

Aesthetic Procedures: Nurse Practitioner's Guide to Cosmetic Dermatology

Beth Haney



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To my mother, Roslyn Brownie, and my late father, Robert Brownie, because without them, this book would not be possible. My love for them knows no bounds.

To my beloved husband, Mike, who encourages me to realize my potential and to achieve my lofty goals. I am so grateful we get to live our lives together. We are one.

Preface

The media continues to define unattainable standards of beauty through glossy magazines, movies, and television shows. In addition, the widespread use of filters to enhance and modify images on social media increases the desire for beauty and perfection. Consequently, global demand for aesthetic medical treatments continues to grow at a rapid pace. Many people want to look as young as possible for as long as possible.

There is an increase in the number of nurses and other healthcare providers who want to learn about nonsurgical aesthetic treatments and add them into their practice. This textbook was written for providers to learn the pharmacology of aesthetic medications, uses of aesthetic devices, appropriate patient selection, treatment indications, proper techniques, and identification and treatment of complications.

Undeniably, aesthetic practice is a broad combination of nursing, medicine, and art. The notion that aesthetics is informal or rudimentary can lead to exaggerated levels of practitioner confidence. Some practitioners delve into aesthetics without proper education or training, and this leads to dissatisfied patients and unsuccessful practices or, worse, legal action. The purpose of this book is to provide practitioners a thorough understanding of aesthetic practice.

Nurse practitioners (NP) are advanced practice registered nurses (APRN) and are legally able to diagnose conditions and prescribe medications and treatments for patients in the United States (US). Alternatively, registered nurses (RN) in the United States are *not* legally able to diagnose conditions or prescribe medications and treatments, and they must have a qualified provider to diagnose and prescribe treatment. Then, after diagnosis and treatment prescription from a qualified provider, in most states, the RN is legally allowed to provide the appropriate aesthetic treatment to the patient. However, nursing laws vary in different countries, and nurses must understand the regulatory mandates that govern their practice to avoid disciplinary measures or legal action. It is vital to understand the legal framework of the country, state, or region where the nurse practices aesthetics.

Aesthetic practice consists mainly of enhancement of the appearance, but it also includes other important features such as improvement in confidence and self-esteem. Some examples are to help people look younger in a competitive job market, to camouflage disfiguring scars with laser and dermal filler treatment, or to reduce female facial hair. These and other enhancements of appearance can help

people acquire a job, get a position in the public eye, or even begin a relationship. The benefits of aesthetics are more than simply skin deep.

Current evidence along with practical information from the author is included in this book. The readers will obtain knowledge of skin and facial anatomy, pharmacology, and descriptions of aesthetic treatment options and learn common injection techniques. While didactic education is an important tool for the integration of aesthetics into clinical practice, hands-on experience is also required for practitioners to become proficient in aesthetics.

Disclaimer: The terms *practitioner* and *provider* are used throughout this textbook because they encompass a variety of professionals who perform aesthetic treatments and procedures, but the main focus is on nurse practitioners and nurses who practice aesthetics or would like to learn about aesthetic procedures. However, laws in the United States allow nurse practitioners to perform many more advanced aesthetic procedures than other nurses around the world. It is important to understand local and regional laws governing professional nursing practice.

This text is an essential tool for nursing professionals who would like to become skillful in aesthetic dermatology and provide safe and effective treatments to patients. No specific products or treatments are recommended by the author for any patient. This book is not a replacement for hands-on training with an expert aesthetic professional but is intended to provide in-depth didactic information on various treatments and procedures. Safe and effective aesthetic practice is the objective of this book.

Irvine, CA, USA

Dr. Beth Haney DNP, FNP-C, FAANP

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Creating a textbook takes a team of dedicated friends and scholars to transform words into knowledge. It is a great responsibility and privilege to provide education on aesthetic practice to students of different backgrounds and specialties.

It is with deep gratitude that I mention the following individuals who supported me during my writing adventure. I truly appreciate the sacrifice of their precious time.

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About the Author



Dr. Beth Haney, DNP, FNP-C, FAANP is Past President of the California Association for Nurse Practitioners (CANP) and owns Luxe Aesthetic Center, an aesthetic practice that she founded in 2006. She is the Recipient of the CANP 2018 Nurse Practitioner of Distinction Award for her excellence in furthering the NP role through legislative efforts and is a Former Assistant Clinical Professor at the University of California Irvine (UCI) from 2010 to 2017. She was inducted in 2016 as a Fellow of the American Academy of Nurse Practitioners (FAANP) for her work in policy and education, represents the American Association of Nurse Practitioners (AANP) on the National Primary Care Advisory Board, and serves on the AANP Health Policy Committee. Beth has served over a decade on her local and state NP organization boards and is currently a member of the Dermatology Nurses Association Nurse Practitioner Society Committee. She has written many peer-reviewed articles and is a contributing author of a dermatology nursing textbook. Outside of nursing, she was elected to the Yorba Linda City Council in 2016 for a 4-year term and is currently serving as Mayor Pro Tempore. She was unanimously appointed by the Orange County Board of Supervisors to the Orange County Waste Management and Recycling Commission and works towards ensuring a healthy environment through her work on this commission.

Part I

Foundations of Aesthetics

The History of Beauty

1

1.1 History of Cosmetics

Men and women have been enhancing their appearance since 4000 BCE. Egyptian women used a mixture of oxidized copper, ash, lead, burnt almonds, sycamore or cedar sawdust, lizard or bat blood, and certain minerals including iron and lead to add color and definition to their faces (Council TPCP 2018; Murube 2013; Blanco-Davila 2000). The most frequently used substance was mesdemet, a black paste commonly used to accentuate the eyes. It consisted of plumbic sulfate or antimony sulfide (Murube 2013). This combination of substances was used on the eyes to give a defined and dramatic look by both men and women. Mesdemet was believed to provide protection from evil spirits and also used as a medical treatment for conjunctivitis (Murube 2013).

Fingernails became a popular cosmetic enhancement in early China, around 3000 BCE and Chinese royalty wore gold, silver, black, or red nail polish made of beeswax, gum arabic, and egg. Brightly colored nails were forbidden in lower classes (Council TPCP 2018). Similarly, women in Greece wore white lead face powder or paste, crushed berries for rouge on their faces, and some women used oxen hairs to enhance their eyebrows. Later, clay colored with red iron was used to color their lips. White powder made from rice to whiten the face was popular in Japan and China around 1500 BCE. Other popular cosmetic enhancements of that time included painted teeth, hair stained with henna, and shaved eyebrows (Council TPCP 2018; Murube 2013). Hair color became more popular in Rome around 100 AD. Men lightened their hair while Indians and North Africans used henna to color their hair (Council TPCP 2018). These different approaches to cosmetic enhancement of appearance reflected cultural views of what was beautiful.

People in ancient times enhanced their appearance using a variety of substances that we know today are not safe. They used compounds and minerals on their skin in attempt to create a uniform, smooth looking face. In 1400–1500 AD, arsenic was occasionally substituted for lead in facial powders.

Later, in the 1700s to 1800s, zinc oxide was used for facial whitening rather than dangerous ingredients of lead and copper. In Britain, laws were passed that expressly prohibited women from using makeup and Queen Victoria claimed makeup as improper and banned its use strictly to actors (Council TPCP 2018).

More recently, cosmetics have become safer and more extensively used, in part due to widespread acceptance by most cultures. The evolution of makeup is critical to contemporary views of aesthetics and forms the basis for the birth and widespread growth in the contemporary aesthetics industry. Chemical peels, permanent eyeliner, neurotoxin injections, dermal fillers, and aesthetic surgical procedures to enhance appearance continue to increase in popularity around the world (ASoPS 2017). And, new technologies and procedures emerge with remarkable frequency.

Imagination and perception play important roles in makeup and aesthetics (Meskin et al. 2017). For these reasons, it is important to set realistic expectations with patients. Generally, people have a vivid imagination and aesthetic patients often fantasize about how the result of their treatment would look. If the imagination or expectation differs too much from the actual outcome, disappointment prevails. Direct and open communication with patients regarding their individual facial shape, dimensions, and possible options are important to address during the consultation. Therefore, it is crucial that the patient understands the potential outcome of their treatment and expect realistic results.

Facial beauty is subjective and can be influenced by local culture as well as certain scientific phenomenon (Hagman 2002). For 3000 years, researchers have been trying to define beauty; is it a geometric equation or a symmetry value? Is it coloring or enhancement of certain features? Some researchers have suggested a specific formula equates to beauty only to have it rebutted in studies where other researchers attempt to define it as “pleasing” or “perfection” (Hagman 2002; Green 1995).

Regardless, theories on what constitutes beauty are wide ranging and difficult to measure. Even the famed *Golden Section*, a mathematical equation, has attempted to define beauty as a scientific calculation based on ratios and symmetry (Luttge and Souza 2018). The Golden Section formula is determined when “the ratios of larger distance to smaller distance equaling whole distance to larger distance are applied to the circumference and sections of a circle” (Luttge and Souza 2018).

Symmetry has been hypothesized to represent beauty but asymmetry has been described as charm. The difficulty in assigning a permanent label to the definition of beauty is difficult because beauty is illusive and transcendental (Luttge and Souza 2018). Beauty is impossible to define in the human face through using mathematical equations because of the psychology of perception, and even the Golden Section provides thin evidence of what constitutes beauty (Green 1995; Luttge and Souza 2018). Beauty is a subjective and psychological perception that is as individualized as each human being.

Conversely, beauty is also applied to the body. Variations of body types are considered beautiful in different cultures. For example, in some African countries, women with full, thick bodies are considered more attractive than thinner women because heaviness is associated with wealth (Toselli et al. 2016). In other countries, particularly Western countries, thin women are considered more attractive (Toselli

et al. 2016; Schaefer et al. 2018). Unfortunately, the mismatch between body ideals and reality contribute to eating disorders and take a toll on the general health of people in many cultures (Schaefer et al. 2018; Cheng et al. 2019). However, a thorough discussion of eating disorders is outside the scope of this book.

1.2 Conclusion

The concept, definition, and perception of beauty are elusive and encompass not only the face, but the body as well. Beauty ideals plus cultural implications should be considered when treating the aesthetic patient. Consideration of many variables is important when attempting to define beauty and arrive at the mutually satisfying goal of improvement in appearance for the patient.

Current aesthetic treatments such as neurotoxins, dermal fillers, and lasers are some of the options to enhance appearance in addition to cosmetics and makeup. Thankfully researchers have made progress in providing data that has identified harmful cosmetic ingredients leading to safer cosmetics and aesthetic options (Salama 2015; Malten 1975; Hepp et al. 2009; Benson 2000). Global education and evidence show certain substances once used in cosmetics were toxic and are now no longer included in cosmetic formulations.

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2.1 Facial Anatomy

Facial structure is comprised of skin, subcutaneous fat, fascia, muscle, and bone. The face has 40 muscles and each has a specific function that results in expression (Vigliante 2005). The amount of facial volume contributes to the projection and fullness of the face. Natural appearance, proportioned features, and firm resting tone are attributes of an aesthetically pleasing face.

Generally, the aging process begins to change the appearance of the face at approximately 35 years old; however, aging takes place at a relatively constant pace throughout life (Pessa 2000). These changes are a result of bone resorption or thinning, muscle atrophy, and skin changes that happen simultaneously. As the bone begins to recede, flattening and shortening of the face occur, and the tissues soften and begin to fall since they are no longer supported adequately by the bone (Mendelson 2012). It is essential for practitioners to understand facial anatomy and the impact of the aging process, so the practitioner can reproduce the appearance of youth in the aging face.

Typically, the face is divided into three parts: the upper face, mid-face, and lower face. The upper face is comprised of the forehead, eyebrows, and eyes; the mid-face is comprised of the nasal area and cheeks; the lower face is comprised of the mouth, chin, and platysma (Vigliante 2005). These three regions should be assessed individually *and* collectively so that the entire face is balanced.

Some important structures lie within the framework of the face. Facial vessels, nerves, ducts, and glands are contained within the face and should be considered (Cohen 2008; DeLorenzi 2014; Scheuer et al. 2017). Understanding key facial structures is essential to avoid serious complications such as emboli, vascular compromise, or nerve impairment as a result of treatment.

2.2 Skin

The anatomy of the skin includes the epidermis, dermis, and subcutaneous tissue including fat (Kolarsick et al. 2011; Habif 2016; Nea 2016). The skin is a living, complex organ that protects the underlying tissues from environmental toxins, ultra-violet radiation, and injury (Nea 2016). In addition, the skin regulates temperature, fluid loss, homeostasis, and vitamin D production and monitors conditions for immune responses (Nea 2016). It is also the heaviest organ of the body with the dorsal and extensor surfaces being thicker than the ventral and flexor surfaces (Habif 2016).

2.2.1 Epidermis

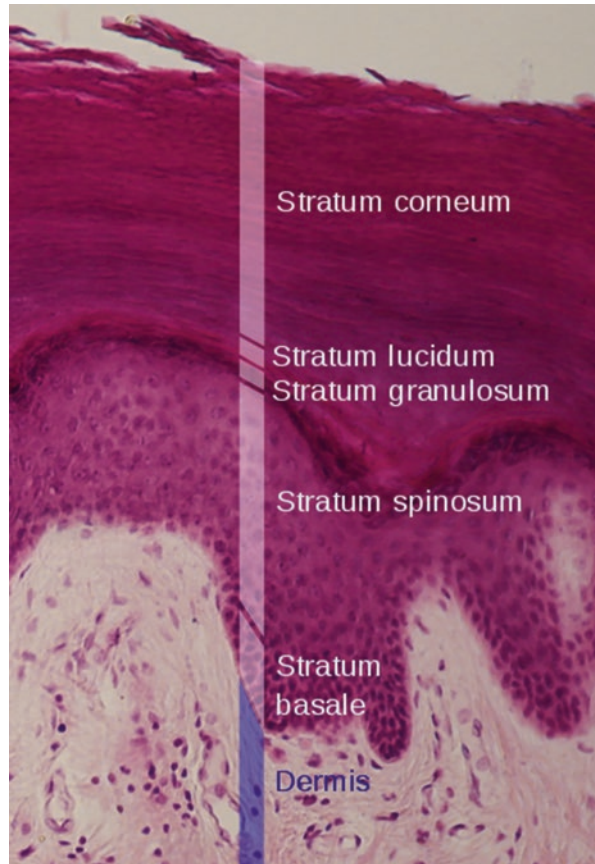
The epidermis is stratified squamous epithelium and is the outermost layer of the skin. Epidermal thickness ranges from approximately 0.05 mm on the eyelids to 1.5 mm on the palms of the hands and soles of the feet (Kolarsick et al. 2011; Habif 2016). There are five layers in the epidermis; stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum, and stratum basale. Each of these layers is on the continuum of the keratinocyte life cycle but not completely separate from each other (Pessa 2000; Vigliante 2005). The basal cells make up the interior most layer of the epidermis and divide to create keratinocytes. The keratinocytes synthesize insoluble proteins, continue to flatten as they move outward, and eventually become the stratum corneum (see Fig. 2.1) (Habif 2016).

Several specialized cell types control how the skin responds to the environment: (1) melanocytes synthesize pigment, (2) Langerhans cells are involved in the immune response, and (3) Merkel cell function plays a role in tactile sensation (Kolarsick et al. 2011; Habif 2016). Melanocytes are located deep in the epidermis and account for the varying degrees of pigmentation as a result of sun exposure. The location of the melanocyte in the skin makes it a challenge to cosmetically lighten unsightly dark lesions that result from sun exposure. Patients must be informed that in general, topical medications and treatments will lighten and blend these pigments but may not completely resolve the hyperpigmentation. Langerhans cells phagocytize antigens in the skin and stimulate cell migration in the event of invasion by foreign organisms (Kolarsick et al. 2011). Merkel cells are more numerous in areas of high tactile sensitivity such as the lips, fingertips, and hair follicles. When stimulated, Merkel cells secrete a chemical signal that generates an action potential in the adjacent afferent neuron that relays the signal to the brain (Kolarsick et al. 2011).

2.2.2 Dermis

The dermis represents the bulk of the skin and is composed of collagen, elastin, and reticular fibers, and varies in thickness from 0.3 mm on the eyelid to 3.0 mm on the back (Habif 2016). The dermis is made up of two layers: the papillary dermis and

Fig. 2.1 Epidermal layers
(Haggstrom 2010)



the reticular dermis. The papillary dermis is a thin layer whereas the reticular dermis houses collagen, elastin fiber, and reticulum and represents the bulk of the dermis that extends from the lower papillary dermis to the subcutaneous layer (Kolarsick et al. 2011). The reticular dermis is composed of thick collagen fibers and, in addition, houses the mast cells that release histamine and contains macrophages that accumulate melanin and debris from inflammation (Kolarsick et al. 2011; Habif 2016). The reticular dermis contains the skin appendages of hair follicles and glands (see Fig. 2.2) (Kolarsick et al. 2011).

2.2.3 Subcutaneous Fat

The third and deepest layer of the skin is the subcutaneous fat layer. The subcutaneous fat layer contains the bulb and matrix of the hair follicle, larger vessels, dermal collagen, and adipose tissue (lipocytes) (Kolarsick et al. 2011). This layer is of varying thickness depending on the area of the body; for example, increased thickness is

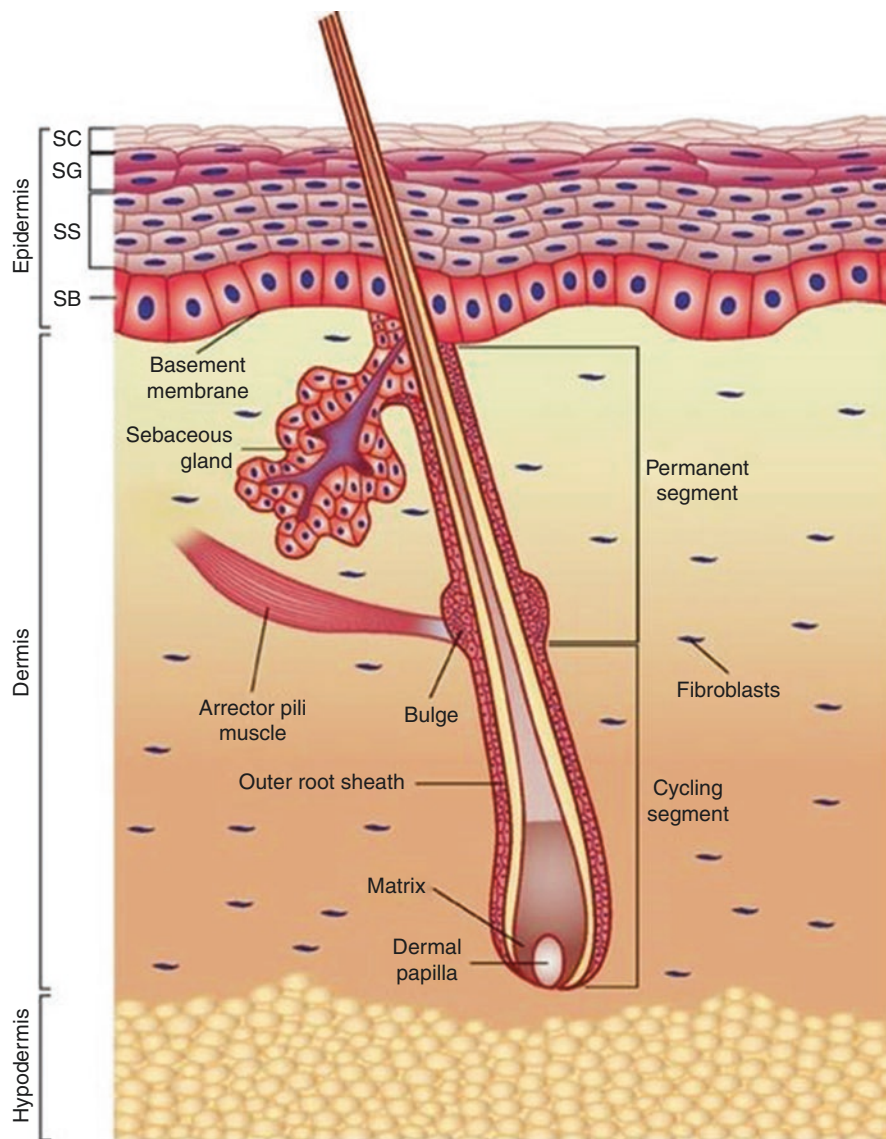


Fig. 2.2 Rendering of the epidermal and dermal layers (Wong 2009)

found on the waist and abdomen vs. the eyelid. The function of the subcutaneous layer is to act as a shock absorber, insulation of underlying tissues, provide buoyancy, and store energy (Kolarsick et al. 2011; Nea 2016). In addition, the subcutaneous tissue is considered an endocrine organ because it converts androstenedione into estrone and also produces leptin, a hormone that influences body weight (Kolarsick et al. 2011).

2.3 Skin Appendage: Hair

The hair follicles are referred to as appendages of the skin as are the sweat glands and nails (Kolarsick et al. 2011). Human beings have all of their hair follicles at birth however, the size changes under the influence of androgens; no hair follicles are formed after birth (Kolarsick et al. 2011; Habif 2016). There are three types of hair as follows. (1) Terminal hairs are thick, heavily pigmented hairs on the head, beard, axillae, and pubic areas. The terminal hair follicles become larger in puberty but shrink during the lifespan at the temporal region. (2) Lanugo hair is fine hair found on the newborn. (3) “Peach fuzz” or vellus hair covers much of the body and is not influenced by androgens as are the terminal hairs (Kolarsick et al. 2011; Habif 2016).

Hair growth varies depending on body area. The eyelashes have double or triple rows of few hairs with an average growth phase of 1–6 months. The scalp has approximately 100,000 hairs and has a range in growth phase of 2–6 years, shedding up to 100–150 hairs per day (Habif 2016). This explains why hair on the head can grow to great lengths. Hair on the arms and legs remain in the growth phase for approximately 30–45 days (Habif 2016).

Hair diameter is determined by the number of hair cells entering the root sheath of the follicle. The curvature of the root sheath determines the shape or shape of the hair itself. For example, oval follicles create curly hair as in people of African descent whereas round follicles create straight hairs in people of Asian descent (Kolarsick et al. 2011; Habif 2016; Nea 2016; James et al. 2006).

Hair color is determined by the amount, size, and distribution of melanosomes interspersed among the matrix cells contained in the hair shaft (Habif 2016). Darker hair has larger melanosomes from an increased number of melanocytes. Conversely, graying hair has fewer melanocytes and produces less or no melanosomes (James et al. 2006).

Hair growth cycles are important to understand especially when considering laser hair reduction treatment. Although there are three phases of hair growth, each follicle behaves independently (James et al. 2006). The three stages of hair growth are anagen, catagen, and telogen (Kolarsick et al. 2011).

Anagen is the active growth stage where the hair cells are tightly bound and forced out through the skin (Habif 2016). Anagen phase varies depending on the location on the body. For example, the scalp hair follicle has an anagen phase of approximately 2–6 years (James et al. 2006). The hair in the anagen growth phase contains the highest number of melanocytes which absorb high levels of heat (Lin et al. 1998). Laser hair reduction is most effective during the anagen phase because the heat from the laser is absorbed by the melanosomes and this heat is transferred to the hair bulb. Damage occurs to the hair follicle from the absorbed heat and results in impaired production of matrix cells, if matrix cells are produced at all (Lin et al. 1998; Sadick and Prieto 2003).

Catagen is the involution phase of the hair follicle when the growth and metabolic processes of hair production regress. Cell division in the matrix ceases, the lower portion of the follicle shrinks and ascends (Habif 2016). This phase lasts about 2–3 weeks in all body areas (Nea 2016).

Telogen phase describes the resting phase of the hair follicle and the hair ceases to grow any longer. The telogen phase lasts approximately 3–5 months on the scalp whereas other body hair has a longer telogen phase and accounts for the shorter hairs in place for longer periods of time (James et al. 2006). This phase also includes the shedding of the hair from the body called exogen (Nea 2016; James et al. 2006). These phases of hair growth are important to know as it relates to laser hair reduction.

2.4 Fascia

Fascia is defined as loose connective tissue found beneath the subcutaneous layer of the skin that encloses and separates muscles. Fascia covers every structure of the body and provides form to all tissues and organs (Seely et al. 1989). The fascia is able to support and penetrate blood vessels, bone tissue, and meninges and holds the muscle cells in place and serves as a passageway for vessels and nerves to reach muscle cells (Seely et al. 1989; Bordoni and Varacallo 2018). Fascia tissues allow the muscles, nerves, vessels, and joints to glide over one another; so the body can move in real time and into different positions while also having the ability to repair its structure and adapt to mechanical stress (Bordoni and Varacallo 2018).

On occasion during BoNT/A injections in the forehead, as the needle passes through levels of skin, fascia can be pierced and create an audible *crunch* sound that both the patient and practitioner can hear. To avoid alarming the patient, this phenomenon is best explained before injection into a treatment naive patient to prepare them for this sound.

2.5 Facial Muscles

The muscles of the face are different than muscles located in the rest of the body and are associated with the dynamic lines of the face. The facial muscles are generally thin and superficial and insert into or affect the skin (Vigliante 2005). The muscles most relevant to facial aesthetics include the frontalis, procerus, orbicularis oculi, corrugator supercilii, levator labii superioris alaeque nasi, nasalis, levator labii superioris, zygomaticus major, zygomaticus minor, risorius, levator anguli oris, orbicularis oris, depressor anguli oris, mentalis, and platysma. All of these facial muscles can be affected by BoNT/A (Carruthers and Carruthers 2005).

When certain muscles are relaxed with BoNT/A, they will naturally be drawn downward, whereas when other muscles are affected, they would naturally be drawn upward—these muscles are classified as depressors or elevators (Carruthers and Carruthers 2005). The effect of BoNT/A on certain muscles requires detailed knowledge of facial musculature and their function and is important when using BoNT/A in aesthetic practice (see Fig. 2.3).

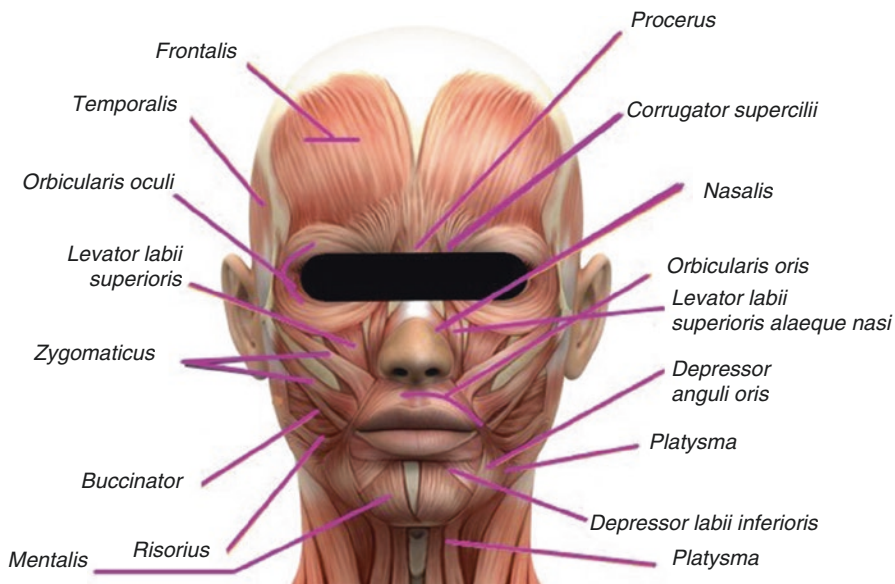


Fig. 2.3 Facial muscles relevant in aesthetic practice. Adapted from imotions.com (2016)

2.5.1 Frontalis

The frontalis muscle is classified as a brow elevator and has no attachments to the underlying bone. It is wide and thin, and when it contracts, it elevates the eyebrows (Vigliante 2005). The frontalis muscle inserts into the procerus, corrugator, orbicularis oculi, and the skin along the ridge of the nose. The horizontal lines across the forehead are a direct result of the action of the frontalis and raising of the eyebrows (Vigliante 2005). Since the frontalis is a brow elevator, BoNT/A is an effective tool used to smooth these lines but caution should be exercised and lower doses used to avoid brow drop (Carruthers and Carruthers 2006).

2.5.2 Procerus

The procerus muscle is classified as a brow depressor and is superficial to the nasal bone (Carruthers and Carruthers 2006). This muscle inserts into the skin between the eyebrows and the root of the nose. The action of this muscle is to draw down the medial brows as part of the *concerned*, *angry*, or *questioning* expression. In some patients, this muscle action causes the small horizontal line(s) across the root of the nose (Prendergast 2012). Although this muscle is small, BoNT/A has a great effect on elevating the medial brows and help soften the glabellar lines in aesthetic patients (Vigliante 2005).

2.5.3 Orbicularis Oculi

The orbicularis oculi is a brow and eyelid depressor, surrounds the orbit of the eye, and acts as a sphincter muscle (Carruthers and Carruthers 2006). This round, flat muscle occupies the eyelids, supraorbital margins, and the superior portion of the cheek. It is divided into three sections: the palpebral, orbital, and lacrimal (Vigliante 2005; Prendergast 2012). The palpebral section encompasses the eyelids and causes the blinking motion. When the palpebral portion acts in conjunction with the tarsal plates it performs as a sphincter and produces a wink. The levator palpebrae superioris is the muscle responsible for keeping the upper eyelid elevated and when this muscle is weakened or injected with BoNT/A, lid ptosis occurs (Vigliante 2005). The orbital section is the largest section of the muscle and encompasses the areas above and below the orbit as well as the nasal portion of the frontal bone. This muscle acts as a depressor of the medial and lateral brow (Vigliante 2005). The lacrimal section of the orbicularis oculi is located near the lacrimal sac and is responsible for compressing the lacrimal sac to express tears into the nasolacrimal duct (Vigliante 2005).

2.5.4 Corrugator Supercilii

The medial portion of the corrugator supercilii is located deep, beneath the frontalis and orbicularis oculi muscles in the medial and superior area of the brows near the frontal bone close to the nasofrontal suture line. The lateral portion of the corrugator supercilii muscles insert into the *skin* of the medial eyebrow (Vigliante 2005; Seely et al. 1989; Prendergast 2012). This is important anatomy to understand since during the BoNT/A injection, needle depth will be more superficial in the lateral areas than in the medial areas where the muscle is deeper.

The action of corrugator muscles is to draw the eyebrows down and medially and they work in conjunction with the procerus muscle to produce the frown or negative expression (Carruthers and Carruthers 2005). It is a widely accepted practice to treat both the corrugator and procerus muscles with BoNT/A to create a refreshed, relaxed, and attractive appearance. BoNT/A works by slightly raising the medial brow and preventing the contraction and frown expression of this muscle group.

2.5.5 Lip Elevator Muscles

The *levator labii superioris alaeque nasi* muscle runs vertically on the bilateral area of the nose and is responsible for the elevation of the lip and flare of the nares (Vigliante 2005; Lightoller 1925). Caution should be used when injecting this muscle with BoNT/A because it can cause upper lip ptosis (Carruthers and Carruthers 2005). The *levator labii superioris* is also a lip elevator and the actions include eversion as well as elevation of the upper lip (Vigliante 2005). Occasionally, a small dose of BoNT/A is used in this muscle to soften the naso-labial folds but inadvertent weakening of this muscle would also produce upper lip ptosis (Vigliante 2005; Carruthers and Carruthers 2005; Mazzuco and Hexsel 2010). The *zygomaticus*

major is a mouth elevator and the principle action is to draw the mouth upward and outward during smiling and laughing. The *zygomaticus minor* muscles are absent in about 25% of the population and run almost parallel to the *zygomaticus major* (Vigliante 2005). These muscles are also responsible for eversion and elevation of the upper lip however, they are not considered part of the modiolus or fibromuscular condensation where the eight muscles at the corners of the mouth meet (Vigliante 2005; Seely et al. 1989; Lightoller 1925).

The *risorius* muscle action retracts the angle of the mouth as in grinning (Vigliante 2005). The difference in this muscle from the other facial muscles is that it does not originate from bone (Lightoller 1925). This muscle has its origins in the subcutaneous tissue over the parotid gland, runs across the masseter muscle, and inserts into the skin and mucosa of the corners of the mouth (Vigliante 2005; Lightoller 1925). This muscle is part of the group that forms the naso-labial fold.

The *levator anguli oris* is an elevator of the angle of the mouth, runs deeper than other levator muscles, and originates from the canine fossa directly below the infra-orbital foramen (Lightoller 1925). This muscle runs downward and inserts into the corner of the mouth. The action of this muscle is to deepen the naso-labial fold in expressions of disdain or indifference (Vigliante 2005; Lightoller 1925). The *levator anguli oris* is part of the group that forms the naso-labial fold, and the area is often treated with a dermal filler to soften the appearance of this fold.

2.5.6 Nasalis

The nasalis muscles are responsible for dilation and compression of the nares. The nasalis is comprised of two parts, one that resides underneath the nares called the alar nasalis, and the other flat, wider portion that fans over the nose called the transverse nasalis (Vigliante 2005; Seely et al. 1989). In regular breathing, the alar muscles hold the nares open against the pressure in the atmosphere and in heightened emotional states such as crying or anger, cause the nares to flare (Vigliante 2005). The transverse muscles are responsible for depression of the cartilaginous part of the nose and the upward tension of the ala. The transverse part of the nasalis can be treated successfully using small amounts of BoNT/A to address what is commonly known as *bunny lines* that run obliquely along the sides of the nose (Vigliante 2005; Carruthers and Carruthers 2005). Caution should be used when injecting BoNT/A into these muscles to avoid accidental weakening of the upper lip elevator muscles and causing lip ptosis (Carruthers and Carruthers 2004).

2.5.7 Orbicularis Oris

The orbicularis oris is a circular muscle with multiple muscle fibers that include the terminating muscle fibers of 10 pairs of surrounding muscles (Lightoller 1925). Its origin is from the subnasal and incisor fossae and other nearby muscles and also includes fibers that are intrinsic to the muscle itself (Vigliante 2005; Lightoller 1925; Hur 2017). The action of the orbicularis oculi along with other surrounding

muscles draws the lips together, brings the corners inward, purses the lips, and draws the lips against the teeth (Lightoller 1925). These muscle movements contribute to the formation of upper and lower lip lines that are commonly called *smoker's lines* and can appear in many people who have never smoked.

Aesthetic patients who have never smoked might inquire why they have these unsightly lines. Therefore, it is important to inform these patients that skin damage from sun exposure and normal orbicularis oris muscle activity can contribute to lip line formation. Care should be taken when treating the orbicularis oris with BoNT/A because of the possibility of weakening of muscle fibers that could lead to lip ptosis or dysfunction (Carruthers and Carruthers 2004). Tiny amounts of BoNT/A are used in two to four injection sites using 1 U–2 U (onabotulinumtoxinA or incobotulinumtoxinA) or 2.5 U–5 U (abototulinumtoxinA) maximum (Carruthers and Carruthers 2003).

2.5.8 Depressor Anguli Oris

The depressor anguli oris (DAO), originates at the mandible, is continuous with the upper fibers of the platysma, and converge at the commissures of the mouth (Vigliante 2005; Lightoller 1925). The action of this triangular shaped muscle is to draw the corners of the mouth down. Persistent contraction of this muscle gives the mouth a sad or disapproving look and an overall expression of unhappiness. BoNT/A treatment of this muscle relaxes the contraction and provides a neutral position but caution should be used to avoid dysfunction and low doses are recommended (Vigliante 2005; Carruthers and Carruthers 2003, 2004, 2005).

2.5.9 Mentalis

The mentalis is a deep muscle and originates from the incisive fossa of the mandible on either side and the two bellies of the muscle pass downward and insert into the skin of the chin (Vigliante 2005). The mentalis does not insert into the orbicularis oris (Vigliante 2005; Lightoller 1925). The action of mentalis muscle creates the deep crease on the chin and raises the center of the lower lip. It is also responsible for the contraction of the chin that results in dimpling, especially when chewing or speaking (Vigliante 2005; Hur 2017; Carruthers and Carruthers 2003). Treatment of the chin with BoNT/A yields a smoothing effect of the dimpling that occurs with contraction however, if a deep horizontal crease is also evident, a small amount of dermal filler may be an appropriate addition to treatment.

2.5.10 Platysma

The platysma muscles are wide and flat, originate in the upper chest, clavicle, and acromial areas, and insert at three points: posterior, central, and anterior (Carruthers and Carruthers 2004; Matarasso et al. 1999). The posterior muscle fibers arc forward

and join into the mentalis, DAO, risorius, and the orbicularis oris muscles at the oral commissures. The central fibers insert into the mandible and the anterior fibers insert into the submental region and are the biggest contributor to the aging neck appearance as the fibers detach from the deeper planes of the muscle as a result of loss of elasticity (Carruthers and Carruthers 2003; Matarasso et al. 1999; Brandt and Boker 2004). The frequently complained about *turkey neck* appearance occurs from the natural process of aging where the platysma begins to separate in the anterior portions of the muscle (Brandt and Boker 2004; Vistnes and Souther 1979).

2.6 Bone

The facial bones undergo changes throughout life and contribute to the aging appearance of the face (Hellman 1927). Bone loss affects the tissues of the face because bony support diminishes and the ensuing increase in tissue laxity causes the facial appearance to draw downward. The facial bones relevant to aesthetic practice are the bones of the upper face, mid-face, and lower face (see Fig. 2.4).

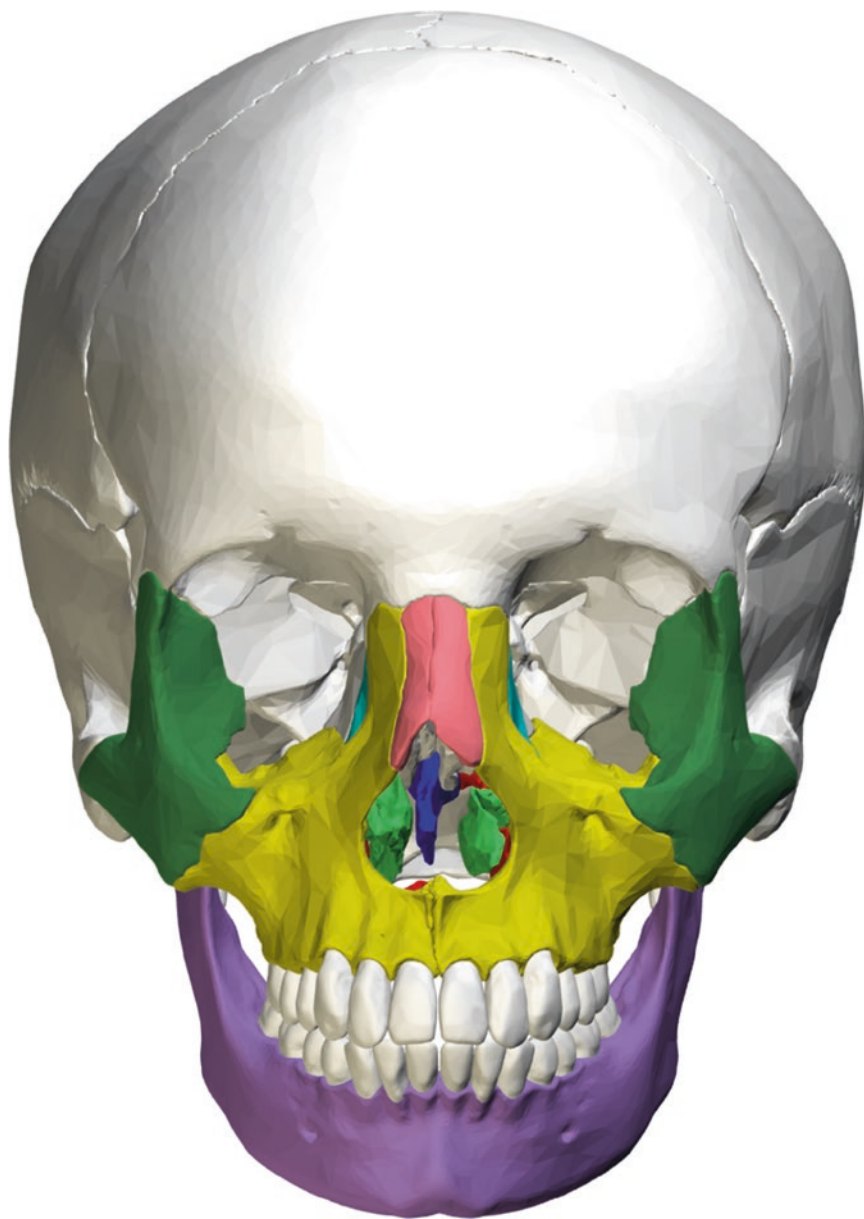
2.6.1 Upper Facial Bones

The frontal bone makes up the entire forehead and relevant to aesthetics, it demonstrates some change as the aging process progresses, although these changes are due mostly to the soft tissues of the forehead (Carruthers et al. 2013). However, the orbital bones change significantly and in combination with frontal bone changes, the rim of the brow may noticeably protrude in some people. The temporal bone may exhibit more obvious changes as the skeleton ages and is evident by the hollowing appearance of the temporal region (Carruthers et al. 2013). Additionally, the inferior orbital bones tend to widen and lengthen creating a more hollowed look where patients might complain of looking *tired* (Hellman 1927).

2.6.2 Mid-Face and Lower Facial Bones

The bones of the mid-face include the nasalis, zygomatic, and maxilla but the mandible is considered a bone of the lower face (Pessa et al. 2008). The changes that occur in the zygomatic area may be exhibited by flattening of the cheeks along with the deepening of the naso-labial folds as the facial bones change and affect the appearance of the face.

The mandible is an area of the lower face that is commonly associated with looking older since the jawline shape is altered as aging occurs (Pessa et al. 2008). Patients may have difficulty explaining why they feel like they are looking older but will verbalize general dissatisfaction with their lower face. Knowledge of the facial skeleton and the bony changes associated with aging assist the aesthetic practitioner in restoring a more youthful appearance for the patient.



- | | |
|--|--|
| ■ Bright green: Inferior nasal concha (2) | ■ Pink: Nasalis bones (2) |
| ■ Bright blue: Lacrimal bones (2) | ■ Red: Palatine bones (2) |
| ■ Purple: Mandible (1) | ■ Blue: Vomer (1) |
| ■ Yellow: Maxilla (2) | ■ Dark green: Zygomatic bones (2) |

Fig. 2.4 Bones of the face. (Animatography Bd 2015) Animatography Bd. BodyParts3D, © The Database Center for Life Science licensed under CC Attribution-Share Alike 2.1 Japan. 2015. Bright green: Inferior nasal concha (2); Bright blue: Lacrimal bones (2); Purple: Mandible (1); Yellow: Maxilla (2); Pink: Nasalis bones (2); Red: Palatine bones (2); Blue: Vomer (1); Dark green: Zygomatic bones (2)

2.7 Conclusion

Understanding facial anatomy and muscle function is essential to provide safe and effective aesthetic treatment. Enhanced, natural looking features that give the patient a rejuvenated, attractive appearance is a common goal. Knowledge of age-related volume and bone loss and the effects of muscle contraction will guide the aesthetic practitioner in creating a pleasing result. Proper use of the available options and consideration of the inherent facial shape of the patient will yield the best outcome.

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3.1 Photoaging

A significant effect from sun exposure during the lifetime is the breakdown of components of the skin from ultraviolet radiation. This breakdown includes cellular changes that eventually lead to the development of skin cancers along with the formation of ephelides (freckles), lentigines, seborrheic and actinic keratosis, fine lines, and wrinkles (Nicol 2016; Habif 2016).

3.1.1 Lentigines

Lentigines are frequently referred to as “liver spots” and can occur on sun exposed areas such as the face, hands, scalp, arms, and back. Lentigo vary in size from 0.02 to 2.0 cm and becomes more numerous in adults as sun exposure increases. Ephelides, also called freckles, are small light brown or reddish macules that become more apparent with sun exposure and are usually found on the face, arms, and back (Habif 2016).

Important differences exist between ephelides and lentigines. The number of ephelides decrease with age and are strongly associated with hair color and skin type where lentigines are associated with sun exposure and increase with aging (see Figs. 3.1 and 3.2) (Habif 2016). Any lesion that develops irregular borders or other signs of neoplasm development should be biopsied.

3.1.2 Seborrheic Keratosis

Seborrheic keratosis (SK) lesions are non-cancerous, nor do they become cancerous. SKs do not contain the human papilloma virus (HPV), therefore, they are not warty lesions although they are characteristically referred to as warts by patients (Habif 2016). SKs occur on hair bearing areas of the body including the scalp, face,

Fig. 3.1 Ephelides
(Beobachter 2017)

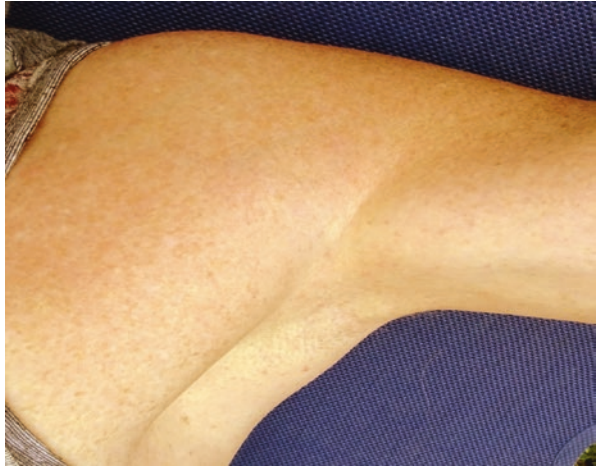


Fig. 3.2 Lentigo Photo:
B. Haney, DNP, FNP-C,
FAANP



arms, trunk, legs, and genitals; they do not appear on the lips, palms of the hands, or soles of the feet (Habif 2016).

Although SKs are not necessarily a result of sun exposure, they are mentioned here because they can cause some people to seek treatment for them because of their appearance or location. SKs present as discreet, sharply demarcated lesions that vary in size from 0.2 cm to over 3.0 cm and range in color from tan, brown, and black oftentimes with color variations within the lesion itself. The surface of these lesions can be smooth with tiny round pearls resembling warty appearance, or they may have a dry and cracked surface with a classic “stuck on” appearance (see Fig. 3.3). The SK lesions look as if they can be peeled off the skin however, they should not be picked at or peeled off due to potential pain that would cause. In fact, SKs occur completely in the epidermis and can be removed with little scarring by a trained practitioner (Habif 2016). Alternatively, malignant melanomas have different characteristics than SKs but may look similar because of their variation in color. Therefore, it is critical that all suspicious lesions be promptly referred to a dermatologist.

Fig. 3.3 Seborrheic keratosis. Photo: James Heilman, MD (Heilman n.d.)



Fig. 3.4 Actinic keratosis on the forehead (FamDoc 2014)



3.1.3 Actinic Keratosis

Actinic keratosis (AK) is a squamous cell carcinoma lesion that is confined to the epidermis; however, when the cells extend deeper into the papillary or reticular dermis, it is termed squamous cell carcinoma (SCC) (Habif 2016). These superficial lesions need to be closely monitored by a qualified practitioner to ensure they do not progress into SCC. Most patients would likely become alarmed when the word *cancer* is mentioned, therefore, AK is the preferred term to use when educating patients. It is also important to inform them of the decreased possibility these lesions can transform into cancers (Habif 2016). Lighter-skinned people are more susceptible to form AKs. Sun exposure is a requisite to the development of these lesions and the judicious use of sunscreen is strongly recommended. Interestingly, organ transplant recipients are 65 times more susceptible to developing AKs so immunosuppression has been determined as a risk factor (Habif 2016).

The appearance of AKs range; most lesions are 3 mm–6 mm, but can become larger, and have sharp, adherent scale (see Fig. 3.4). Some lesions will have surrounding color change ranging from pink to red, are usually sensitive, and will bleed if picked or scraped (Habif 2016). Any lesion that becomes inflamed, changes, or begins oozing, a prompt referral to a dermatologist is warranted.

Treatment for AK varies depending on the severity of the condition and lesions. Regimens include topical treatment of specific lesions using 0.05% tretinoin for several months, laser treatment with or without photodynamic therapy (PDT), or chemotherapy agents such as 5-fluorouracil or imiquimod (Habif 2016; Le Pillouier-Prost and Cartier 2016).

3.1.4 Lines and Wrinkles

The aging process begins in the third and fourth decade of life but then progresses quickly throughout the sixth decade (Binder and Azizzadeh 2008). However, fine lines and wrinkles can begin to appear on the skin as early as the second decade of life. Certain factors such as the amount of sun exposure and other lifestyle habits such as smoking, hydration, stress, environmental exposures, chemical exposures, and other factors initiate and accelerate aged appearance. Static lines are visible at rest or without facial muscle motion, and contribute to the appearance of aging (Baumann et al. 2016). These lines are a source of distress for many aesthetic patients and are a frequent cause for aesthetic consultation.

Many patients also complain of fine, crêpey skin under the eyes. The thinness of the skin in the suborbital area lends itself to fine lines, even when the remainder of the facial skin may have few, if any wrinkles. Non-ablative carbon dioxide laser resurfacing treatments have been successful in treating fine lines in the thin skin of the upper and lower eyelids (Tierney et al. 2011). In addition to laser treatments, lower eyelid skin has been shown to respond favorably to topical tretinoin (Hoenig and Hoenig 2013; Manaloto and Alster 1999).

Deeper wrinkles and folds are the result of one or more of the following: (1) sun exposure with subsequent collagen breakdown, (2) gravity in association with volume loss from aging or weight loss, (3) facial muscle contraction, (4) genetic influence, (5) bone changes (Hellman 1927; Whitaker and Bartlett 1991; Carruthers et al. 2008; Carruthers and Carruthers 1992; Carruthers et al. 1996). Some of these causes can be prevented or controlled, while some are the result of a natural process or genetic tendencies. Facial changes become more apparent between 35 and 50 years of age (see Figs. 3.1 and 3.2). This age group is the largest portion of the population who seeks aesthetic enhancement (Cosmetic Surgery National Data Bank STATISTICS 2017).

Static lines, increased skin laxity, discoloration, changes in bone structure, and softening of tissues that support the face all intensify the appearance of aging (Bitter 2000). Prevention of damage from ultraviolet (UV) radiation from sun exposure is an important aspect in the prevention of pre-mature aging. Protection from the UV rays of the sun can be achieved by using physical block, such as clothing, or chemical block from sunscreens. This is an important strategy recommended for young and old alike.

Dermal fillers, botulinumtoxin type A (BoNT/A), laser treatments, topical medications such as tretinoin, intense pulsed light (IPL) treatment, or surgery can be

reasonable options to address the appearance of aging. The specific issue and condition of the skin will determine which options are appropriate for the patient (Walgrave et al. 2012; Beer 2006; Dreher et al. 2013; Rivas and Pandya 2013; Kotlus 2010). Understanding the aging process and elements that contribute to it, in conjunction with utilizing appropriate treatment options, will guide the practitioner in providing appropriate options for the best outcome.

3.2 Facial Volume Loss

Facial volume changes are due in part to depletion of fat in some areas but deposition of fat in other areas of the face (Coleman and Grover 2006). The reorganization of tissues in the face is a natural progression of aging and contributes to older appearance with advancing age. Patients might complain about deepening nasolabial folds (NLF), flattening cheeks, sunken temples, hollowing eyes, and/or the formation of jowls. While the human face generally loses fat as aging progresses, some facial compartments age differently and accumulate fat. For example, the mid-face tends to lose volume, while the submental and/or suborbital areas may accumulate fat (Hellman 1927; Coleman and Grover 2006; Rohrich et al. 2009). This redistribution of fat leads to many changes, puffiness under the eyes, flattening of the cheeks, hollowing of the eyes and temples, increased fullness of the submental area, formation of jowls, and development of melomental folds.

Variations of facial bones during the aging process add to the changes in facial structure (see Fig. 3.5) (Hellman 1927; Rohrich et al. 2009; Pessa et al. 2008; Zadoo and Pessa 2000). Simultaneous fat redistribution and bone resorption occur in the jaw, temporal, and malar areas adding to the aged appearance (Hellman 1927;

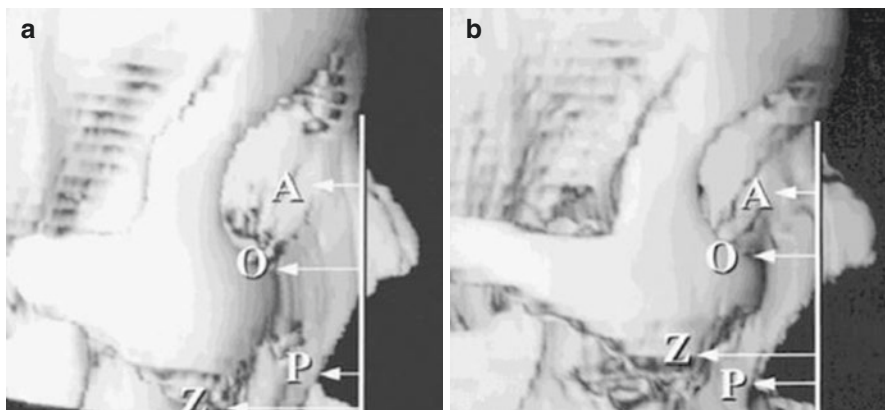


Fig. 3.5 In youth, the piriform (P) lies anterior to the lacrimal crest of the orbital bone (a) but with bone resorption during aging, the piriform falls to the posterior position (b). From: Mendelson, B. & Wong, CH. *Aesth Plast Surg* (2012) 36: 753–760. <https://doi.org/10.1007/s00266-012-9904-3>

Coleman and Grover 2006; Rohrich et al. 2009). Soft tissues of the face become more lax as the support from the underlying bone decreases.

The overall changes in the aging face are somewhat insidious and occur over time. Patients often present complaining about looking tired or sunken, stating these changes seem to have occurred overnight. Familial tendencies also contribute to the appearance of the face and patients often report they are starting to “look like my mother/father.”

Knowledge of naturally occurring changes that affect facial structures is essential for practitioners to understand when working with aesthetic patients. This allows the practitioner to provide the patient with appropriate and effective treatment options. Assessment of the patient’s skin and facial structures will guide the practitioner in creating the most suitable treatment plan.

3.2.1 Mandible

Facial bones grow and change shape significantly and the changes in the mandible contribute to the appearance of aging (Hellman 1927; Pessa et al. 2008). The aging process has a substantial effect on the appearance of the lower face. Hellman demonstrated that during the aging process, the mandible continues to grow, widen, and flatten (see Figs. 3.6, 3.7, 3.8, 3.9) (Hellman 1927; Pessa et al. 2008).

This is in contrast to the perception of youth where the small, convex shape of the mandible is considered youthful (Pessa et al. 2008). This feature of the aging lower face is important for aesthetic practitioners to understand because there are soft tissue dermal fillers that can be implemented into the aesthetic regimen. Dermal fillers can improve the shape of the face and provide a more youthful appearance by reshaping the mandibular area and adding volume and support to the lower face (Moradi et al. 2019; Moradi and Watson 2015).

Rejuvenation of the lower face should also include attention to the melomental folds, commonly referred to as marionette lines (MLs). The deepness of the ML formation can be due to genetics, age, amount of tissue variation, bone re-structuring, or a combination of these elements (Carruthers et al. 2008). The appearance of the aging lower face is difficult to quantify but recently a system was developed where the ML area can be graded to help the practitioner reach a reasonable goal of lower face restoration (Carruthers et al. 2008).

Other areas of the face including the orbital, maxillary, and zygomatic bones change shape during aging and contribute to issues commonly reported by aesthetic patients, e.g., looking tired, deep folds, and/or cheek flattening (Hellman 1927; Rohrich et al. 2009; Pessa et al. 2008; Zadoo and Pessa 2000). The facial fat compartments change shape because of age-related volume loss (Rohrich et al. 2009). Careful, thorough assessment and appropriate placement of dermal filler to the suborbital and zygomatic areas can improve the appearance of the aesthetic patient by providing a more youthful facial structure and shape. Volumizing the portion of the mandible *anterior* to the soft protrusion of facial tissue of the ML or “jowl” can create a more rounded, youthful look to the lower face (Carruthers and Carruthers 2013).



Fig. 3.6 Bone resorption and facial position variations. Nasolabial fold formation and mandibular changes during aging. From: Mendelson, B. & Wong, CH. *Aesth Plast Surg* (2012) 36: 753–760. <https://doi.org/10.1007/s00266-012-9904-3>

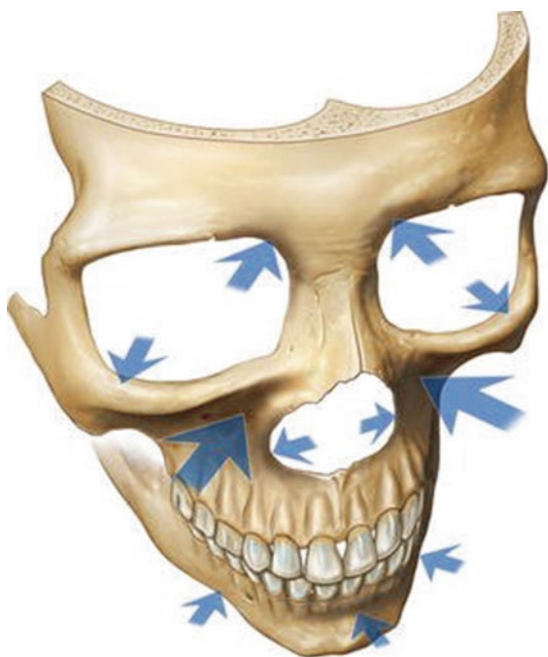
3.2.2 Lips

Full lips are an attribute of the youthful face. However, as people age, the lips typically become thinner. Fine upper and lower lip lines begin to form beyond the vermillion border. Lip line formation can be due to volume loss, sun exposure, and/or orbicularis oris muscle contraction from using straws, smoking, or animation when speaking. The combination of thinning lips and the accompanying lip lines leads to an older looking lower face, especially when the oral commissures, chin, and mandible also exhibit tissue loss (Moradi et al. 2019; Moradi and Watson 2015; Carruthers and Carruthers 2013).

Fig. 3.7 The blackened areas are those of the greatest bone loss and correspond with the areas of decreased skeletal support. From: Mendelson, B. & Wong, CH. *Aesth Plast Surg* (2012) 36: 753–760. <https://doi.org/10.1007/s00266-012-9904-3>



Fig. 3.8 The larger arrows show areas of greatest bone loss. The smaller arrows show less bone loss. From: Mendelson, B. & Wong, CH. *Aesth Plast Surg* (2012) 36: 753–760. <https://doi.org/10.1007/s00266-012-9904-3>



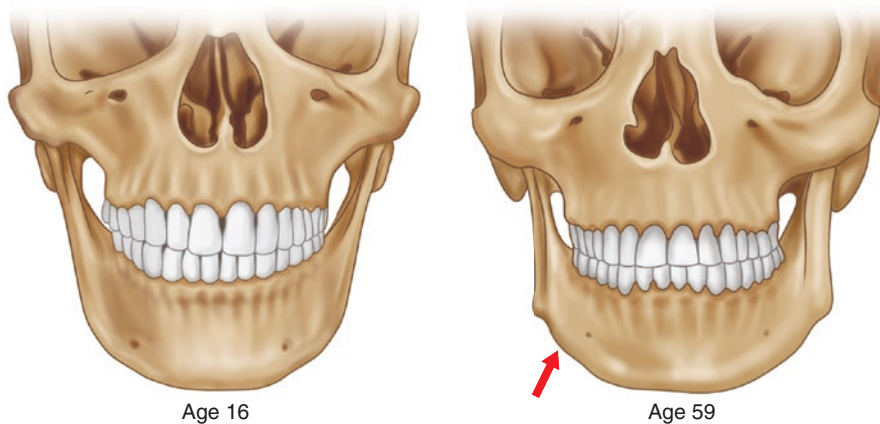


Fig. 3.9 Adapted from Pessa JE, Slice DE, Hanz KR, Broadbent TH, Jr., Rohrich RJ. Aging and the shape of the mandible. *Plast Reconstr Surg*. 2008;121(1):196–200

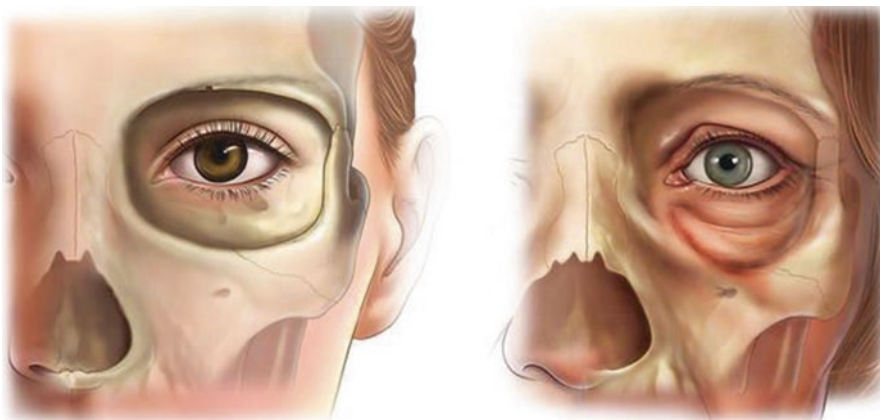


Fig. 3.10 From: Mendelson, B. & Wong, CH. *Aesth Plast Surg* (2012) 36: 753–760. <https://doi.org/10.1007/s00266-012-9904-3>

Thin lips tend to accentuate the appearance of fine lines and magnify the aspect of volume loss of the lower face. A common procedure to address thinning lips is augmentation with (hyaluronic acid) HA. The appearance of both men and women can improve from subtle and natural looking lip augmentation (Carruthers and Carruthers 2013; Stojanovic and Majdic 2019; Glogau et al. 2012).

Assessment of the lips should include consideration of the entire lower face because the lips might be only a portion of the area in need of enhancement (Carruthers and Carruthers 2013). The chin, oral commissures, and MLs should also be considered (Moradi et al. 2019). Simply creating a fuller lip in the presence of sunken lower face may not produce an optimal effect for the patient. For example, the practitioner may note the lips and corners of the mouth have lost volume, and the

formation of fine vertical lines around the mouth is noticeable. In addition, the chin has become atrophied and may need volume restoration to provide a pleasing projection of the lower face. In this case, correction of the MLs and chin areas with added filler *in addition to* the lips would enhance the result of the rejuvenation process and overall patient appearance.

3.2.3 Cheeks/Malar Area

The cheeks are a major component of facial structure and full cheeks convey a youthful appearance as well as play an important role in smiling and laughing (Carruthers and Carruthers 2013). The cheeks begin to lose volume during the aging process and, because it is a slow progression, patients do not appreciate the loss until later in life (Binder and Azizzadeh 2008; Rohrich et al. 2009). Patients often notice the NLFs deepening and request those folds be directly addressed. It is important for the practitioner to assess the face and consider the flattened cheeks as a contributing factor to the deep NLFs. The NLFs begin to deepen in part due to the loss of volume in the malar and cheek areas in conjunction with the bone changes of the zygomatic, malar, and infraorbital bones (see Fig. 3.6) (Binder and Azizzadeh 2008; Coleman and Grover 2006; Narurkar et al. 2016). Replacing lost volume in the cheek compartments with dermal filler can soften or alleviate the appearance of prominent NLFs (Figs. 3.7, 3.8, 3.9, and 3.10).

Volume loss and redistribution of fat result in a flattening of the cheek area. This leads to a downward positioning of the facial tissue and patients may complain that their “face is falling.” The downward direction of the NLFs, marionette lines, and the occasional crease in the malar area all create corresponding downward directed lines and contribute to the falling appearance of the face. These lines also contribute to a sad appearance (Binder and Azizzadeh 2008; Carruthers and Carruthers 2013). In contrast, when the lines and folds are softened and the cheek volume is replaced, the downward directional lines disappear, fullness is replenished, and the face is more youthful looking.

3.2.4 Temples

The temporal area of the face is susceptible to the aging process. The temples are a subtle sign of aging but in severe cases, the appearance of the upper face is notably improved with the use of dermal filler. The temporal layers are made up of temporal muscle, deep temporal fascia, superficial temporal fascia, subcutaneous fat, and skin (Carruthers and Carruthers 2013). As the face ages, the subsequent loss of subcutaneous fat and the increasing protrusion of the temporal vessels cause the area to appear hollow. The loss of support from the underlying tissue can cause changes such as lateral brow ptosis (Coleman and Grover 2006).

Although the temporal area loses volume with aging and is improved with dermal filler placement, there are no dermal fillers that are currently FDA approved for

temporal volume replacement in the USA. However, the normal aging process involves the hollowing of the temples and this area may be treated by a qualified practitioner. Some of the volume replacement options include hyaluronic acid (HA), poly-L-lactic acid (PLLA), and calcium hydroxyapatite (CaHA).

3.3 Conclusion

As the human face ages, tissue and bone changes affect appearance. Volume loss, tissue redistribution, and gravity contribute to the components of the aging facial structure. Symmetrical and proportioned projections of facial features are crucial for excellent results. Consideration of the entire face during patient assessment is an important part of aesthetic practice. Holistic assessment and treatment using appropriate modalities will result in a youthful, symmetrical appearance.

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4.1 Unexpected Patient Responses

Reputations can be elevated from beautiful aesthetic procedure results, or harmed from poor outcomes. Patient perception and subsequent satisfaction have the greatest impact on the success of the outcome. Although rare, an unexpected patient response to aesthetic treatment can occur. Aesthetic practice is highly subjective for both the patient and practitioner and an unexpected response due to unrealized expectations can be particularly emotional. Although comprehensive and detailed consultations are provided, and the patient is initially agreeable, there can be an unexpected patient response. For example, disappointment, anger, or hostility may occur, to the surprise of the practitioner.

The most effective way to avoid medical-legal issues is through prevention (Raveesh et al. 2016). The prudent practitioner provides a thorough and direct consultation by the *actual treatment provider* rather than through an assistant or technician. Providing the opportunity for the patient to ask questions and relay expectations directly to the practitioner who will perform the treatment will avoid potential miscommunication (Huycke and Huycke 1994).

The reasons patients may pursue legal recourse include (1) feeling like not enough information was provided regarding the condition or options available, (2) the practitioner not being available, (3) poor relationship with the practitioner, and (4) not being referred appropriately (Raveesh et al. 2016; Huycke and Huycke 1994). Practitioners should supply realistic and understandable information about appropriate procedures and thoroughly explain side effects, risks, and benefits to every patient. The patient's level of understanding and expectations of treatment must be established by asking direct questions and allowing time for discussion (Raveesh et al. 2016; Huycke and Huycke 1994). In the case of any adverse event, prompt follow-up is essential to ensure the patient is evaluated and appropriately treated, or referred to a qualified provider (Huycke and Huycke 1994).

Pictures, diagrams, drawings, and other teaching materials are tools that can be used to illustrate outcomes to the patient and provide realistic visual information.

Discussion using teaching tools allows for potential inconsistencies to be realized and misconceptions clarified. As an example, many patients confuse the muscle weakening actions of botulinumtoxin type A (BoNT/A) with the volume replacement action of dermal filler. While the actions and outcomes of these treatment modalities are understood by practitioners, oftentimes a comprehensive consultation and assessment reveal misunderstandings by the patient. Detailed explanation and direct communication of available aesthetic options appropriate for the individual patient result in an excellent outcome.

4.2 Euphoria

Unexpected patient responses can include exaggerated euphoria. Unusually euphoric patients are infrequent and, although can be initially pleasant, extreme euphoria is not expected and may be indicative of psychological disturbance. Repeat visits to the practitioner for multiple, additional treatments or *fixes* have been reported (Scharschmidt et al. 2018; Phillips et al. 2019a). Unfortunately, patients with psychological disturbances respond poorly to cosmetic treatments and the attempt by the practitioner to modify the result may worsen the situation (Rankin and Borah 1997; Phillips et al. 2019b).

Multiple, repeat visits for a previously resolved issue can lead to loss of revenue for the practice because of decreased availability to care for additional patients due to scheduling issues. The extremely euphoric patient who continuously invades the practice under the guise of delight but routinely requests touch-ups or re-treatments is a challenge for the practitioner.

This is not to say patients are not invited to be thrilled with their treatment, but careful consideration of a patient with extreme euphoria is advised. Direct communication and thorough documentation of the consultation at each visit are essential; however, in some cases referral to a psychologist may be warranted.

4.3 Hostility

Hostility is an unexpected and unpleasant patient response in any clinical practice. A compassionate and direct consultation that outlines realistic expectations and limitations of treatment or medication prior to initiation of the procedure can help alleviate the potential for an angry patient. Detailed review of the consent form should include realistic outcomes and possible side effects to help ensure the patient has clear understanding of the limitations of treatment. In addition, the practitioner should have a selection of referral options to offer the patient in the event either the patient or the practitioner is compelled to seek outside assistance.

Many patients have some level of anxiety before or during aesthetic treatments. Some patients may not divulge true expectations and this makes it difficult to identify patients who are at increased risk of hostility (Rankin and Borah 1997). However, some aesthetic patients may not only bring the *normal* anxious component into the situation but some may have escalating or intense anxiety. Coupled with unrealistic expectations, this can predispose the patient to the unfavorable response of hostility (Scharschmidt et al. 2018; Rankin and Borah 1997).

Nevertheless, if a patient becomes hostile after treatment, whether it is immediate or weeks or months after treatment, a conversation in a sympathetic and calm demeanor along with reiteration of options should be reviewed with the patient (Raveesh et al. 2016; Huycke and Huycke 1994). Understanding the reason for hostility through conversation can shed light on this atypical response and calm the patient. When patients believe the practitioner has their best interest in mind, they are more receptive to options and may ultimately become satisfied (Huycke and Huycke 1994). However, in some cases, referral to psychiatry or to a psychologist may be justified (Rankin and Borah 1997).

4.4 Body Dysmorphic Disorder

Body dysmorphic disorder (BDD) is a psychological condition that is diagnosed according to Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria (American Psychiatric Association 2013). This condition is characterized by an intense preoccupation of hardly noticeable or non-existent defects in the person's appearance that is upsetting to them in ways where they believe they are ugly or deformed when in reality, they appear normal (Phillips et al. 2019a). This obsessive preoccupation can lead to repetitive behaviors such as continually checking their image in mirrors, windows, or other reflective objects (Phillips et al. 2019b). Interestingly, this behavior is not easily controlled by the patient and they do not enjoy having to constantly confirm their appearance. BDD is more common than practitioners may realize and is associated with suicidal ideation and behavior. According to research, most patients seek help with their perceived defects through plastic surgery or cosmetic dermatology (Phillips et al. 2019b). This is risky for the practitioner because the patient who suffers with BDD will not likely be satisfied with the outcome of the procedure and might focus on the result or discover another defect.

The diagnosis of BDD includes the following (American Psychiatric Association 2013):

- Preoccupation with one or more non-existent or extremely slight defect, thinking about it for at least 1 h per day
- Concerns about appearance that lead to repetitive actions such as mirror checking or skin picking or mental acts such as comparing their appearance to others
- Clinically significant distress or interruption of social behaviors that result from appearance concerns
- Psychosocial impairment
- The patient preoccupation is not better explained by concerns of body fat/weight in an individual who meets diagnostic criteria for an eating disorder

There is a short screening assessment tool available that can be of great value in determining who may not be an appropriate aesthetic candidate or who may require psychological referral (Phillips et al. 2019b). Patients who suffer with BDD may welcome the suggestion for psychological referral however, this is not always the case and the practitioner should be prepared to handle this sensitive situation. It is advised to avoid providing aesthetic treatments to a person who might have BDD until a psychological evaluation can be performed. Referral to a qualified provider for treatment is essential for the optimal health of a patient suffering with

BDD. Treatment for BDD can include pharmacotherapy and/or cognitive behavioral therapy and many patients find relief using medications or cognitive behavioral therapy provided by a qualified provider (Phillips et al. 2019b).

Some BDD screening tools are available to assess the patient prior to treatment (Phillips et al. 2019c). A practice policy that requires every new patient to complete a BDD screening questionnaire can assist in the screening process. If the patient responses indicate the possibility of BDD, referral to a mental health provider is strongly recommended.

The following is a sample questionnaire that utilizes available screening questions to determine the possibility of BDD in a person who presents for cosmetic treatment (*not intended for use in clinic*):

Sample BDD Questionnaire				
Patient Name: _____ Date: _____				
Are you very concerned about the appearance of some part of your body, which you consider especially unattractive? <i>(Please circle one)</i> Yes No				
If you answered no, thank you for your time and attention. You are finished with this questionnaire.				

If yes, do these concerns preoccupy you? That is, you think about them a lot and they're hard to stop thinking about?				
<i>(Please circle one)</i> Yes No				
What are these concerns? What specifically bothers you about the appearance of these body parts? _____ _____				
What effect has your preoccupation with your appearance had on your life? _____ _____				
Has your defect often caused you a lot of distress, torment or pain? How much? <i>(circle best answer)</i>				
1 No distress	2 Mild and not too disturbing	3 Moderate and disturbing but still manageable	4 Severe and very disturbing	5 Extreme and disabling
Has your defect caused you impairment in social, occupational or other important areas of functioning? How much? <i>(circle best answer)</i>				
1 No limitation	2 Mild interface but overall performance not impaired	3 Moderate, definite interference, but still manageable	4 Severe, causes substantial impairment	5 Extreme, incapacitating
Has your defect often significantly interfered with you social life?			Yes	No
If yes, how? _____ _____				
Has your defect often significantly interfered with your school work, your job, or your ability to function in your role?			Yes	No
Are there things you avoid because of your defect?			Yes	No
_____ _____				