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OPTIMIZATION OF SKIN QUALITY ON THE FACE AND NECK: AN INTEGRATED PROTOCOL WITH NEW GENERATION POLY-L-LACTIC ACID (ANGELIS® – PHARMAESTHETICS) AND HYPERDILUTED BOTULINUM TOXIN

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Abstract: The optimization of skin quality in the face and neck—including texture, micro-relief, sheen, visible pores, oiliness, and uniformity—has become a central therapeutic outcome in aesthetic dermatology and orofacial harmonization, especially in the lower third of the face and neck, regions with high anatomical complexity and functional risk when injectable techniques do not respect critical planes and areas (BRANDT; BOKER, 2003; JABBOUR et al., 2017; YOUN et al., 2022; KASSIR et al., 2023). This article proposes an integrated protocol combining new-generation PLLA (Angelis® – Pharmaesthetics) and Botulinum Toxin Type A, applied both conventionally (dynamic force control) and by hyperdiluted intradermal microdroplets (microbotox) for skin quality endpoints (WU, 2015; AWAIDA et al., 2018; RAHMAN et al., 2024; CIDRÃO, 2026). It should be emphasized that Angelis® PLLA (150 mg) has optimized micromorphology (spherical/homogeneous particles and lower average micronization, around 30.4 μm) and that hyperdilution generates a very low viscosity suspension ("low rheology"), promoting homogeneous spreading, reducing polymer density per tissue volume, and minimizing the risk of microaggregates—a critical point for enabling application in areas of repetitive mobility when associated with muscle tension reduction with toxin (CIDRÃO, 2025). It is concluded that the integrated strategy is mechanistically coherent and clinically applicable, provided it is performed with refined technique and in-depth anatomical mastery (VLEGGAAR; FITZGERALD, 2021; TAM et al., 2025).

Keywords: Poly-L-Lactic Acid; PLLA; Angelis; Pharmaesthetics; Biostimulation; Botulinum toxin; Microbotox; Skin quality; Neck.

Introduction

Contemporary aesthetics has evolved from an exclusive focus on wrinkles and volumization to a model in which skin quality acts as a determinant of naturalness and perception of rejuvenation—especially in the neck and lower third of the face, where crepitus, texture, and fine irregularities are often the "bottleneck" of the result (WU, 2015; NG; LELLOUCH, 2022; RAHMAN et al., 2024).

At the same time, biostimulators such as PLLA have gained relevance for inducing neocollagenesis and progressive dermal remodeling (VLEGGAAR, 2005; AO; YI; WU, 2024; SIGNORI et al., 2024; OUYANG et al., 2025). Botulinum toxin has expanded beyond the control of wrinkles, including intradermal microbotox, with an impact on texture/glow and adnexal parameters when performed strictly superficially (WU, 2015; AWAIDA et al., 2018; KANDHARI et al., 2022; CIDRÃO, 2026).

This article organizes an integrated protocol with an emphasis on a new generation PLLA — Angelis® (Pharmaesthetics) — and highlights that feasibility in areas of repetitive mobility is supported by a combination of optimized micromorphology + low viscosity rheology through hyperdilution + reduction of muscle tension with toxin (CIDRÃO, 2025).

Methodology

This is a technical-scientific synthesis article with an integrated protocol proposal, anchored in contemporary literature on:

- PLLA (mechanisms, safety, reconstitution/hyperdilution, and adverse events) (LAESCHKE, 2004; VLEGGAAR, 2005; VLEGGAAR; FITZGERALD, 2021; AO; YI; WU, 2024; SIGNORI et al., 2024; OUYANG et al., 2025).
- Intradermal microbotox for skin quality on the lower face and neck, considering technique, anatomy, and safety (WU, 2015; AWAIDA et al., 2018; NG; LELLOUCH, 2022; RAHMAN et al., 2024).

The clinical images presented are from the author's personal collection, obtained with free and informed consent, with anonymization and removal of identifiers, and are used exclusively for scientific and educational purposes.

Theoretical basis

PLLA as a collagen biostimulator

PLLA is a biomaterial widely used as a biostimulator, with a mechanism based on controlled subclinical inflammatory response and fibroblastic stimulation, resulting in a progressive increase in collagen (types I and III) and gradual improvement in skin firmness/thickness/elasticity (OH et al., 2023; BERNARDO et al., 2024; AO; YI; WU, 2024; SIGNORI et al., 2024).

The safety of PLLA depends on technique, plan, dilution, and homogeneous distribution, as well as understanding adverse events and their mitigation (LAESCHKE, 2004; VLEGGAAR; FITZGERALD, 2021). Studies and reviews also address reconstitution/use and clinical safety (BAUMANN et al., 2020; PALM et al., 2021; BRAVO; CARVALHO, 2021; VASCONCELOS-BERG et al., 2024).

Angelis® PLLA (Pharmaesthetics): micromorphological and rheological properties that enable technique in dynamic areas

In regions of repetitive movement (e.g., frontal and perilabial), the main requirement is that the implant integrates without mechanical resistance to contraction and without generating micro-deposits that are noticeable with facial expressions (CIDRÃO, 2025).

In the CIDRÃO (2025) reference, Angelis® PLLA (150 mg) is described as a new generation PLLA with technical differences directly related to safety in mobile areas:

1. Optimized micromorphology

- Lower average micronization, around 30.4 µm, when compared to traditional formulations (CIDRÃO, 2025).
- Spherical and homogeneous particles, reducing particle-particle friction and propensity for agglomeration, favoring greater suspension stability and more uniform tissue dispersion (CIDRÃO, 2025).
- From a biomaterial point of view, microparticles in this dimensional range tend to resist rapid phagocytosis, maintaining tissue stimulation with a lower risk of disorganized responses when well dispersed (LAESCHKE, 2004; CIDRÃO, 2025).

2. Low viscosity rheology due to hyperdilution ("low rheology")

- Hyperdilution (e.g., 10–12 mL or more for a 150 mg vial) produces a suspension with very low viscosity, facilitating spreading over a wide area and reducing polymer density per tissue volume, which is critical for reducing the risk of microaggregates and nodules in dynamic areas (CIDRÃO, 2025).

3. Feasibility of immediate use after reconstitution

- The protocol described supports immediate stable reconstitution, without signs of clumping/precipitation, favoring clinical logistics and, above all, reducing a factor historically associated with nodules (insufficient/heterogeneous reconstitution) (BAUMANN et al., 2020; BRAVO; CARVALHO, 2021; PALM et al., 2021; VASCONCELOS-BERG et al., 2024; CIDRÃO, 2025).

In addition, the same reference describes synergy when combining botulinum toxin to reduce muscle tension, creating an environment of less mechanical traction during the collagen deposition/organization phase, which is particularly relevant in areas of repetitive mobility (CIDRÃO, 2025).

Botulinum toxin type A in the lower third and neck

Botulinum toxin type A remains a therapeutic pillar for controlling muscle hyperactivity and functional/aesthetic harmonization, with applications in the neck and lower face requiring careful selection and refined technique, given the possibility of adverse effects due to diffusion (BRANDT; BOKER, 2003; JABBOUR et al., 2017; KASSIR et al., 2023). Anatomical findings of the platysma support safer strategies based on morphological characteristics and relationships with cervical structures (YOUN et al., 2022).

Intradermal microbotox: rationale, technique, and evidence for skin quality

Intradermal microbotox (superficial microdroplets of hyperdiluted toxin) has been proposed to modulate components of the skin envelope and appendages, with outcomes in texture/sheen, visible pores, and overall improvement in skin quality, preserving naturalness when strictly superficial (WU, 2015; AWAIDA et al., 2018; KANDHARI et al., 2022; RAHMAN et al., 2024; CIDRÃO, 2026).

The CIDRÃO (2026) reference consolidates parameters and practical markers for safe execution, especially relevant in the neck/lower face:

- Intradermal plane validated by whitish papule/bleb and resistance to the plunger (WU, 2015; AWAIDA et al., 2018; BERTOSSI et al., 2019; CIDRÃO, 2026).
- High density of points and microvolumes (e.g., ~0.01 mL per point in protocol descriptions), avoiding large drops and deep planes (BERTOSSI et al., 2019; CIDRÃO, 2026).
- Approximate grid 0.8–1.0 cm, with anatomical delimitation of the platysma and protection zones: avoid the depressor anguli oris (DAO) region (smile asymme-

try) and the sternocleidomastoid (SCM) area (cervical weakness) (CIDRÃO, 2026).

Additional evidence includes quantitative aesthetic improvement (DIASPRO et al., 2020), a lifting effect in reviews (NG; LELLOUCH, 2022), oiliness (ROSE; GOLDBERG, 2013; RHO; GIL, 2021), and erythema/rosacea (YEH; SHIH; HUANG, 2025), with heterogeneity of products and concentrations (WU, 2015; AWAIDA et al., 2018; KASSIR et al., 2023).

Proposed integrated protocol (Face + Neck)

Patient assessment and selection

1. Targeted medical history with functional risk screening (history of dysphagia/dysphonia, cervical weakness, previous surgeries, and functional complaints).
2. Static and dynamic examination of the lower third and neck, with analysis of the platysma pattern and vectors (BRANDT; BOKER, 2003; JABBOUR et al., 2017; YOUN et al., 2022).
3. Definition of the primary endpoint:

- a) Muscle dynamics/strength → conventional toxin.
- b) Skin quality → intradermal microbotox.
- c) Progressive structure/firmness → PLLA (AO; YI; WU, 2024; SIGNORI et al., 2024).

PLLA Angelis® (Pharmaesthetics): reconstitution/hyperdilution and application

Biostimulator: Angelis® PLLA 150 mg (Pharmaesthetics) (CIDRÃO, 2025).

To increase reproducibility and reduce variability between sessions, it is recommended to standardize the protocol with photographic records of the material used, including Angelis® PLLA (Pharmaesthetics) and supplies for hydration/hyperdilution (Figure 1). This documentation strengthens the technical traceability of the procedure and facilitates internal auditing of the protocol.

Figure 1 – Angelis® (Pharmaesthetics) and supplies for the hydration/hyperdilution protocol: organization of the clinical kit.

Source: Author's personal collection.

Reconstitution/hyperdilution (operating protocol):

- Reconstitute immediately before use with a total volume of 12 mL (10 mL of sterile water for injection + 2 mL of articaine with vasoconstrictor).
- Shake vigorously for ~1 minute to obtain a homogeneous suspension (CIDRÃO, 2025).

For didactic and clinical standardization, the author uses a color-coded map that

differentiates indications by plane/strategy: white for reconstituted botulinum toxin markings; solid red for standard hydrated PLLA; dashed red for PLLA with reduced standard hydration volume; red on the neck for hyperdiluted PLLA on the neck; and gold for hyperdiluted PLLA in mobile areas (Figure 2). This visual reading allows for consistent distribution and reinforces the "material + technique" logic described in the protocol (CIDRÃO, 2025).

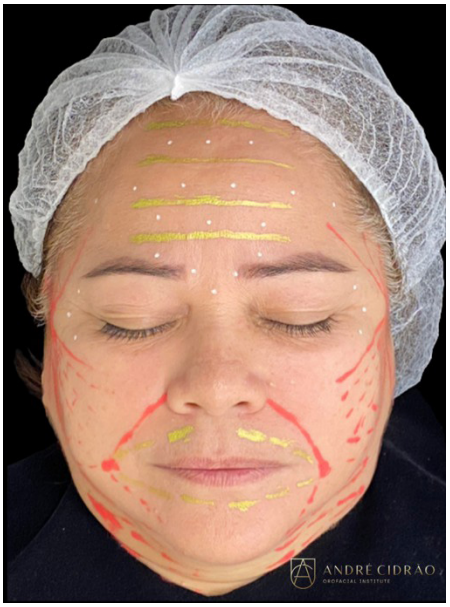

Figure 2 – Chromatic map marking the protocol (patient): white (reconstituted botulinum toxin), solid red (standard hydrated PLLA), dashed red (PLLA with lower hydration), red neck (hyperdiluted PLLA in the neck), and gold (hyperdiluted PLLA in mobile areas).

Source: Author's personal collection.

Plan and technique:

- Plan: dermo-subcutaneous (CIDRÃO, 2025).
- Instrument: 22G × 50 mm microcannula (CIDRÃO, 2025).
- Method: linear retroinjection.
- Volume control: limit to approximately 0.1 mL per path/route to promote homogeneous distribution and reduce the risk of nodules (CIDRÃO, 2025; VLEGGAAR; FITZGERALD, 2021).

Areas of application (as proposed in the protocol): face (middle/lower third, temporal/preauricular region) and neck (submental/lateral, areas of sagging and crepitus), always with individual assessment (CIDRÃO, 2025).

Key point (the technical "why"): hyperdilution creates a very low viscosity suspension, favoring spreading, reducing polymer density per volume and, together with the optimized micromorphology of Angelis®, reduces the risk of agglomeration — enabling application with a better safety margin in dynamic areas, when well indicated and associated with muscle tension control with toxin (CIDRÃO, 2025).

Conventional botulinum toxin (force control)

Individualized application to reduce muscle hyperactivity and contribute to aesthetic predictability, including mimicry regions and neck when indicated (BRANDT; BOKER, 2003; JABBOUR et al., 2017; KASSIR et al., 2023).

The association with PLLA is supported as a strategy to reduce mechanical traction during the remodeling period, especially in areas of repetitive movement (CIDRÃO, 2025).

Hyperdiluted intradermal microbotox (skin quality) – lower third and neck

Minimum technical principles (safety + reproducibility):

1. Mandatory intradermal plane, guided by:

- whitish papule/bleb;
- resistance to the plunger (WU, 2015; AWAIDA et al., 2018; BERTOSSI et al., 2019; CIDRÃO, 2026).

2. Grid/interval: typically 0.8–1.0 cm between points, adjusted to skin phenotype and cervical thickness (WU, 2015; CIDRÃO, 2026).
3. Microvolume: microdroplets with very low volumes (e.g., ~0.01 mL per point in described protocols), avoiding bolus and excessive depth (BERTOSSI et al., 2019; CIDRÃO, 2026).
4. Anatomical delimitation and protection zones: respect the extent of the platysma and avoid DAO (smile asymmetry) and ECM (cervical weakness), in addition to paying maximum attention to functional risk in the neck (BRANDT; BOKER, 2003; YOUN et al., 2022; CIDRÃO, 2026).

To increase reproducibility and reduce technical variability, it is recommended to standardize the application of microbotox by means of prior marking on a grid, respecting regular intervals and anatomical limits of the lower third and neck, including protection zones to reduce functional risk. An example of clinical marking used by the author is shown in Figure 3.

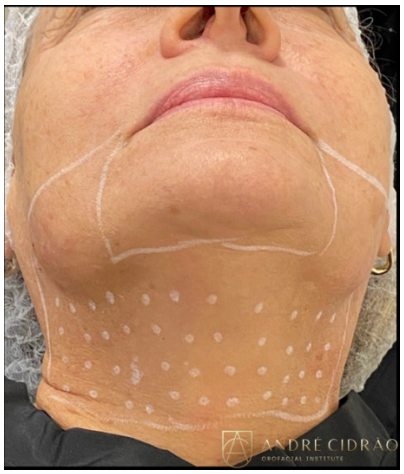

Figure 3 – Grid marking for intradermal Microbotox in the lower third of the face and neck (clinical example from the author).

Source: Author's personal collection (CIDRÃO, 2026).

The safety of microbotox in the lower third and neck is plane-dependent. Intradermal execution can be clinically confirmed by the formation of a papule/bleb and resistance to the plunger during microinjection. Figure 4 illustrates intradermal application and the expected immediate bleb pattern, used as a practical plane marker.

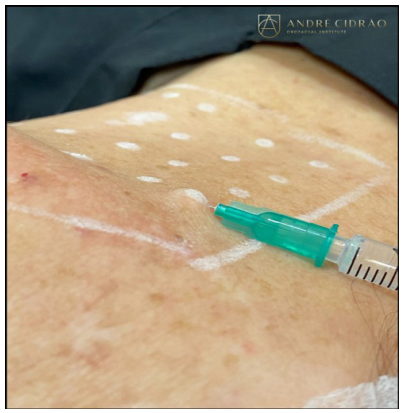

Figure 4 – Intradermal application in microdroplets with papule/bleb formation as a clinical plane marker (Microbotox).

Source: Author's personal collection (CIDRÃO, 2026).

Practical risk rule: on the neck, "flat and drop" determine risk. The literature agrees that deep deposits and large drops increase diffusion and functional events, while superficiality and microdrops tend to reduce complications (WU, 2015; AWAIDA et al., 2018; YOUN et al., 2022; CIDRÃO, 2026).

Integrated schedule (clinical logic)

- D0: conventional toxin (forces) + hyperdiluted Angelis® PLLA (structure) + intradermal microbotox (surface), according to the dominant endpoint.
- D15–D30: symmetry check, fine adjustments, and reassessment of skin quality.
- D60–D90: intermediate phase of PLLA (consolidation of firmness/thickness/elasticity).
- D180: long-term review and annual maintenance plan (CIDRÃO, 2025; RAHMAN et al., 2024; TAM et al., 2025).

Discussion

Synergy: "functional control" + "structural reconstruction" + "surface polishing"

The integrated proposal acts on three layers of aging:

- Functional/dynamic: conventional toxin (BRANDT; BOKER, 2003; KASSIR et al., 2023).
- Structural/biological: PLLA (AO; YI; WU, 2024; SIGNORI et al., 2024; OUYANG et al., 2025).
- Superficial/skin quality: intradermal microbotox (WU, 2015; AWAIDA et al., 2018; RAHMAN et al., 2024; CIDRÃO, 2026).

The combination with toxin is particularly strategic for dynamic areas, as it reduces repetitive traction, favoring more orderly collagen deposition during the biological phase of PLLA (CIDRÃO, 2025).

Why Angelis® "opens the door" to areas of repetitive mobility

The differential defended for Angelis® PLLA – Pharmaesthetics lies in the combination of micromorphology + rheology by hyperdilution:

- more spherical/homogeneous particles and ~30.4 μm, reducing the propensity for agglomeration and favoring suspension stability;
- hyperdilution with very low viscosity, allowing wide spreading and lower local polymer density;
- feasibility of immediate immediate post-reconstitution withoutevidence of lumps/precipitation in the protocol described (CIDRÃO, 2025).

This combination reduces a classic risk vector in mobile areas: concentrated micro deposits that become visible/palpable with mimicry (VLEGGAAR; FITZGERALD, 2021; CIDRÃO, 2025).

In areas of repetitive mobility, technical feasibility depends on the combination of material properties and distribution strategy. The author's clinical marking illustrates the selection of areas for Angelis® PLLA in standard hydration (solid red) and in hyperdilution for mobile areas (gold), reinforcing

the logic of dispersion/low viscosity and reduced risk of microaggregation described in the rheological rationale (Figure 5) (CIDRÃO, 2025).

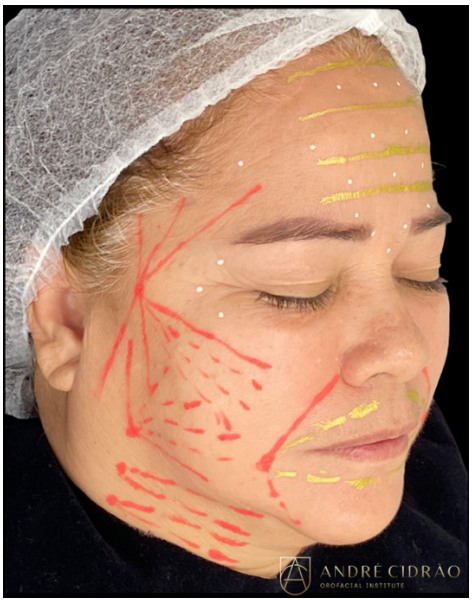

Figure 5 – Clinical marking of Angelis® PLLA in the upper third of the face and hyperdilution strategy in mobile areas (gold).

Source: Author's personal collection.

Safety and risk mitigation

For PLLA: risk historically associated with nodules/irregularities is mitigated by hyperdilution, correct technique, volume control per path, and material properties (BAUMANN et al., 2020; PALM et al., 2021; BRAVO; CARVALHO, 2021; VASCONCELOS-BERG et al., 2024; VLEGGAAR; FITZGERALD, 2021; CIDRÃO, 2025).

For microbotox: safety critically depends on intradermal plane, microvolumes, high density, and respect for critical anatomical areas (WU, 2015; AWAIDA et al., 2018; YOUN et al., 2022; CIDRÃO, 2026).

From a practical point of view, in the neck, "plane and drop determine risk." Therefore, photographic documentation of D0 (marking, application, and immediate post) also functions as a technical audit and clinical traceability tool for the protocol (Figures 3, 4, and 6).

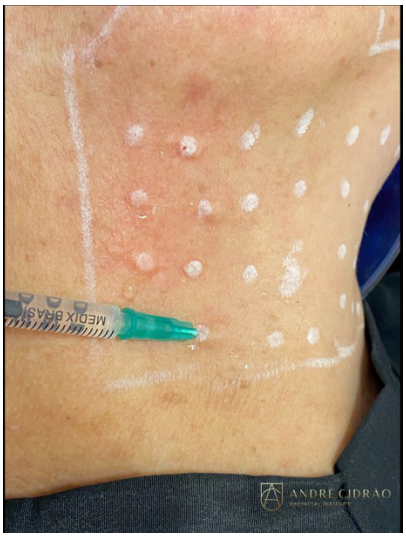

Figure 6 – Immediate post-treatment after intradermal Microbotox in the neck and lower third: pattern of discrete micro papules.

Source: Author's personal collection (CIDRÃO, 2026).

Limitations

1. Heterogeneity of protocols (types of toxin, dilutions, density, equivalencies) limits universal standardization and comparability (WU, 2015; AWAIDA et al., 2018; KASSIR et al., 2023; RAHMAN et al., 2024).
2. Specific evidence for combined protocols on the lower face/neck still requires comparative studies with standardized instrumental endpoints (TAM et al., 2025; CIDRÃO, 2026).

3. In dynamic areas, risk is highly dependent on technique and distribution, requiring a learning curve and strict safety criteria (VLEGGAAR; FITZGERALD, 2021; CIDRÃO, 2025; CIDRÃO, 2026).

Conclusion

The integration of new-generation PLLA (Angelis® – Pharmaesthetics) with conventional botulinum toxin and hyperdiluted intradermal microbotox offers a comprehensive strategy for optimizing skin quality in the face and neck. The clinical rationale is based on the combination of:

- progressive structural biology of PLLA,
- functional control of dynamic forces, and
- surface polishing by microbotox.

The possibility of application in areas of repetitive mobility is technically grounded by the micromorphological properties (sphericity /homogeneity and lower average micronization) and the low viscosity rheology obtained via hyperdilution, in addition to the support of muscle tension control with toxin (CIDRÃO, 2025). Safety, however, remains strictly dependent on technique, plan, and anatomy, especially in the neck and lower third of the face (YOUN et al., 2022; CIDRÃO, 2026).

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