

## Methylene Blue is a Desirable Marker to Distinguish between Drugs Used in Plastic Surgery

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Seventy-five percent alcohol, botulinum toxin and local anesthetics such as lidocaine are commonly used in plastic surgery and dermatology, and these drugs are all colorless, clear liquids that are difficult for doctors and nurses to distinguish from each other with the naked eye. Once these drugs are misidentified and misused, they can cause great harm to patients. For example, the subcutaneous injection of alcohol mistakenly as an anesthetic can cause severe pain and local tissue necrosis in patients. Therefore, a simple, effective, and safe method of marking various drugs is of great clinical value.

Methylene blue is a kind of biological dye with multiple medical applications and is often used for localization of sentinel lymph nodes.<sup>1</sup> Studies have shown that methylene blue is an effective local analgesic after anorectal surgery.<sup>2</sup> Recently, methylene blue has been found to be safe and effective in relieving pain in the donor site for a long time after costal cartilage harvest procedure.<sup>3</sup> Intravenous methylene blue can also counteract nitrite-induced methemoglobinemia, thus acting as a detoxification agent.<sup>4</sup> The aqueous solution of methylene blue appears as blue in an oxidizing environment, and the colors of methylene blue solution after different multiples of dilution are obviously different from each other. The author's department tried to use methylene blue as a marker to distinguish between drugs commonly used in plastic surgery and dermatology. We used 1000-multiple diluted methylene blue to mark lidocaine (0.1 ml 2% methylene blue: 100 ml 2% lidocaine) and the lidocaine turned light blue-green. We used 200-multiple diluted methylene blue to mark 75% alcohol (0.5 ml 2% methylene blue: 100 ml 2% lidocaine) and the 75% alcohol turned dark blue (Fig. 1). To evaluate the safety of local anesthetics marked by 1000-multiple diluted methylene blue, with the approval of the ethics committee, we used marked lidocaine or ropivacaine for local anesthesia in more than 500 patients, and no adverse side effects were observed. This

new method can mark drugs by turning their appearance into a specific color, thus helping doctors and nurses to easily distinguish various drugs by observing their colors.

The correct use of drugs is a matter of patient health and is an issue that should be paid much attention clinically. Drugs that are packaged completely can be distinguished by the markings on the package, whereas drugs that look similar after being unsealed and drawn into a syringe are difficult to distinguish and can easily lead to misuse. Our study found that methylene blue is a desirable marker to distinguish



**Fig. 1.** The syringe on the left contains unmarked botulinum toxin, which is colorless and transparent. The middle syringe contains lidocaine marked by 1000-multiple diluted methylene blue, which is light blue-green. The syringe on the right contains 75% alcohol marked by 200-multiple diluted methylene blue, which is dark blue.

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between drugs commonly used in plastic surgery and dermatology. If the method of using methylene blue to mark drugs is extended in clinical practice, it will greatly improve the efficiency and accuracy of medical staff in identifying drugs and avoid tragic cases of drug misuse. In the meantime, more clinical practice is needed to prove whether the safety of the drugs marked with methylene blue has changed.

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#### DISCLOSURE

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