

HACKS

UNDERSTANDING FIELD OF EFFECT OF BOTULINUM TOXINS



A simple equation highlights how cosmetic experts have been “doing it wrong” for 30 years.

BY JOHN H. JOSEPH, MD

For the last 30 years aesthetic medical practitioners have employed botulinum toxins to treat facial expression lines. The safety has been universally accepted and the treatments well tolerated. A duration of three to four months has widely been assumed as the longest duration obtainable for decades. Recent evidence, however, seems to challenge this concept and may reveal that a potential duration of six months or longer can be obtained from a single injection of neurotoxin using a higher dose.

The reason for current underutilization of duration potential may be a result of initial fears regarding complications from botulinum toxins that led to patients being under-dosed. This under-dosing produced suboptimal duration. Trials that I and others conducted have shown by a simple increase in dose, along with a decrease in the volume of reconstitution, a prolonged result is seen without an increase if the adverse events (AEs) associated with these types of injections. To better understand how this could be true, a more detailed knowledge of the concept “Field of Effect” will be required.

When an injection of toxin is given, the effect will encompass a certain surface area wherein the muscle will be affected. This area is called the *Field of Effect*. The size of this area is directly proportional to two things: the Diffusion and Spread of the toxin. *Diffusion* is mostly related to the *Dose* and *Spread* mostly related to the *Volume* of fluid injected. Therefore, a simple conceptual algebraic equation can be created that explains this concept: $D \times V = FE$. The Dose (D) multiplied by the Volume (V) of fluid used will create the size of the Field of Effect (FE).

This simple equation allows for a markedly larger dose of toxin to be safely injected in order to extend the duration. This

is done by simply controlling the FE by decreasing the usual Volume of fluid used to deliver this larger Dose. By controlling the FE, there should be no increase in AEs. In fact, by reducing the FE and delivering this larger dose, a potentially lower rate of adverse events may be seen along with the extended duration.

This concept is what I call *High Dose MicroFocused Botulinum Toxin Injections*, or HDMF Injections. If proven true, HDMF injections will potentially advance the treatment of facial expression lines and other indications, as well. Areas such as the upper lip and *Depressor Anguli Oris* muscles will now be able to enjoy the same duration with fewer AEs as are seen in the glabella or lateral canthal lines. Forehead treatments can also capitalize on this concept. Platysma banding muscles could be treated in this fashion with higher doses without fear of dysphagia. Therapeutic treatments can also be advanced from this simple technique.

It appears we have been “doing it wrong” for 30 years with respect to dosing and diluting botulinum toxins for duration in cosmetic injections for the face. By understanding the Field of Effect better, we can now increase our dosing of toxins safely to enjoy the true potential duration that was always there. It requires a basic understanding of a simple conceptual algebraic equation to now unlock a whole new evolution in the area of aesthetic and therapeutic toxin treatments for patients. It is an exciting advancement that will undoubtedly stimulate a great deal of discussion and new treatments in the future. ■

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