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CASE REPORT

FACIAL AESTHETICS – REVIEW

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ABSTRACT

An organized and systematic approach is required to evaluate, diagnose and resolve esthetic problems predictably. It is of prime importance that the final result is not dependent only on the looks alone. Our ultimate goal as clinicians is to achieve pleasing composition in the facial aesthetics by creating an arrangement of various esthetic elements. Treatment planning according to the facial architecture and dental configuration allows function and harmonious aesthetics to be improved. The primary objective of aesthetic dental treatmentis to generate a natural healthy appearance for an otherwise damaged dentition. In order to fulfill this complex task, an interdisciplinary approach is required to synchronize periodontal, orthodontic, restorative and occasional plastic surgical treatment modalities which results in comprehensive treatment plan. A detailed diagnosis of the given facial architecture and dental configuration with analysis of the individual patient aesthetcs are required to initiate the treatment plan. This article reviews the various principles that govern facial aesthetic.

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INTRODUCTION

Facial aesthetics have an important influence on social behaviour and perception in our society (Julie C. Faure *et al*., 2002). Smile, a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine how well a person can function in society. Of course, the importance given to a beautiful smile is not new. The search for beauty can be traced to the earliest civilizations; both the Phoenicians (app 800 BC) and Etruscians (app 900 BC) carefully carved animal tusks to simulate the shape, form and hue of natural teeth. It was not until the 18th century that dentistry was recognized as a separate discipline and its various branches were established. Pierre Fauchard (1678–1761) of France, the leader of the movement, together with several colleagues modernized and promoted dentistry and also advocated esthetic practices. Harmonizing an esthetics smile requires a perfect integration of facial composition and dental composition. The facial composition includes the hard and soft tissues of the face. The dental composition relates more specifically to teeth and their relationship to gingival tissues. A smile design should always include the evaluation and analysis of both facial and dental composition (Mohan Bhuvaneswaran, 2010).

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The view that subjective patient satisfaction—not objective physiological outcomes, such as a block or complete immobilization of the treated musculature—importance is rapidly gaining ground. This satisfaction can be described in general terms as the achievement of a ''natural, relaxed look'' (Alastair Carruthers *et al*., 2007). The perception of aesthetics varies from person to person and is influenced by personal experiences and social environment (Flores-Mir *et al*., 2004). For the same reasons, there can be differences of opinion regarding aesthetics between laypeople and professionals (Albino *et al*., 1984). Whereas Roden-Johnson *et al*. (2005) and Pinho *et al*. (2007) reported that general practitioners, orthodontists, and laypersons evaluated smiles differently Ioi *et al*. (2009) found that orthodontists and dental students rated the attractiveness of smiling photographs similarly. However, other researchers reported that smile attractiveness did not differ between dental professionals and laypeople (Ritter *et al*., 2006; Martin *et al*., 2007; Elham *et al*., 2011).

Currently, people's esthetic requirements and expectations have increased substantially. Therefore, dentists have been seeking ways to provide excellent treatment results which, consequently, increasingly require a well organized transdisciplinary approach. The link between orthodontics and periodontics became evident from the moment professionals began to understand the biology of tooth movement.

As regards smile esthetics, however, such cooperation is now essential (Máyra Reis Seixas, 2012). Historically attempts to define essence of beauty were a combination of artistic expression and mathematical proportions. Aesthetics is an element of philosophy concerning the science of beauty and is often associated with circumscriptions such as good and true. While dental clinicians utilize full mouth radiographs and diagnostic models to evaluate the condition of their patients teeth, analysis of the anterior and lateral facial skeletal relationships and their soft tissue drape is often overlooked in these examinations. An incomplete diagnosis when one neglects to review cephalotmetric linear and angular measurements, the facial contours the position of the nose, lips and chin (Robert Rifkin and Facial analysis, 2000). The patient's presenting complaint, as always, is very important. However, clinicians must be aware that patients for an initial consultation may have numerous mixed emotions and will often find it difficult to convey their reasons for seeking advice or treatment. Therefore, jumping in with the type of treatment that is required may well frighten the patient. The clinician must assess the patient's - Perception of his/her dentofacial appearance, motivation for seeking treatment, realism of his/her expectations from treatment and likely level of co-operation, as well as the support of the family (Farhad B Naini, 2008). The goal of an esthetic makeover is to develop a peaceful and stable masticatory system, where the teeth, tissues, muscles, skeletal structures and joints all function in harmony (Peter Dawson) (Mohan Bhuvaneswaran, 2010).

Clinical assessment

The most important aspect of the clinical assessment is for the clinician to know what to look for. Every face has disproportions and asymmetries, as does every smile and its associated dentition. Therefore, it requires a clinician's educated eye if the correct diagnosis is to be reached. A number of important soft tissue landmarks are used in the assessment of facial aesthetics. The patient must be examined for facial proportions and symmetry in full face and in profile view (Farhad B Naini, 2008).

Natural head position

In order to assess facial proportions patients must be examined in natural head position (NHP).NHP is a standardized and reproducible position of the head in space when the subject is focusing on a distant point at eye level. In NHP, the visual axis is horizontal. This allows an extra-cranial vertical, and a horizontal perpendicular to that vertical, to be used as reference lines for facial aesthetic analysis. This is important as the cant or inclination of all other reference lines, such as the Frankfort plane, is subject to biologic variation. The procedure to obtain a clinical facial photograph in NHP is with the subject standing upright and looking straight ahead into the image of his/her own eyes in a small mirror located at a distance, at the level of the eyes (Farhad B Naini, 2008).

FACIAL ANALYSIS

It begins with the establishment of certain lines of reference. Deviations from the norm in how these reference lines relate to one another are the first step in diagnosing functional and esthetic discrepancies. The interpipillary line is genrally accepted as the key horizontal plane of refrence, but care should be taken in the establishment of the horizontal plane of refrence because the interpupillary line and the horizon line fail to coincide, the patient and clinician together should decide on which line to base their horizontal frame of refrence (The esthetics in and out). The parallelism of the lip/incisal lines and eventually the gingival line is compared with the interpupillary line to document horizontal discrepancies in the patient's facial profile and possible divergence in the occlusal plane (The esthetics in and out).

FACIAL TYPE

The facial height to width ratio (Facial index) gives the overall facial type, such as 'long' or 'short' or 'square' face. The proportionate facial height to width ratio is 1.35:1 for males and 1.3:1 for females. Bizygomatic facial width, measured from the most lateral point of the soft tissue overlying each zygomatic arch (zygion), is approximately 70% of vertical facial height.In addition, bitemporal width, measured from the most lateral point on each side of the forehead, is 80−85% of bizygomatic width. Bigonial width, measured from the soft tissue overlying the most lateral point of each mandibular angle (soft tissue gonion), is usually 70−75% of bizygomatic width (Farhad B Naini, 2008).

The basic shape of the face when viewed from the frontal aspect can be one of the following (Mohan Bhuvaneswaran, 2010)

- Square
- Tapering
- Square tapering
- Ovoid

The lateral profile of an individual can be any one of the following (Mohan Bhuvaneswaran, 2010)

- Straight
- Convex
- Concave

FACIAL SYMETRY

The face must also be examined for bilateral symmetry, bearing in mind that a small degree of asymmetry is present in most individuals and essentially normal. The facial midline can be constructed using two main landmarks. The mid-philtrum of the upper lip (Cupid's bow) will be in the midline of the face, except in exceptional circumstances, eg cleft lip. A line joining this point to the mid-glabellar region (glabella), midway between the eyebrows, forms the facial midline. In the symmetrical face, this line will extend to the mid-point of the chin. The presence of a cant in the transverse occlusal plane may be assessed in relation to the interpupillary line with the patient biting on a wooden spatula, either in the incisor/canine region or the premolar/molar region (Figure 9). In the absence of a maxillary cant and/ or vertical/orbital dystopia, the transverse occlusal plane should be parallel to the interpupillary line (Farhad B Naini, 2008).

SMILE ANALYSIS

Harmonizing an esthetics smile requires a perfect integration of facial composition and dental composition. The facial composition includes the hard and soft tissues of the face. The dental composition relates more specifically to teeth and their relationship to gingival tissues. A smile design should always include the evaluation and analysis of both facial and dental composition (Mohan Bhuvaneswaran, 2010).

Facial composition

Facial beauty is based on standard esthetic principles that involve proper alignment, symmetry and proportion of face. Analyzing, evaluating and treatment planning for facial esthetics often involve a multidisciplinary approach which could include orthodontics, orthognathic surgery, periodontal therapy, cosmetic dentistry and plastic surgery. Thus, esthetic approach to patient care produces the best dental and facial beauty (Mohan Bhuvaneswaran, 2010). But in our clinical practice, unless and otherwise there is an obvious discrepancy in the face, we restrict our smile makeover to the dental composition only. There are two facial features which do play a major role in the smile design:

- The interpupillary line and
- Lips.

The interpupillary line should be perpendicular to the midline of the face and parallel to the occlusal plane. Lips are important since they create the boundaries of smile design. If we come across major discrepancies in the above-mentioned two factors, then we have to seriously consider the correction of the facial composition, before we venture into the correction of the dental composition (Mohan Bhuvaneswaran, 2010).

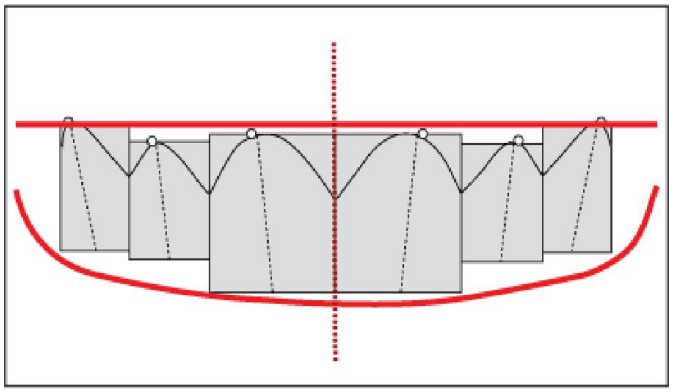
DENTAL ANALYSIS

Numerous variables eg; embrasures, axis, zeniths, shapes contribute to the appearance of the dentition and consequently to the appearance of the patient. These factors play an important role in facial aesthetics and have been the focus of myriad clinical reports.[6]

DIAGRAM OF FACIAL AESTHETIC REFERENCES - DFAR (new characteristics) (Carlos Alexandre Câmara, 2010)

The Diagram of Facial Aesthetic References (DFAR) was created to facilitate the visualization of maxillary anterior teeth, by suggesting what needs to be created or achieved with those teeth, aiming for the best possible dental aesthetics. The objective of the diagram is to give an exact idea of the positioning and ratios between teeth, as well as their relationship with the gum and lips in frontal view. As previously mentioned, the diagram consists of six frames that surround the maxillary incisors and canines; their limits are specific to each dental reference. Each frame surrounds its respective tooth, observing its limits (Fig 1).

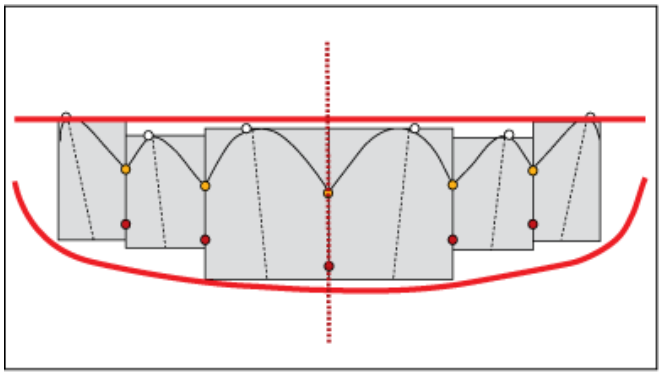
Although these frames can serve as references in the different observation planes, DFAR is evaluated at a 90° view from the frontal plane-in other words, perpendicular to it. Its use facilitates the planning and visualization of the best aesthetic positioning of anterior teeth, and its objective is to provide data that can assist the reorganization and restructuring of those teeth, whenever they need to be repositioned and/or restored. However, although the original conception of DFAR is useful to assist in the evaluation of mouth aesthetics, a few references of dental, gingival and labial structures can be added to its format, improving and facilitating the visualization of the smile.



Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod, vol.15 no.1 Maringá Jan./Feb. 2010.

Figure 1. Diagram of facial aesthetic references (DFAR)

In its original format, DFAR makes reference to the gingival apexes, which are most apical landmarks of the gingival contour. The present reevaluation will add the locations of the extremities of gingival papillae (papillary tips) and emphasize the contact points (Fig. 2).

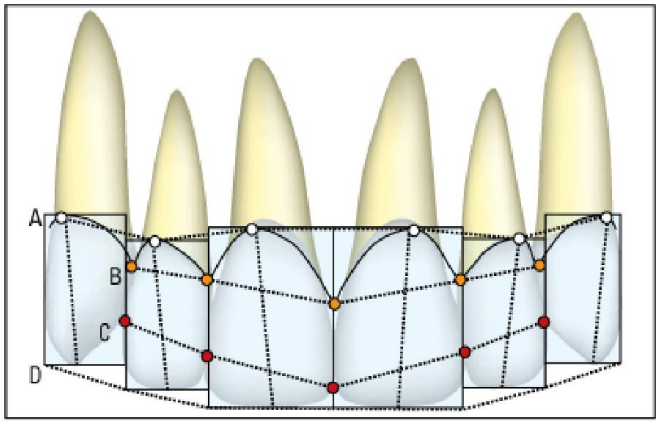


Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010.

Figure 2. DFAR with new reference points: contact points and gingival papillary tips

Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010. The union of these points will form lines that give evaluative references in the analysis of the smile. As such, DFAR will intrinsically have four lines, formed by the following structures (Fig. 3):

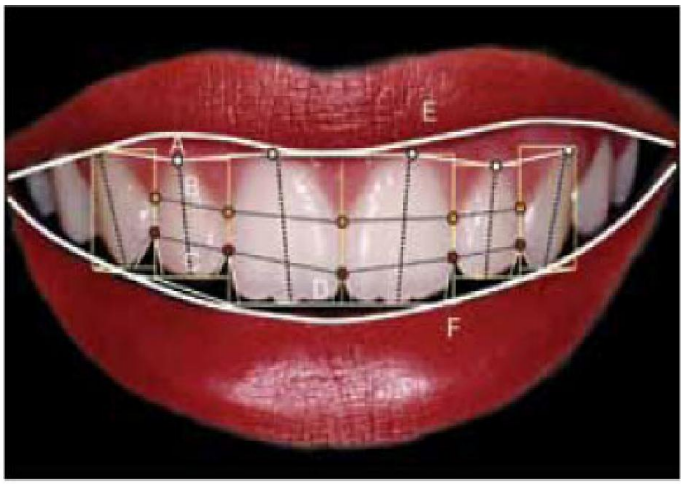
- Cervical line_gingival apexes.
- Papillary line_papillary tips.
- Contact points line_contact points.
- Incisal line_incisal edges (incisal line).



Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010.

Figure 3. Aesthetic reference lines: Cervical Line (A); Papillary Line (B); contact points line (C); incisal line (D)

Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010. The relationship of the papillary line with the contact points line will create a band named connector band, in a reference to the concept of dental connectors (Carlos Alexandre Câmara, 2010). This band, formed by the two lines (papillary and contact points), added to the cervical and incisal lines, will provide the horizontal dental references of the smile in a frontal view. The other two lines that make up the group of horizontal smile lines are the upper lip line and lower lip line. These lines, along with the dental and gingival lines, compose the group of six horizontal smile 1 Fig 4 Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010.



Carlos Alexandre Câmara, Aesthetics in Orthodontics: six horizontal smile lines. Dental Press J. Orthod. vol.15 no.1 Maringá Jan./Feb. 2010.

Figure 4. The six horizontal smile lines cervical line (A); papillary line (B); contact points line (C); incisal line (D) upper lip line (E) lower lip line (F)

Tooth dimensions (Mohan Bhuvaneswaran, 2010)

Correct dental proportion is related to facial morphology. Central dominance dictates that the centrals must be the dominant teeth in the smile and they must display pleasing proportions. The proportions of the centrals must be esthetically and mathematically correct. The width to length ratio of the centrals should be approximately 4:5 (0.8–1.0); a range for their width of 75–80% of their length is most acceptable. The shape and location of the centrals influences or determines the appearance and placement of the laterals and canines (Mohan Bhuvaneswaran, 2010). Arch form has a direct influence on the buccal corridor. The ideal arch is broad and conforms to a U shape. A narrow arch is generally unattractive. The unattractive, negative space should be kept to a minimum. This problem can be solved or minimized by restoring the premolars. The buccal corridor should not be completely eliminated because a hint of negative space imparts to the smile a suggestion of depth (Mohan Bhuvaneswaran, 2010).

Zenith points (Mohan Bhuvaneswaran, 2010)

Zenith points are the most apical position of the cervical tooth margin where the gingiva is most scalloped. It is located slightly distal to the vertical line drawn down the center of the tooth. The lateral is an exception as its zenith point may be centrally located. Establishing the proper location of zenith points is a critical step in alteration of mesial and distal dimensions,

Zenith points and its relation to midline

- Closure of diastema: move the zenith points to
- Provide the illusion of bodily movement and reduce exaggerated triangular form and
- Correction of tooth angulation (mohan bhuvaneswaran, 2010).

Tooth inclinations (Mohan Bhuvaneswaran, 2010)

Axial inclination compares the vertical alignment of maxillary teeth, visible in the smile line, to central vertical midline. From the central to the canine, there should be natural, progressive increase in the mesial inclination of each subsequent anterior tooth. It should be least noticeable with the centrals and more pronounced with the laterals and slightly more so with the canines. If the incisal plane is canted, the axial inclination of the anterior teeth and the midline itself, if it is at right angle to the incisal plane, will be correspondingly incorrect. The evaluation of axial inclination can be done on a photograph of the anterior teeth in a frontal view. A line is sketched on each tooth from the middle of the incisal edge through the midline of the tooth at its gingival interface. Axial inclination can also refer to the degree of tipping in any plane of reference.

The guide for labiolingual inclination is as follows

- Maxillary central incisor – positioned vertically or slightly labial
- Maxillary lateral incisor – cervical is tucked in, incisal edge inclined slightly labially

- Maxillary canine – cervical area positioned labially, cusp tip lingually angulated

Interdental contact area and point (Mohan Bhuvaneswaran, 2010)

Interproximal contact area (ICA)

- It is defined as the broad zone in which two adjacent teeth touch.
- It follows the 50:40:30 rule in reference to the maxillary central incisor. ICAs – 50:40:30 rule, ICPs – moves appically as we move from central to canine, Incisal embrasure – increase in size and depth from central to canine
- The increasing ICA helps to create the illusion of longer teeth by wider and also extend apically to eliminate black triangles.

Interproximal contact point (ICP)

- It is the most incisal aspect if the ICA.
- As a general rule, the ICP moves apically, the further posterior one moves from the midline.

Incisal embrasures (Mohan Bhuvaneswaran, 2010)

The incisal embrasures should display a natural, progressive increase in size or depth from the central to the canine. This is a function of the anatomy of these teeth and as a result, the contact point moves apically as we proceed from central to canine. The contact points in their apical progression should mimic the smile line. Failure to provide adequate depth and variation to the incisal embrasure will

- Make the teeth appear too uniform and
- Make the contact areas too long and impart to the dentition a box like appearance. The individuality of the incisors will be lost if their incisal embrasures are not properly developed.

Also, if the incisal embrasures are too deep, it will tend to make the teeth look unnaturally pointed. As a rule, a tooth distal to incisal corner is more rounded than its mesio incisal corner.

Gingival analysis

The gingival perspective is concerned with sft tissue envelope surrounding the teeth. In cross section, the dentogingival complex is composed of three entities: the supra – crestal connective tissue attachment, epithelial (or junctional epithelium attachment and sulcus. The connective tissue fibres emanate from the osseous crest to the cement-enamel junction, the epithelial attachment from CEJ onto the tooth enamel, coronal to the latter is the gingival sulcus or crevice (Robert Rifkin, 2000). The gingiva acts as the frame for the teeth; thus, the final esthetic success of the case is greatly affected by the gingival health. It is of paramount importance that the gingival tissues are in a complete state of health prior to the initiation of any treatment (Mohan Bhuvaneswaran, 2010). Healthy gingiva is usually pale pink in color, stippled, firm and it should exhibit a matte surface, located facially – 3 mm above the alveolar crestal bone and located interdentally – 5 mm above the intercrestal bone papilla should be pointed and should fill the gingival embrasure right up to the contact area (Mohan Bhuvaneswaran, 2010).

Gingival level and harmony

Establishing the correct gingival levels for each individual tooth is the key in the creation of harmonious smile. The cervical gingival height (position or level) of the centrals should be symmetrical. It can also match that of the canines. It is acceptable for the laterals to display the same gingival level. However, the resultant smile may be too uniform and it is preferable to exhibit a rise and fall in the soft tissue by having the gingival contour over the laterals located toward the incisal compared to the tissue level of the centrals and canines (Figure 10). The gingival margin of the lateral incisor is 0.5–2.0 mm below that of the central incisors. The least desirable gingival placement over the laterals is for it to be apical to that of the centrals and or the canines (Mohan Bhuvaneswaran, 2010). The gingival shape on the mandibular incisors and the maxillary laterals should exhibit a symmetrical half oval or half circular shape. The maxillary centrals and canines should exhibit a gingival shape that is more elliptical. Thus, as mentioned earlier, the gingival zenith is located distal to the long axis of the maxillary centrals and canines and coincides along the long axis of the maxillary lateral incisors.(Mohan Bhuvaneswaran, 2010). A smile demonstrating minimal gingival display has been deemed more aesthetic than one with excessive gingival display. Geron and Atalia (2005) reported that upper gingival exposure of up to 1 mm was regarded as attractive. Kokich *et al*. (2006) reported that the lay and orthodontic groups rated a 3 mm distance as unattractive (Elham *et al*., 2011).

Conclusion

In the past, orthodontists made all the decisions about the treatment plan for a child or an adolescent. However, in the compromised adult malocclusion, a team of orthodontist, oral maxillofacial surgeon, periodontist, endodontist and restorative dentist must interact to make prudent treatment decisions for the patient. Human dental anatomy has remained relatively constant for centuries. In the assessment of dentofacial aesthetics, art and science must act in unison. Edward Angle, known as the father of modern orthodontics, said, 'There is nothing in which the student of Orthodontia should be more keenly interested than art generally and especially in its relation to the human face'. This is true of all aspects of aesthetic dentistry and is indeed the beauty of orthodontics. Moreover the smile designing done has to be as conservative as possible unlike the past. The aim has to be less reduction of tooth structure and greater esthetics and durability. This simply means that cosmetic dentistry has to be a multispecialty branch, wherein all treatments like orthodontics, periodontics, surgical procedures have to be performed whenever deemed necessary. Following simple principles regarding the special arrangement of the face can guide the clinician in providing more natural smiles with less tooth reduction. It is noted that the degree of anterior tooth display is determined by the lips at rest and during smiling.

The LARS factor guides the amount of tooth exposure in the static muscular position of the lips. A smile is determined by the dynamic muscular position of the lips. Thus in the assessment of dent facial aesthetics, art and science must act in unison. The clinician must be able to discuss every treatment option with the patient, both in terms of its effects on dental aesthetics and its potential effect on facial aesthetics, be it positive or negative. While the ultimate objective of reconstructive dentistry is to diagnose and treat the oral hard and soft tissues with proper form and aesthetics to function within physiological limits and restore health, the utilization of various desciplines to achieve these goals has been shown to provide different results. Multidisciplinary and interdisciplinary studies are based on collaboration of disciplines to develop and implement a comprehensive treatment plan.

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The esthetics in and out.

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