International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

From Helix to Habitat Understanding Salmon DNA Beyond Biology

Dr. Shruti R. Digraje

I2CAN, Institute of Cosmetology, Aesthetic and Nutrition.

Abstract: ***Salmon DNA is one of the newest technologies creating waves in the constantly changing fields of skincare and aesthetics. Despite its unusual name, research has revealed that this natural substance has amazing regeneration qualities that can greatly enhance the health and appearance of skin. Salmon DNA precisely being same as human DNA its, been found to give wonderful results in skin aesthetics. Salmon DNA is transforming the cosmetic industry with its anti-aging properties, deep hydration, and skin restoration (Beautologie, n.d.; Chen et al., 2022).and regeneration.***

Keywords: Salmon DNA, Regeneration, Anti-ageing, Deep Hydration, Skin Restoration, PDRN, Intrinsic and Extrinsic ageing

1. Introduction

Polydeoxyribonucleotide (PDRN), a different term for salmon DNA, is extracted from the sperm of fish or salmon. This DNA extract has strong healing, anti-inflammatory, and rebuilding qualities and is precisely same as to human DNA (Chen et al., 2022; IOSR Journals, 2023). It is a demanded component of the aesthetic treatment because it accelerates the production of collagen and repairs damage when applied to skin (Beautologie, n.d.; IOSR Journals, 2023)..

2. Aim

To study the role of Salmon DNA in skin aesthetics.

3. Objective

How Salmon DNA will work in skin repair and regeneration.

4. How Does Salmon DNA Work

Intrinsic and extrinsic causes, that each impair the skin's structural integrity and physiological function, are the driving forces behind the unavoidable process of skin aging. The first obvious indicators of aging are drooping, wrinkles, fine lines, and parched skin. One of the major issues of this century is combating aging.

Intrinsic and extrinsic causes, that each impair the skin's structural integrity and physiological function, are the driving forces behind the unavoidable process of skin aging (Tobin, 2017; Ganceviciene et al., 2012). The first obvious indicators of aging are drooping, wrinkles, fine lines, and parched skin. One of the major issues of this century is combating aging.

PDRN's qualities have been proven by research, these include anti-inflammatory, anti-apoptotic, anti-osteoporotic, anti-melanogenetic, anti-allodynic, anti-osteo-necrotic, bone-regenerative, tissue damage prevention, anti-ulcerative, and wound-healing qualities (Chen et al., 2022; IOSR Journals, 2023).

Additionally, PDRN can be utilized to treat hyperpigmentation and stimulates angiogenesis, cellular activity, collagen production, soft tissue repair and rejuvenation. Thus, the prospective application of PDRN as a skin anti-aging drug was evaluated in this research (Beautologie, n.d.; Chen et al., 2022).

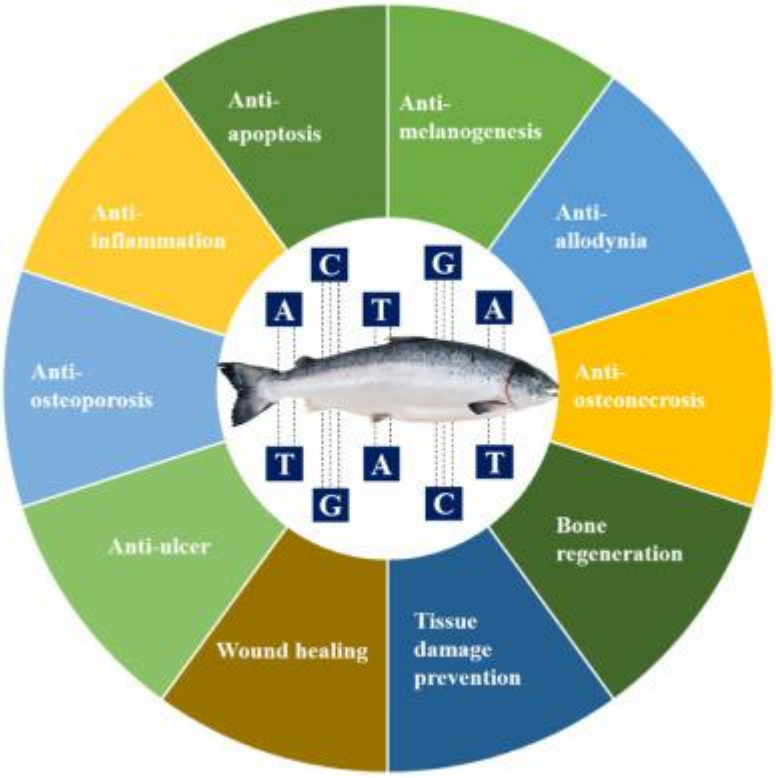

Figure 1: Therapeutic effects of PDRN. PDRN, Polydeoxyribonucleotide.
Referred from: https://doi.org/10.1016/j.cjprs.2022.09.015

5. Understanding Process of Skin Aging

- There are multiple factors responsible for the aging in the skin.
- They are classified as Intrinsic and Extrinsic Aging (Tobin, 2017; Strnadova et al., 2019).
- There are multiple factors responsible for the aging in the skin.
- They are classified as Intrinsic and Extrinsic Aging.

5.1 Intrinsic Aging

The main cause of intrinsic aging is the production of reactive species (ROS). These are continuously formed during normal energy production inside the mitochondria. ROS damages skin cells and lead to decrease in dermal fibroblasts. They also increase enzymes that break collagen and elastin and reduce the ability of skin's matrix to produce new collagen and elastin (Strnadova et al., 2019). As a result, the skin becomes thinner, weaker and less elastic, showing the signs of aging (Tobin, 2017; Birch-Machin & Bowman, 2016).

5.2 Extrinsic Aging-

Extended exposure to ultraviolet (UV) radiation is the primary cause of extrinsic skin aging because it produces reactive oxygen species (ROS) that lead to harmful oxidative stress (Ganceviciene et al., 2012; Birch-Machin & Bowman, 2016).

5.3 How to understand ageing caused is by intrinsic factors or extrinsic factors-

Intrinsic ageing (natural / chronological ageing)
This is the ageing that happens from within. It is genetically programmed and unavoidable. With time, cell turnover slows down, collagen and elastin production decreases, fibroblast activity reduces, and skin's repair mechanism weakens. The result is fine lines, gradual loss of firmness, dryness, and thinning of skin—even if the skin is well cared for.

Extrinsic ageing (environment-induced ageing)
This ageing happens due to external factors and is largely preventable. UV radiation, pollution, smoking, stress, poor diet, lack of sleep, and repetitive facial movements accelerate oxidative stress and inflammation. These factors damage collagen, increase MMP activity, cause pigmentation, deep wrinkles, dullness, and uneven texture- making skin look older than its actual age.

5.4 Mode of Action of Salmon DNA (Polydeoxyribonucleotide)-

The adenosine A2A receptor is activated as part of PDRN's mode of action. Specifically, A2A receptor activation can enhance tissue regeneration and healing by keeping track of the process of inflammation and cellular death process (Chen et al., 2022; IOSR Journals, 2023).

Damage to the skin occurs by structural and internal modifications in collagen, the most prevalent protein. Collagen gives tissues firmness and rigidity. In one research, it was shown that inhibition of MMP1 expression led to a rise in elastin, collagen, and fibroblast production, whereas a reduction in MMP activity led to collagen synthesis (Chen et al., 2022).

As previously stated, PDRN increases the formation of collagen by blocking MMP1 expression, thus boosting collagen production (Chen et al., 2022; IOSR Journals, 2023).

5.5 How NAD+ and Salmon DNA work differently in skin-

NAD^+ (Nicotinamide Adenine Dinucleotide)
NAD^+ works at the cellular energy and ageing regulation level. It is essential for mitochondrial function and ATP production. In skin cells, NAD^+ activates sirtuins (anti-ageing proteins), improves DNA repair, reduces oxidative stress, and delays cellular senescence. Its main role is slowing intrinsic ageing by improving cell metabolism, longevity pathways, and stress resistance.

Salmon DNA (PDRN – Polydeoxyribonucleotide)
PDRN works at the tissue repair and regeneration level. It acts via the adenosine A2A receptor, stimulating fibroblast proliferation, collagen synthesis, angiogenesis, and wound healing. In skin, it repairs damaged tissue, improves elasticity, thickness, hydration, and accelerates recovery after procedures. Its main role is repairing damage caused by extrinsic ageing and inflammation. Think of PDRN as healing and rebuilding damaged skin structure**.**

5.6 DNA Synthesis

Damage to the DNA is a leading cause to skin aging (Tobin, 2017). For skin homeostasis to be maintained, DNA synthesis is required. UV radiation is a major cause of DNA damage (Ganceviciene et al., 2012). Angiogenesis and tissue regeneration are two benefits of PDRN (Chen et al., 2022; IOSR Journals, 2023).

5.7 Salmon DNA for Hyperpigmentation-

Melanin is a pigment that gives a person's skin its colour. Melasma, freckles, and post-inflammatory hyperpigmentation are just a few of the hyperpigmentation problems that can result from its excess production and buildup with more ultraviolet (UV) exposure (Ganceviciene et al., 2012).

By inhibiting melanogenic gene expression and tyrosinase enzymatic activity, PDRN prevents the formation of melanin (Chen et al., 2022). PDRN has a significant impact on skin lightening (Beautologie, n.d.; IOSR Journals, 2023)..

5.8 Hair Regeneration

Hair loss is defined as progressive thinning of hair characterized by a gradual decrease in number of hairs. This common form of alopecia affects millions of people worldwide (Strnadova et al., 2019).

Studies have shown that PDRN used for hair treatment has shown good results in increasing number of hair as well as their thickness (IOSR Journals, 2023). Also combining PDRN with other treatments for hair growth has shown efficient results (IOSR Journals, 2023).

6. Methods of Use

Fibroblasts present in dermis layer serve as building block of collagen. Polynucleotides promote growth of fibroblasts. As fibroblasts are located in dermal layer, polynucleotides must be administered directly into this layer to get its maximum benefits (Chen et al., 2022).

We can directly penetrate PDRN into the dermis layer with help of lasers. Also, we can do micro-needling to increase the absorption of PDRN by doing minimal invasion into the skin. Mesotherapy or electroporation helps in restoration and supplementation of the loss in skin nourishment (Beautologie, n.d.; IOSR Journals, 2023). We can also give skin boosters for collagen boost. These are few methods we can use PDRN in skin aesthetics.

7. Discussion

Skin aging can't be stopped but it can be delayed. Skin is largest organ that serves barrier between organs and outside world. Changes in structure of skin shows visible signs of aging (Strnadova et al., 2019)..
Collagen helps in slowing down of aging process. The main aim of PDRN is anti-aging. It reverses the signs of aging, repairs the damage caused to skin due to various reasons, improves hydration and barrier function and overall improvement in skin quality (Beautologie, n.d.; Chen et al., 2022). Hence, PDRN when combined with other therapy gives good results (IOSR Journals, 2023).

8. Conclusion

Based on studies, well-known mechanism of action of PDRN helps in slowing down aging, improve skin quality, and improve skin regeneration (Chen et al., 2022; IOSR Journals, 2023).. However, more research study will help in knowing benefits of using PDRN.

References

[1] https://www.beautologie.com/blog/what-are-the-aesthetic-benefits-of-salmon-dna?utm_source
[2] https://doi.org/10.1016/j.cjprs.2022.09.015Get rights and content
[3] D.J. Tobin Introduction to skin aging J Tissue Viability, 26 (1) (2017), pp. 37-46, 10.1016/j.jtv.2016.03.002 View PDFView articleView in ScopusGoogle Scholar
[4] R. Ganceviciene, A.I. Liakou, A. Theodoridis, *et al.* Skin anti-aging strategies Dermatoendocrinol, 4 (3) (2012), pp. 308-319, 10.4161/derm.22804 Google Scholar
[5] M.A. Birch-Machin, A. Bowman Oxidative stress and ageing Br J Dermatol, 175 (Suppl 2) (2016), pp. 26-29, 10.1111/bjd.14906 View in ScopusGoogle Scholar
[6] K. Strnadova, V. Sandera, B. Dvorankova, *et al.* Skin aging: the dermal perspective Clin Dermatol, 37 (4) (2019), pp. 326-335, 10.1016/j.clindermatol.2019.04.005 View PDFView articleView in ScopusGoogle Scholar
[7] https://www.iosrjournals.org/iosr-jdms/papers/Vol22-issue8/Ser-7/C2208073235.pdf?utm_source

[8] IOSR Journal of Dental and Medical Sciences. (2023). Role of polydeoxyribonucleotide in tissue regeneration. https://www.iosrjournals.org/iosr-jdms/papers/Vol22-issue8/Ser-7/C2208073235.pdf

Author Profile

Dr. Shruti Digraje is a qualified medical professional and faculty at I2CAN Institute, Pune. She holds a Bachelor's degree in Homeopathic Medicine and Surgery (BHMS). Further, she has pursued advanced training in Post Graduate Diploma in Emergency Medicine and Post Graduate Diploma in Clinical Cosmetology and Trichology. She has four years of hands-on clinical experience, with a professional focus on patient- centered care and clinical cosmetology. Currently contributing to both academic instruction and clinical skill development.