Introduction

There has been a growing demand for tattoo removal. Although Q-switch laser treatments are considered the standard procedure, the results vary, depending on the color of ink. The number of treatments also varies and may reach up to 12 sessions per tattoo.

3VO™ System Using the Trigation™ Technology

A new innovative technology, Trigation™, was developed for various aesthetic applications. The first application, was developed to remove tattoos of various colors. The 3VO system uses Trigation technology to reach high efficacy in up to six sessions. This new technology combines three actions in parallel:

1. **Dermal perforation** by microneedling causes homogeneously stimulation
2. **Transdermal vehiculation** of specific active ingredients
3. **Simultaneous suction** of extracted contents and residuals

The 3VO system has been used to treat more than 100 tattoos to evaluate the safety and efficacy of the Trigation technology. Treatment sessions were performed in one- to two-month intervals. This clinical bulletin presents one of these cases.

Materials and Methods

When performing a treatment with the 3VO system, mechanical and chemical reactions are executed.

Mechanical parameters are set up by choosing a specific array of needles and the depth of needle penetration. For this case, a 14-needle array was chosen to achieve maximum removal effect. The depth of penetration was decided on during treatment and based on the skin’s reaction to treatment.

Undoit’s proprietary solution was used during each treatment. The solution contains some agents that bind to the tattoo pigments and some agents that induce a keratolytic effect.

This allows the vehiculation of pigments into the system’s waste tank.
Trigation™ Technology
Removal of an Extremely Large tattoo with Multiple Colors

Successful Tattoo Removal

A 31-year-old male presented for removal of an unwanted tattoo. Since the tattoo covered a very large area (patient’s entire back), for control purposes only the middle part was chosen for treatment. The tattoo was of multiple pigment colors, including black, blue, green, and red (Fig. 1). It was 10 years old and done in a professional manner. The patient had skin type III (Fitzpatrick scale).

The patient was counseled as to the risks and benefits of Trigation treatments and an informed consent was signed.

Prior to the start of the treatments, the skin was cleaned and disinfected and 1% lidocaine injections were given to anesthetize the area and prevent unnecessary pain.

Six treatment sessions were performed one to two months apart due to the patient’s skin healing process.

At all treatment sessions, a 14-needle array head was applied with a depth of penetration between 1.5–2 mm, which was chosen based on the patient’s skin reaction. The proprietary Undoit solution was applied. A corticosteroid was added to the solution to prevent future inflammation.

During treatment, the tip of the needle head fluttered on the skin and slight pressure was applied to create a firm adherence between the needle heads and the skin. All of the tattoo area was covered in circular manner.

Treatment was performed until the expected end point was reached. In this case, when reaching the end point, frost and pinpoint bleeding appeared on the tattoo area (Fig. 2).

Immediately after each treatment, the area was covered with a salt solution to initiate an osmotic phenomenon with consequent tissue bulging. After 10 minutes, the salt solution was removed and the treated area was covered with an antibiotic and cortisone cream. The patient was instructed to continue to apply the antibiotic and cortisone cream for two weeks to prevent infection and reduce inflammation.
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After one of the tattoo treatments, liquid accumulating in the 3VO waste tank was sent for a metal detection test at the Geological Survey of Israel in Jerusalem. The test was performed using an ICP-MS system. As a control, samples of liquid were tested from two different places on the patient’s skin:

1. Area without tattoo, post treatment with Trigation
2. Area with tattoo post treatment with Trigation

Results

From one treatment to the next, greater improvement was observed in tattoo clearance (Figs. 3 and 4). Four months post the sixth treatment, the tattoo reached a high clearance rate. Higher than 95% of the treated area was cleared by the treatments.

Results from a general metal detection test (Table 1) on the accumulated liquid demonstrated that the liquid collected from the area without the tattoo (control) had lower metal concentrations compared to the liquid collected from the tattooed area. Aluminum (Al) concentration was 3.6 times higher in liquid extracted from the tattooed area; nickel (Ni) concentration was 2.26 times higher and tin (Sn) concentration was 4.9 times higher. Zinc (Zn) appeared in especially high concentrations in the tattooed extracted liquid, 30493 ng per tattooed sample vs. 3687 ng per non tattooed sample, 8.27 times higher.

<table>
<thead>
<tr>
<th>In sample ng</th>
<th>Al</th>
<th>As</th>
<th>B</th>
<th>Ba</th>
<th>Cd</th>
<th>Cd</th>
<th>Co</th>
<th>Cu</th>
<th>Mn</th>
<th>Ni</th>
<th>Pb</th>
<th>Sb</th>
<th>Sn</th>
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<tbody>
<tr>
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<td>177</td>
<td>&lt;9</td>
<td>18</td>
<td>5</td>
<td>≤0.9</td>
<td>≤0.9</td>
<td>&lt;9</td>
<td>35</td>
<td>&lt;1.8</td>
<td>19</td>
<td>14</td>
<td>&lt;1.8</td>
<td>16</td>
<td>11</td>
<td>3687</td>
</tr>
<tr>
<td>With tattoo</td>
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<td>≤25</td>
<td>80</td>
<td>9</td>
<td>≤2.5</td>
<td>≤2.5</td>
<td>≤25</td>
<td>46</td>
<td>14</td>
<td>43</td>
<td>51</td>
<td>&lt;5</td>
<td>79</td>
<td>18</td>
<td>30493</td>
</tr>
</tbody>
</table>

Table 1: Metal detection test results
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Conclusion

The multicolor tattoo included black, blue, green, and red pigments, which made it especially resistant to tattoo removal with laser devices. The A3V 3VO platform system and Trigation technology achieved a high clearance rate, above 95% clearance over a large area.

The metal detection test results provide strong evidence that the extracted and accumulated liquid from the tattooed area contain higher metal concentrations than non-tattooed skin. This is proof that Trigation technology removes tattoo pigment from the skin.

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Neno Grkavac, M.D., received his medical degree from the University of Belgrade in 1984, with a specialty in plastic and reconstructive surgery. His expertise includes advanced techniques in aesthetic and laser surgery of the face and body.

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References


