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Selected issues in the field of aesthetic dentistry

The study of colour is an extremely complicated field of knowledge and it includes various disciplines: physics, chemistry, psychophysics, physiology, and psychology. The issue of colour is not limited to mere physical process, which in case of colour object consists of interaction between electromagnetic radiation and matter (and its result), but also involves the subjective area related to colour stimulus interpretation in human brain. Because eye and brain are physical factors, interpretation of colour is connected with its perception, which to an extent is individual.

Division of spectrum in visible scope and colour names have been presented in Table 1. In dental technique one should distinguish between perception of so-called free colours and perception in real situation, i.e. in regular visual area. In the former case other stimuli do not have any influence, in the latter perception of colour is also related to perception of shape, size and distance.

Table 1. Division of spectrum in visible scope and colour names

Colour	Wave length [nm]
Violet	400-440
Indigo	440-470
Light blue	470-480
Blue	480-490
Blue-green	490-495
Green	495-560
Green-yellow	560-570
Yellow	570-575
Yellow-orange	575-590
Orange	590-600
Orange-red	600-620
Red	620-780

Colour is an optic sensation evoked by the visible part of electromagnetic radiation. Primary light colours are: dark blue, green, red. Colour is light. Six colours mixed together give white light; These six colours can be reduced to three: red, green and blue. If we take all this into account it is hard to

understand that all objects are made of materials absorbing and reflecting light: in other words they absorb and reflect electromagnetic waves. If a beam of light consisting of three basic spectrum colours (red, green and blue) falls on a white object, it will reflect all of them and in result white colour is acquired. If the object is black the situation will be reversed: it will fully absorb all the three spectrum colours so the object will be black for us. This phenomenon of absorption and reflection shows us how light creates colours of objects by adding the electromagnetic waves to one another.

Secondary light colours are: yellow, purple, light blue, light "paints" by adding colours up. To provide an example it would be worth while adding the following. In order to "paint" an object white, light adds all its spectrum colours to one another; in order to "paint" it yellow, red and green colours are added. Acquiring colours through adding the colours of light is known in physics as synthesis through addition. We cannot acquire colours of light through mixing of pigments colours. Our mixing of pigments colours is based on subtraction of light. When we paint a surface of cardboard red, we subtract green and blue colour of light from white. In order to have a green stain, we mix yellow with cyanic blue: yellow absorbs (subtracts) blue colour. The darker the shades surrounding white colour the whiter it seems to be. The lighter the shades surrounding grey colour the greyer it seems to be. Colour can be lighter or darker depending on the colours and shades surrounding it.

Measuring of colours. In order to define a colour it is necessary to describe its three parameters: hue (shade) – e.g. blue, red, green; value – describing the level of brightness (darkness) of a colour; chroma – which is the measure of light intensity.

A phenomenon of metamerism consists in the fact that body colour is different depending on lighting conditions. In order to select an appropriate colour it is best to use three sources of light. A colour that retains its characteristics in light coming from three different sources is always better that the one, which looks properly only in the light from one source, while it proves to be completely wrong in other lighting. In a dentist's office there are usually three sources of light available: natural light from the window; glowing light from a dental surgery lamp (shadowless); cold white fluorescent light from the ceiling light.

After 5 seconds of looking at a tooth or a corresponding colour our eye accommodates and gets used to it. If we keep looking at a colour for over 5 seconds and then we look at a white surface or we close our eyes the same picture will appear but in a colour of a complementary hue. This phenomenon, known as "hue sensitivity", unfavourably influences shade selection. One of the most important factors for a dentist to pay attention to is the type of enamel of the tooth to which restoration will be selected: opaque or transparent and matt or reflecting light to large extent (glossy). Regardless of how beautiful the colour of restoration will be and how skilfully the shape of the tooth created, highly glossy look of the restoration will not match the adjacent teeth, if they are relatively matt.

Availability of new materials to be used in dentistry and development of new techniques requires the dentists to constantly develop their "artistic" skills and abilities of using light, colour, shape and form in order to create a more aesthetic look of the treated patient.

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SUMMARY

On the basis of clinical experience and literature the role of colour in aesthetic dentistry has been described. Recently the dynamic development of aesthetic dentistry can be observed and every opportunity for a dentist to include the issues of aesthetics in dental treatment is extremely important. One of the most important factors in conservative dentistry as well as in dental prosthetics will be proper colour selection for reconstructive restoration, filling, inlay and prosthetic restoration.

Wybrane zagadnienia z zakresu stomatologii estetycznej

Na podstawie doświadczenia klinicznego i piśmiennictwa opisano rolę koloru (barwy) w stomatologii estetycznej. W ostatnich latach obserwuje się dynamiczny rozwój stomatologii estetycznej i wszystko, co umożliwia stomatologowi uwzględnić zagadnienia estetyki w leczeniu stomatologicznym pacjentów, jest niezmiernie ważne. Jednym z kluczowych czynników w stomatologii estetycznej jest właściwy dobór koloru (barwy) na uzupełnienia odtwórcze, wypełnienia, wkłady, uzupełnienia protetyczne.