fusco P, Stecco C, Petroni GM, Ciaschi W, Marinangeli F. Fascial plane blocks: flashes of light on the dark side of the moon. Minerva Anestesiol 2023;89:361-2. DOI: 10.23736/S0375-9393.22.17028-8.

Comment on: Fusco P, Stecco C, Petroni GM, Ciaschi W, Marinangeli F. ESP block and chronic pain: the dark side of the moon. Minerva Anestesiol 2022;88:528-9. DOI: 10.23736/S0375-9393.22.16282-6.

History.—Manuscript accepted: September 2, 2022. - Manuscript received: August 8, 2022.

(*Cite this article as*: Costa F, De Cassai A, Pascarella G, Strumia A, Schiavoni L, Mattei A, *et al.* Fascial plane blocks: time to explore the dark side of the moon. Minerva Anestesiol 2023;89:360-1. DOI: 10.23736/S0375-9393.22.16936-1)