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# Critically Analyse the Historical and Economic Contexts of Aesthetic Practice

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## Abstract

Botulinum Toxin is produced by Clostridium botulinum, a gram-positive anaerobic bacterium. The first case of Botulism was believed to have occurred in Germany in 1793 a rare and potentially fatal illness causing weakness, blurred vision and neurological manifestations that can lead to respiratory failure. Commonly acquired through ingestion of contaminated or improperly processed food and from wound infection. This toxin exists in eight distinct forms; A to G, with A, B, E & F causing Human botulism. The same organism, Clostridium botulinum type A (BoNTA) has been cultivated and is a widely used therapeutic and cosmetic agent. It is the core component of "BOTOX®"- the infamous tradename for anti-wrinkle injection treatment. Beyond cosmetic use, BoNTA has numerous therapeutic uses; migraines, spastic disorders, bruxism, hyperhidrosis and cerebral palsy are just a handful of examples. In the past decade cosmetic use propelled its popularity; used to treat glabellar "lines, the frontalis muscle, peri-orbital lines, gummy smile and masseter **muscle hypertrophy**".

Whilst Botulinum Toxin was known about as early as the 1700's and has been refined over time to produce a safe and widely used products today- the history of Dermal Fillers and their role in cosmetics and therapeutic Medicine is much shorter. First discovered in 1970s, when animal Collagen and in particular Bovine Collagen was used as the basis of collagen injections and implants. Being a foreign body, adverse reactions and rejection was high with numerous complications experienced. It was not until the discovery and implementation of Hyaluronic Acid; an already abundant substance in the human body in Dermal Fillers that increased its safety profile and subsequently popularity. Similar to BoNTA, Dermal Filler treatment has had a role to play in clinical and cosmetic treatments. HA plays a key role in "tissue injury, regulating tissue repair and disease processes, such as activation of inflammatory cells to mount an innate response to injury" whilst also providing "protection against tissue damage" and "promotes (tissue) regeneration and repair". In the Aesthetic industry it plays a central role in 'volume replacement' and is widely used to treat lines and reshape the face. The premise of dermal filler treatment in aesthetics is to use high concentration of Hyaluronic Acid to replace lost collagen or to increase tissue volume- depending on the treatment requested and client desired outcome.

This essay will explore the development of BoNTA & dermal fillers and how they have been adapted for therapeutic and cosmetic use, thereby making them one of the most versatile and popular treatments today and being the core component of a multi-billion-pound industry.

## Changing Role of BoNTA

As discussed above, Clostridium Botulinum has been known about since the 18th century however, it was not until 1968 that Botulinum was used for medicinal purposes- where it was used the treat "hyperactive muscles involved with strabismus" and today is used to treat a variety of ophthalmoplegic conditions. This initial research paved the way for Botulinum to be used for a variety of medicinal purposes; from treating tremors to migraines and bruxism. Its properties as a neurotransmitter blocker are what drew doctors and researchers and in the late 20th Century became an ever-popular treatment.

It was Jean Carruthers, a Canadian Ophthalmologist in 1987 who observed that "frown lines disappeared after the use of botulinum toxin A for blepharospasm"; and from this simple observation stumbled upon one of the most revolutionary and widely used cosmetic treatments today. Since then, Botulinum has become the mainstay of cosmetic treatment for fine lines and wrinkles; particularly the glabellar, forehead and 'crows feet'. Other dermatological applications have been in the treatment of facial asymmetry and hyperhidrosis. An excellent safety profile, minimal complications and ease of use has been the driving force behind the popularity of Botulinum treatment.

Uses of Botulinum Toxin in Cosmetic and Therapeutic Medicine

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| wrinkles between the eyebrows, called frown lines, glabellar lines, or elevens |
| wrinkles around the eyes, known as crow's feet |
| horizontal creases in the forehead |
| lines at the corners of the mouth<br>"cobblestone" skin on the chin<br>upper limb spasticity |
| crossed eyes or Strabismus |
| severe underarm sweating or Hyperhidrosis |
| preventing migraine in people whose migraine headaches last at least 4 hours on 15 or more days per month |
| reducing symptoms of an overactive bladder due to a neurological condition |

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| eyelid spasms, or blepharospasm, due to dystonia |
| a neurological movement disorder called cervical dystonia that affects the head and causes neck pain |
| Grinding of teeth or Bruxism |

With guidelines on dosage and how to administer Botox, it is one of the simpler aesthetic procedures- often very quick to administer and "produces high rates of improvement with rapid onset and long duration of action"; taking up to 14 days for full effect and often lasting 3-6 months, after which the effects will reduce over time. By paralysing the muscle injected, this will prevent fine lines and wrinkles from forming or worsening. This shows why this is such a popular treatment; quick to administer, safe, minimal contraindications, quick onset of action and long lasting whilst even leading to events such as "Botox" parties.

## Changing role of Dermal Fillers

Juvenescence, as described by Professor Harrison at Stanford in his exploration of the cultural history of our age, refers to a societal obsession with maintaining a youthful appearance. He remarked "the young have become a model of emulation for the older population, rather than the other way around". This concept has been prevalent throughout history; with the earliest forms of skin rejuvenation techniques using paraffin used in the 1800's- abandoned after complications developed. It was not until the 1930s that injectable silicone was used for facial rejuvenation- and was still widely used until relatively recently, however, being a permanent foreign product, the chances of complications remained high. The first synthetic group of fillers were bovine derived collagen however these also led to frequent complications and required lengthy allergy testing prior to injection (2 separate tests 4 weeks apart); for an industry centred around immediate effect and ease of accessibility, these bovine collagen injectables were not going to last. In 1989, Balazs developed the first HA filler, understanding the lack of immunogenicity making this a novel and ground-breaking new product- the revolution had begun.

By 2003, the FDA approved Hyaluronic Acid for use in dermal fillers as a wrinkle treatment; and subsequently we have seen an exponential rise in its use, with numerous brands worldwide releasing variations of HA fillers aimed at the aesthetic industry. This propelled HA filler treatment popularity and has now become the fifth most common non-surgical cosmetic procedure in the US. As a naturally occurring product, its bio and physico-chemical properties alongside its safety profile has made HA a highly popular product, becoming the mainstay of aesthetic medicine. Furthermore, a key reason behind HA based dermal fillers becoming increasingly popular and the cornerstone of aesthetic treatment above materials used historically (such a Bovine Collagen and Silicone) is its reversibility. Whilst serious complications can still occur, such as Vascular occlusions and granulomatous nodules- with prompt recognition the potentially harmful effects of these can be revered through the use of Hyaluronidase Enzymes to dissolve the filler.

Whilst an excellent product for dermal fillers, a comprehensive study of its applications and roles in wider medicine by Arianna Fallacara et al explored how HA can be used beyond cosmetic medicine Figure 1 shows the applications of HA and its derivatives and summarized.


## Hyaluronic Acid Therapeutic Role

- Cancer therapy: Numerous tumour cell receptors have a high binding capacity with HA, and therefore through use of HA based drug delivery can offer more targeted cancer therapy treatments.
- Wound Treatment: Hyaluronan plays a central role throughout the wound healing process as "a product of inflammation but, more importantly, a promoter of inflammation and of the entire process of wound repair".
- Ophthalmology: Naturally found in the "vitreous body, lacrimal gland, corneal epithelium and conjunctiva and tear fluid". Used in numerous interventions, HA solutions protect, lubricate and replace lost vitreous fluids. It is also a core component of many eye drops, hydrating and improving quality of vision whilst even being used to increase the comfort of contact lenses.
- Arthrology: HA is known to be commonly found in joints around the body; providing a lubricating effect, in particular of synovial joint fluid. Inflammation of joints, as seen particularly in Osteoarthritis causes a reduction in HA concentration. Intra-articular injections of HA into joints have been shown to provide long term benefits
- Rhinology & Pneumology: HA plays a role in airway functionality; forming an important constituent of airway secretions, promotes mucociliary clearance, stabilises the airway connective tissue and has an anti-inflammatory role. HA has proven to be an effective agent in treating Rhinitis, Asthma, COPD and CF.
- Soft Tissue Regeneration: The most widely used role of HA is in cosmetics, used to counteract the effects of aging skin through "loss of facial skin hydration, elasticity and volume" . Forming a key component of dermal fillers, these products have become the cornerstone of viscoaugmentation; "soft tissue contouring and volumizing". As our understanding of HA

has increased and with a highly competitive consumer driven market, the development of new HA dermal filler products for the cosmetic industry and spurred development and progression, with HA now used for a variety of roles, including as a "injectable moisturiser" (eg Profilho). Its safety record and ease of administration with modern injectable techniques makes this a highly popular product.

HIV-associated facial lipoatrophy: This is a HIV associated condition, causing changes to the fat distribution, in particular loss of fat from the face is one of the most stigmatizing signs of HIV. With HIV now a medically manageable disease, with those treated having a lifespan and quality of life similar to those without, such symptoms of FLA- a known side effect of anti-retroviral treatment, affecting the cheeks, temple and orbits has an associated social stigma, with a prevalence exceeding 50%. A systematic review of HIV associated facial lipoatrophy by Jagedo et al found the use of dermal fillers (in particular "poly-L-lactic acid" fillers) to show good results at treating this side effect. An excellent example of the remarkable diversity of use of HA filler treatment.

The table above is just a small example of the diverse role HA treatments can play in modern medicine. Whilst its use in aesthetics has propelled the use of these treatments, due to the consumer driven market with scope for large profits. This financial injection has been a significant driving force in the rapid increase in our understanding of HA; how it can be manipulated and manufactured to cater to our needs. Through this medical practice has also benefited as our realisation of its diverse uses and as seen above cosmetic and aesthetic treatments is just one of the many roles HA plays in modern day medicine.

Through this essay we have explored the historical context of BoTNA and HA based dermal fillers, seeing how these two highly popular products have been refined and developed over time to suit a variety of roles and purposes. This essay has highlighted the wide variety of roles these products can play beyond cosmetic and dermatology purposes. We have seen many of their roles being central to medicinal treatment, and their initial discoveries were for therapeutic use. It has been over time that we have realised these products can be used for aesthetic medicine. The consumer driven market of Aesthetics has propelled their popularity and has exponentially increased our research and development into these products; something which will only increase over time.

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