

Salmon DNA Combination for Hypertrophic Scar Treatment with Diabetes Mellitus Type 2: A Case Report

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ABSTRACT

Background: Hypertrophic scar is a problem of wound healing process. Salmon DNA (Polydeoxyribonucleotide/PDRN) is a mixture of deoxyribonucleotide gonads derivate of *Oncorhynchus mykiss* (Rainbow Salmon) that helps wound healing process and preventing the formation of scars.

Methods: A diabetic 30-year-old man with 5x3 cm hypertrophic scar on his dorsal hand since 10 months. The hypertrophic scar had been treated with ointments and Triamcinolone 10mg/ml every 2 weeks for 2 months. The patient was treated with intradermal injection 2% Polydeoxyribonucleotide (PDRN) in 2.7 ml (PDRN Bellavita®) and topical therapy containing *Allium cepa* extract and Vitamin E (Lanakeloid®) every 12 hours. PDRN was injected intradermal into the whole area of the scar using a 30-G Needle at a dose of 0.05 ml at each injection site with a distance of about 0.5-1.0 cm. PDRN was given every 2 weeks for 3 months. Vancouver Scar Scale was used to asses hypertrophic scar treatment progress.

Results: The Vancouver Scar Scale was downgrading from 10 to 3 in 3 months.

Conclusion: The combination of PDRN injection with topical administration of *Allium cepa* and vitamin E, is effective for hypertrophic scar treatment.

KEYWORDS: Hypertrophic scar, Polydeoxyribonucleotide (PDRN), Vancouver Scar Scale.

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1. BACKGROUND

Wound healing is one of the most common events that occurs repeatedly throughout human life. Nevertheless, it is a complex process consisting of four phases, there are: hemostasis, inflammation, proliferation, and remodeling. Disruption of any of these processes can cause problems ranging from irreversible wounds to excessive scarring, including hypertrophic scars and keloids. Many studies have shown that inflammation is involved in modulating collagen synthesis, and the intensity of the inflammatory process is positively correlated with the final size of the scar. Excessive scarring has many adverse consequences including pain, itching, contractures, and restriction of movement, leading to both physical and psychological injury.¹

PDRN is a mixture of deoxyribonucleotides derived from sperm DNA of *Oncorhynchus mykiss* (Salmon Trout) or *Oncorhynchus keta* (Chum Salmon). The binding of PDRN comes from the Adenosine A2 receptor which plays a role in

wound healing, in this case reducing inflammatory infiltration and accelerating the wound healing process.²

2. CASE PRESENTATIONS

A diabetic 30-year-old man with 5x3 cm hypertrophic scar on his dorsal hand which he has been experiencing since about 10 months ago due to injury with potassium permanganate powder to remove the tattoo on his hand. Previously, the patient had been treated with ointment and injection of triamcinolone 10mg/ml every 2 weeks for 2 months. However, according to the patient's statement, the patient was still not satisfied with the results because the color of the scar is darker than the surrounding skin, the size has not decreased significantly, and the patient also feels itchy and pain. In addition, according to the patient's description, after the last injection of triamcinolone, there was a lump in the form of a pustule above the scar. Because the patient has received treatment with steroid injections before, it is possible to

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change the pigmentation of the scar so that the patient feels increasingly dissatisfied (Figure 1). Giving other treatments such as laser, injection of 5-Fluorouracil is highly

recommended to patients, but considering that the therapy is still invasive and also expensive.



Figure 1. Patient's hand before PDRN Injection

The patient was treated with intradermal injection 2% Polydeoxyribonucleotide (PDRN) in 2.7 ml (PDRN Bellavita®) and topical therapy containing *Allium cepa* extract and Vitamin E (Lanakeloid®) every 12 hours. PDRN was injected intradermal into the whole area of the scar using a 30-G Needle at a dose of 0.05 ml at each injection site with a distance of about 0.5-1.0 cm. PDRN was given every 2 weeks for 3 months. Vancouver Scar Scale was used to assess hypertrophic scar treatment progress.

All treatments were continued for the following 3 months; they were noninvasive and had reasonable costs. Steroid infiltrations and silicone topical treatment were never used during the treatment period. The patient showed clinically significant aesthetic improvement. The pain and itchy recovered. The patient was fully compliant with the treatment and showed no treatment-related adverse events.



Figure 2. Patient's Hypertrophic Scar Post 3rd (1 Month 2 weeks) PDRN Injection

3. RESULT AND FOLLOW UP

There are four parameters in Vancouver Scar Scale to evaluate the scar: vascularity, pigmentation, pliability, and height. Each parameter contained ranked subscales that may be summed to obtain a total score ranging from 0 (representing

normal skin) to 13 (representing worst scar imaginable). During treatment period with PDRN, the patient did not show any worsening of Scar's condition from the thickness, width, rigidity, soreness decreased, and color became pale (Figure

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3). The Vancouver Scar Scale was downgrading from 10 to 3 in 3 months (Table 1).

Table 1. The Vancouver Scar Scale Result during Hypertrophic Scar Treatment Progress

Number of Meeting	Vancouver Scar Scale				Total
	Vascularity	Pigmentation	Pliability	Height	
1	2	3	3	2	10
2	2	2	2	1	7
3	2	2	2	1	7
4	1	1	1	1	4
5	1	1	1	1	4
6	1	1	0	1	3



Figure 3. Patient's Hypertrophic Scar Post 6th (3 Months) PDRN Injection



Figure 3. Follow up Post 6 Months from starting PDRN Injection

4. DISCUSSION

The combined use of PDRN injection and topical creams with *Allium cepa* extract and Vitamin E, showed a positive effect on hypertrophic scar without side effects. Minimizing inflammation is thought to be associated with

reducing scar formation. Persistent and histologically localized inflammation of the reticular layer of the dermis produces a pathological scar. Similarly, it has been shown that in a wound, dermal inflammation lasting 1–2 weeks

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can cause abnormal scarring and eventually pathological scarring.³

In patients with Diabetes Mellitus, it is explained that problems can occur in the wound healing process due to the prolongation of the inflammatory process in the wound. This is due to the process of increasing the release of pro-inflammatory cytokines such as interleukin 1 β (IL-1 β), Transforming growth factor, and tumor necrosis factor (TNF α) whose levels increase not only during the acute repair phase of early inflammation, but remain at high concentrations in the wound area for a longer time, thus indicating a prolonged inflammatory response. This long inflammatory process is a form of problem in the wound healing process. When the wound healing process undergoes an extension, it can cause one of them to form keloid scars or hypertrophic scars.⁴ This is supported by an experimental study about the comparison of the area of the scar formed between the addition of HMGB-1 in a tissue with tissue receiving PDRN therapy. Scar size in the HMGB-1 group and significantly wider than the PDRN group on Days 7 and 14, This is because the addition of HMGB-1 can cause higher inflammation with a wider scar area on Day 14.³

A case report using PDRN with *Allium cepa* topical therapy and vitamin E in a case of Hypertrophic Retracting Scar with Type 2 Diabetes Mellitus showed very good results.⁵ There a case report has also been reported with PDRN injection accompanied by a combination of treatment on hypertrophic scars showing improvement in thickness, width, stiffness, reduced pain, pale scar color, no telangiectasia.⁶ In addition, the results of the Vancouver Scar Scale showed changes in the pigmentation of the scars from hyperpigmentation to hypopigmentation. This is because PDRN can cause a decrease in melanin content, tyrosinase activity, and MITF and TRP-1 expression with a concomitant increase in the phosphorylated form of extracellular signal-regulated protein kinase (ERK) and AKT in mouse melanocytes. has anti-melanogenic properties.⁷

Topical Treatment with *Allium cepa* and vitamin E can have the effect of reducing thickness and symptoms in scars. This is because *Allium Cepa* can help reduce histamine levels and improve collagen formation in pathological scar tissue. In addition, this extract inhibited the production of cytokines and growth factors, such as IL-6 and VEGF, in human fibroblast cell lines. This activity may play an important role in distinguishing the abnormal proliferative process that results in the formation of keloids or hypertrophic scars.⁸

5. CONCLUSION

The combination of PDRN injection with the topical administration of *Allium cepa* extract, and vitamin E was reasonably effective, and safe in the treatment of this disabling scar on the dorsal hand. Further, properly

designed, controlled clinical trials are needed to confirm the effectiveness of this combination in a wider population and the role of the different treatments.

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STATEMENT OF CONSENT

The patient gave his informed consent to use his anonymized data for this study.

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