FDI CSA

世界牙科联盟 中华口腔医学会

临床牙科进展报告会

Continuing Dental Education Programme

UPDATE IN CLINICAL DENTISTRY

25-27 October, 2004

Hangzhou China

Programme

报告会日程

2004年10月26日（星期二）

地址:

8:30 ~ 9:00	Opening ceremony 开幕式	
9:00 ~ 10:20	Color theory and Application in Dentistry 颜色的理论及在牙科中的应用	Asbjorn Jokstad Norway
10:20 ~ 10:40	Break 休息	
10:40 ~ 12:00	Tooth wear 牙齿磨损	Asbjorn Jokstad Norway
12:00	Lunch 午餐	
1:30 ~ 2:50	Chemotherapeutics in the management of Periodontal Diseases 牙周疾病治疗中的药物治疗	P.Mark Bartold Australia
2:50 ~ 3:10	Break 休息	
3:10 ~ 4:30	Relationship between Periodontal Health and Systemic Health 牙周健康与全身健康的关系	P.Mark Bartold Australia

2004年10月27日（星期三）

8:30 ~ 11:30	(9:50 ~ 10:10 Break 休息) Current Trends in Aesthetic and Restorative Dentistry 美容修复口腔医学的目前发展趋势	Juergen Manhart Germany
12:00	Lunch 午餐	
1:30 ~ 2:50	How to Fabricate Complete Denture for Edentulous Patients with Low and Flat Alveolar Ridge 如何为牙槽嵴低平患者制作全口义齿	TianWen Guo China
2:50 ~ 3:10	Break 休息	
3:10 ~ 4:30	The Preliminary Research on the Basis and Clinical Apply of Reverse Neck Dissection 逆行性颈淋巴清扫术的基础和临床应用初步探讨	ShiFang Zhao China

2004年10月25日（星期一）

Orthodonic Course 口腔正畸专题

地址:

8:30 ~ 12:30	(10:30 ~ 10:50 Break 休息) Contemorary Orthodontic Practice---Biomechanics and Smart Wires 现代正畸实践: 生物力学与SMART弓丝	Ravindra Nanda USA
12:30	Lunch 午餐	
1:30 ~ 2:30	Differential Diagnosis and Treatment of Class Ⅱ and ClassⅢ Malocclusions Angle Ⅱ类和Ⅲ类错𬌗的鉴别诊断与治疗	QiMin Teng Taipei
2:30 ~ 3:30	Orthodontic management of periodontal Patients with Periodontal disease 牙周病患者的正畸治疗	YanHeng Zhou China
3:30 ~ 4:30	Adult orthodontic treatment--a great chance and challenge for orthodontist 成年人正畸治疗—机遇与挑战同在	HaiPing Lu China

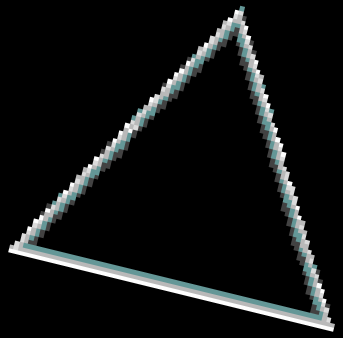
Applying color theory in clinical practice to improve patient treatment

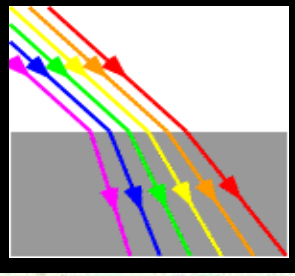
Asbjørn Jokstad
Science Manager, FDI World Dental Federation
Professor, University of Oslo, Norway

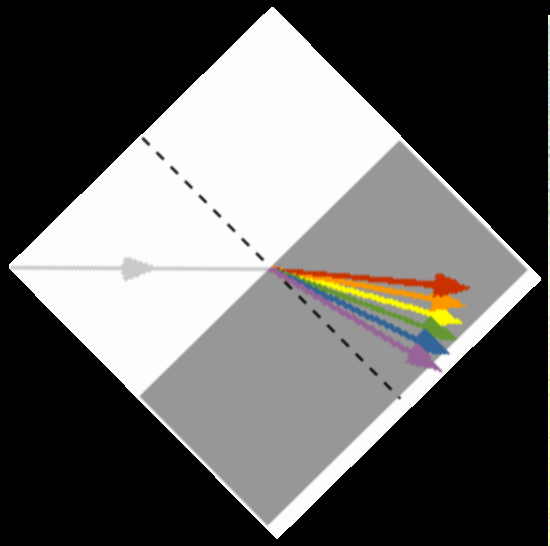
Learning objectives

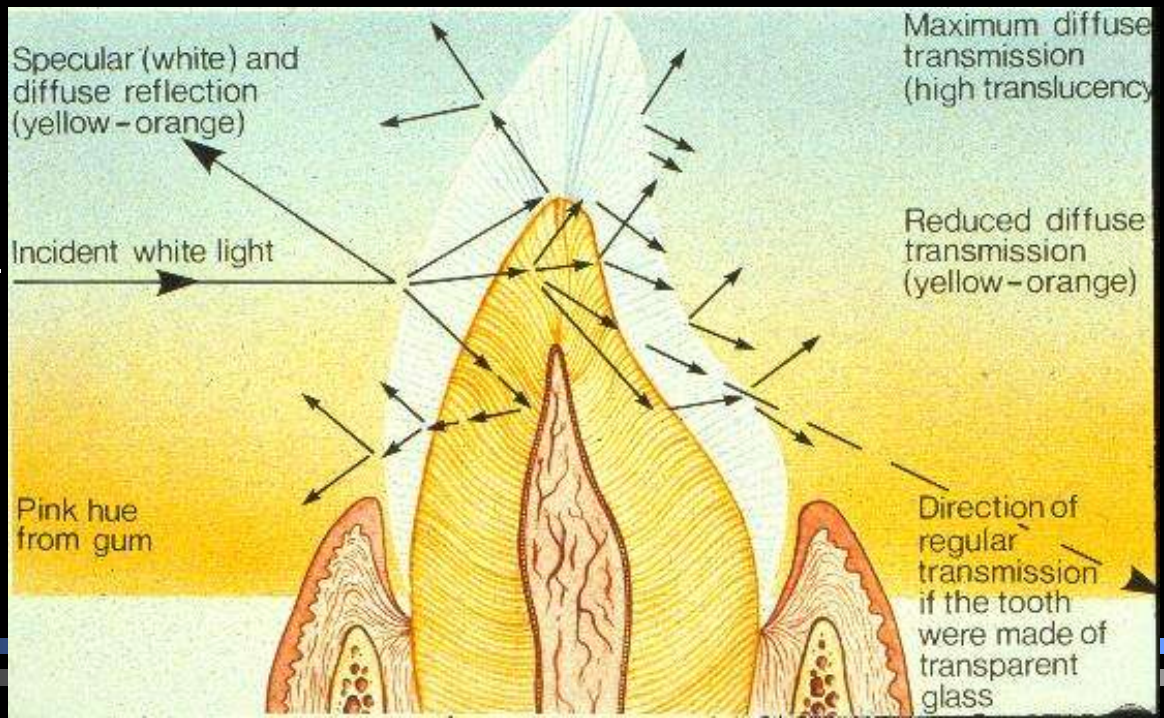
- Be familiar with the physical mechanisms of tooth coloring and its measurement
- Recognize possible etiology for discoloration
- Realize the potentials and limitations of esthetic restorative materials
- Be acquainted with different shade guides and their characteristics
- Know of commercially available digital systems for shade matching
- Know procedures for optimizing correct shade matching & communication

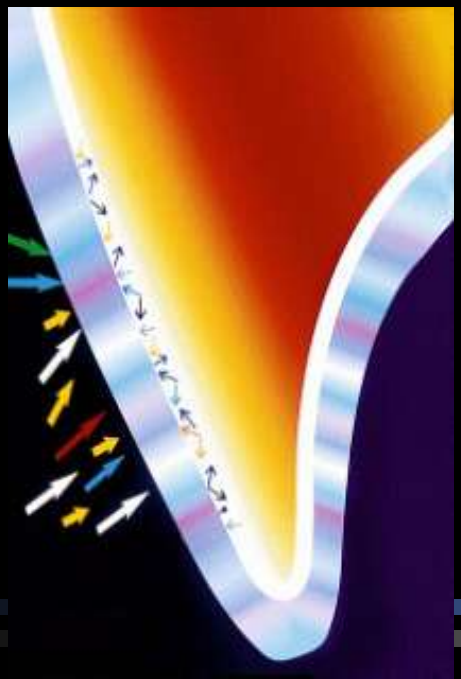
Light- tooth interaction











Natural tooth

Light

Refracted light

Scattered light

Conventional porcelain crown

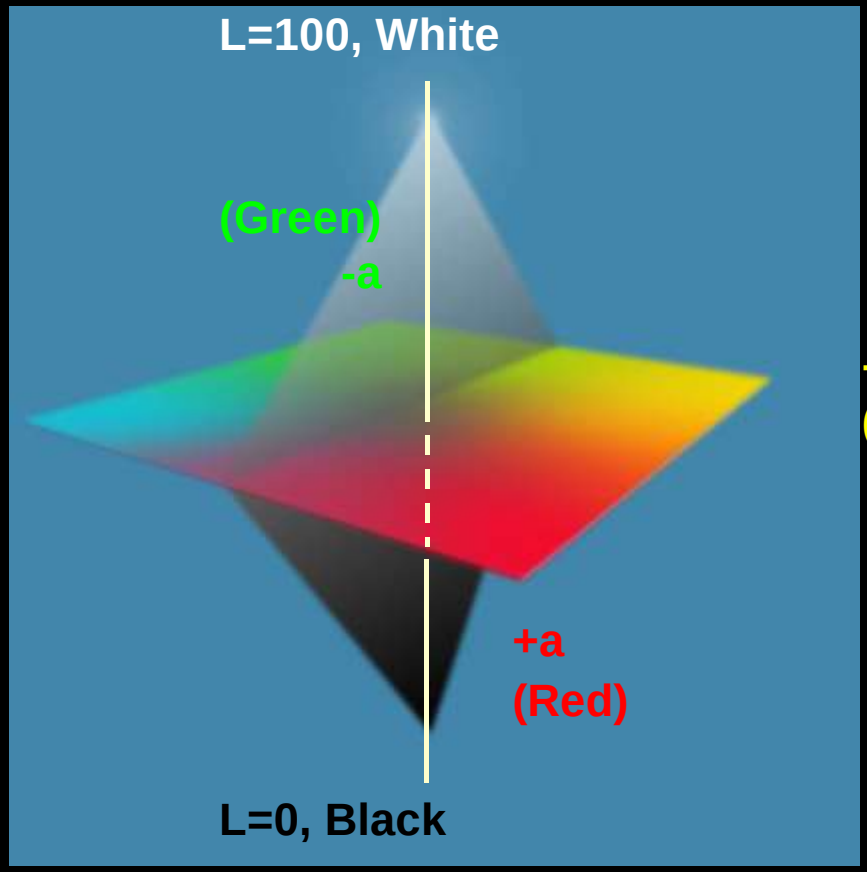
Light

Refracted light

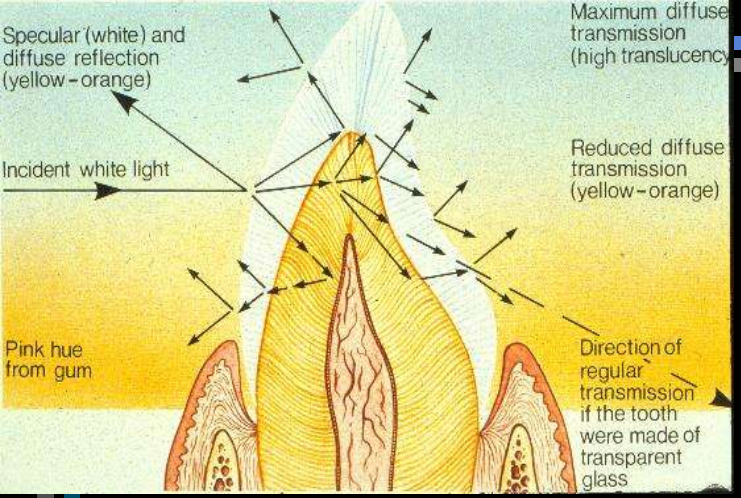
Colors for teeth and dental materials are reported in the literature as:

- *Munsell values (Hue, Chroma, Value)*
- *Tristimulus values X, Y, Z*
- *CIE chromaticity values Y(%), x, y*
- ***CIE L*a*b***

CIE L*a*b color system

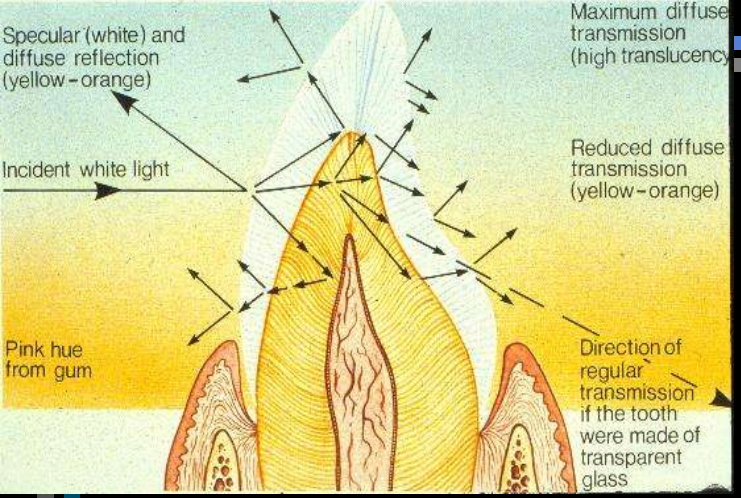


ΔE*= Change of L*a*b values



Proportional contributors to tooth color

- The proportional contribution of enamel, dentin, pulp, gingiva and mucosa to the spectral reflection from the tooth in isolation remain uncertain



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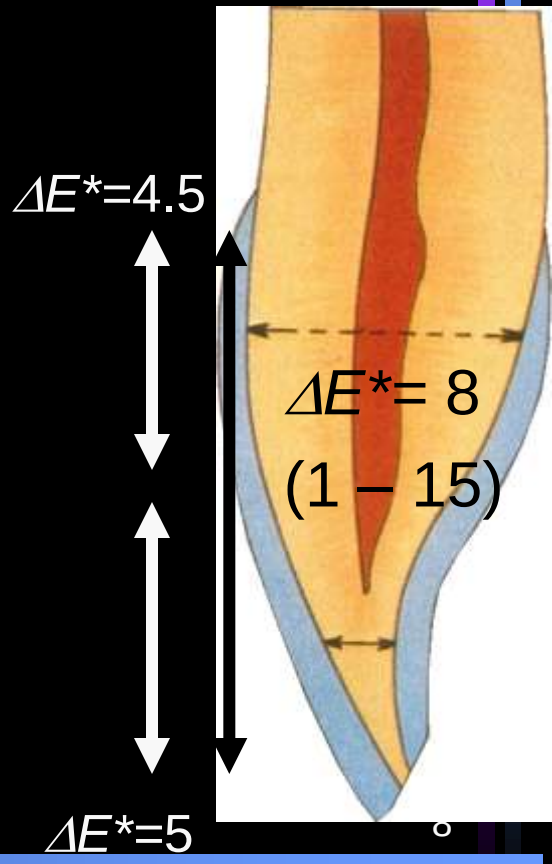
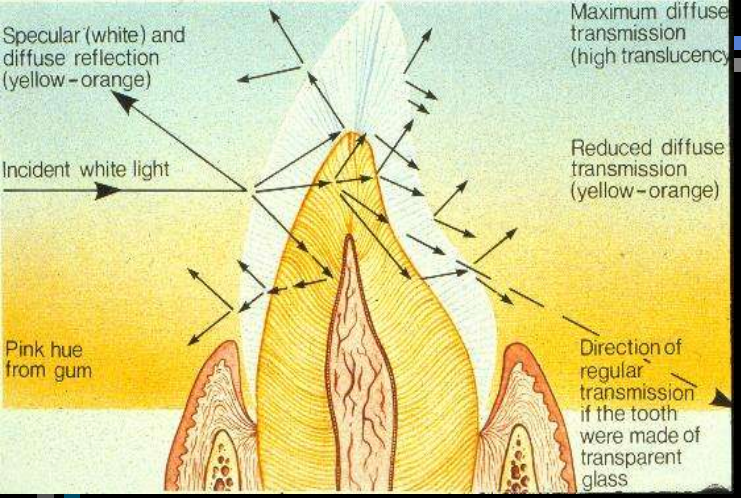
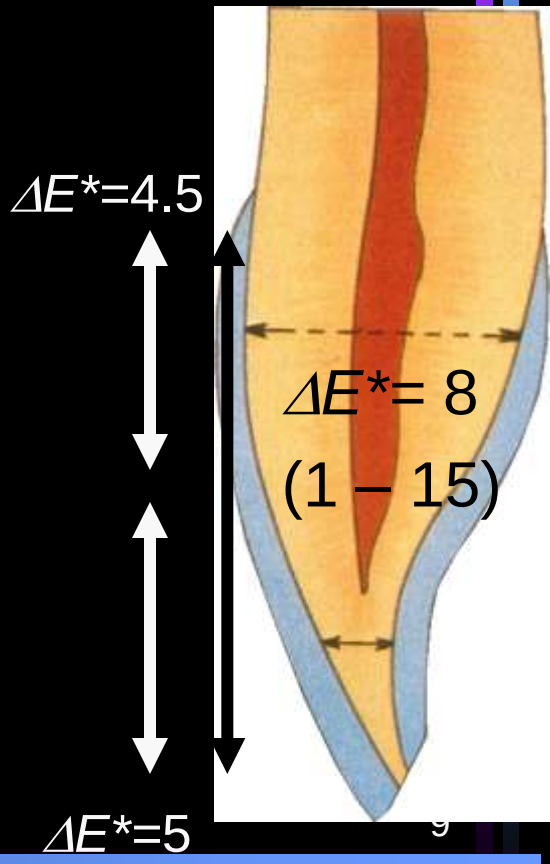




Proportional contributors to tooth color

- The proportional contribution of enamel, dentin, pulp, gingiva and mucosa to the spectral reflection from the tooth in isolation remain uncertain
- In general, dentin contributes the most as it is more chromatic than enamel
- Enamel is very translucent and more grey-blue than dentin



Realistic white shades for special cosmetic needs

SYNERGY® Super White shades are ideal for restoring whitened teeth and deciduous teeth.

Only SYNERGY® offers three different bright white shades selected by dentists.

- Super White N (neutral)
- Super White O (opaque)
- Super White P (pear)

With SYNERGY® Super White shades, tooth whitening can be accomplished with one-off office-visit or laboratory produced veneers.

Let SYNERGY® Super White assist you with your cosmetic needs.

Before veneer

After SYNERGY® Super White veneer

Definitely not realistic!

Learning objectives

1. Be familiar with the physical mechanisms of tooth coloring and its measurement
2. Recognize possible etiology for discoloration and best treatment
   - Extrinsic
   - Intrinsic

Extrinsic discolored teeth – etiology

N1-type colored material (chromogen) binds to the tooth surface. The color of the chromogen is similar to that of dental stains caused by tea, coffee, wine, chromogenic bacteria, and metals.

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N3-type colorless material or prechromogen binds to the tooth and undergoes a chemical reaction to cause a stain. N3-type stains are caused by carbohydrate-rich foods (eg, apples, potatoes), stannous fluoride, and chlorhexidine.

(Nathoo 1997)

Discolored teeth – best treatments

Etiology	Appropriate method	Active agent
Surface staining	AirScaling / Brushing with (whitening) toothpaste + Patient counseling	Abrasives

Intrinsic discolored teeth – etiology

1. Hereditary defects

Dentinogenesis imperfecta.

- Teeth relatively normal at eruption
- Discolor increases with time
- More and more translucent, pink yellow, brownish or grey-brown
- Enamel may chip off with subsequent heavy dentin discoloration

Intrinsic discolored teeth - etiology

1. Hereditary defects

Dentinogenesis imperfecta. Normal at eruption. Translucent, yellow, pink, brownish or grey-brown. The enamel may chip off with subsequent heavy discoloration of dentin

Amelogenesis imperfecta. 2 categories:

1. Hypoplastic:

Teeth smooth and glossy

Color is orange, reddish or brown

2. Hypomineralised:

Color can vary between bone white, yellow, red and black

The enamel may chip off later

Intrinsic discolored teeth - etiology

2. Toxic effects during tooth development

Fluorosis: Surface may range between small opaque white spots to extensive yellow-brown bands and/or areas

Intrinsic discolored teeth - etiology

2. Toxic effects during tooth development

Fluorosis: The surface may range between small opaque white spots to extensive yellow-brown areas

Tetracycline:

Chemical complex to ameloenamel proteins

Color can vary between light to dark yellow

Characteristic fluorescence in UV light

Cervically usually darker due to thin enamel

Intrinsic discolored teeth - etiology

1.Hereditary defects: Dentinogenesis imperfecta. - Amelogenesis imperfecta

2.Toxic effects during tooth development: Fluorosis - Tetracycline

3.Trauma: Sometimes in the early phase following a trauma, due to internal bleeding in the pulp, with retention of porphyrines and iron in the dentin.The discoloration may be reversible or remain, even if the pulpa remains vital

4.Pulp necrosis: Results usually in a tooth discoloration, but not always

Intrinsic discolored teeth - etiology

1. Hereditary: Dentinogenesis & Amelogenesis imperfecta

2. During tooth development: Fluorosis - Tetracycline

3. Trauma: Internal bleeding in the pulp, with retention of porphyrines and iron in the dentine

4. Pulp necrosis: Usually tooth discoloration, but not always

5. Other reasons:

Degradation products from metallic restoratives

Seldom bleeders' diseases

Surface erosions

Unknown reasons, possibly related to some childhood illness. E.g. hepatitis over a period

Discolored teeth – best treatments

Etiology	Appropriate method	Active agent
Surface staining	AirScaling / Brushing with (whitening) toothpaste + Patient counseling	Abrasives
Heriditary defects	Restorative treatment	
Tetracycline staining	Custom bleaching trays worn by patient daily for six to 12 weeks	10 % carbamide peroxide
Single or multiple discolored teeth	External bleaching—in-office one to three visits	30 - 38 % H- peroxide, alone or with heat or light
Multiple teeth and entire arches, most effective for yellow or brown discoloration	Custom bleaching trays worn by patient daily for two to six weeks	10 % carbamide peroxide
Isolated brown or white discolorations of shallow depth in enamel	Microabrasion followed by neutral NaF applications	Abrasives + HCl up to 36 %
White discoloration on yellowish teeth	Microabrasion followed by custom tray bleaching	Abrasives and acid; 10 % carbamide peroxide
Endodontically treated teeth	Internal bleaching—in-office or walking	Na perborate or 35 % H peroxide

Learning objectives

1. Be familiar with the physical mechanisms of tooth coloring and its measurement
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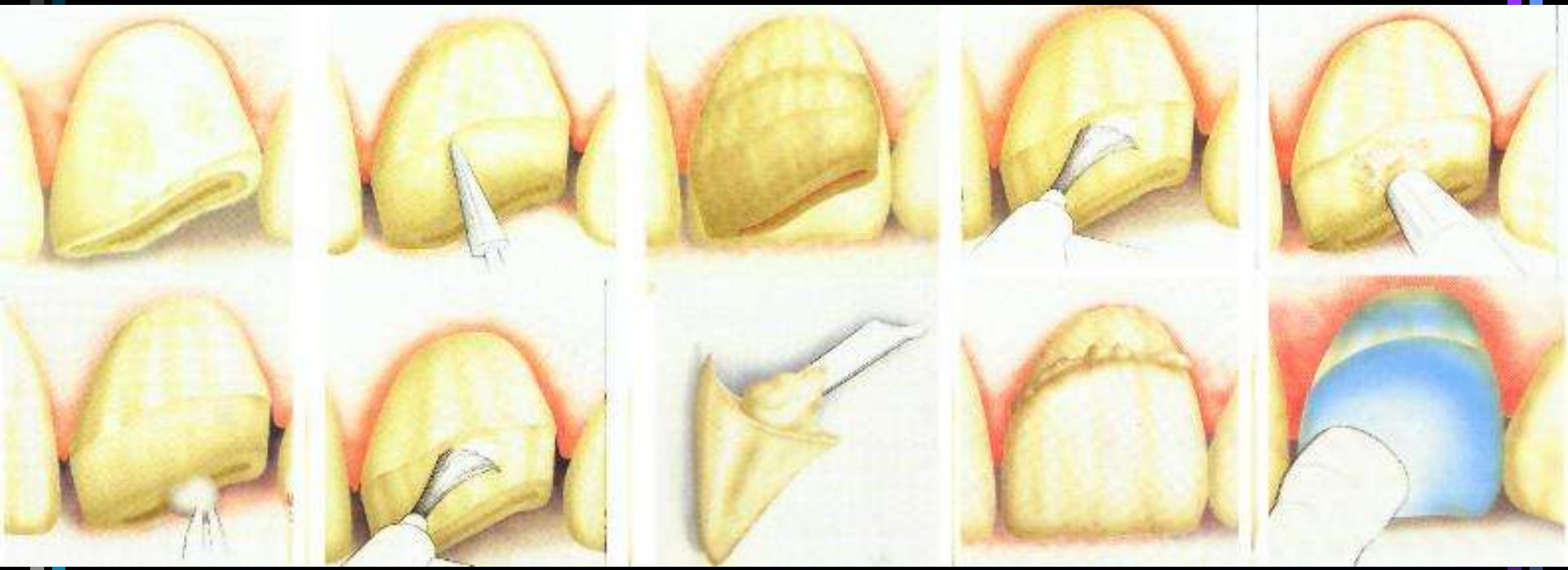
3. Realize the potentials and limitations of esthetic restorative materials

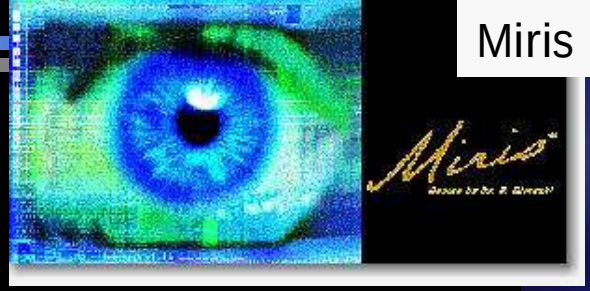
Dental Materials

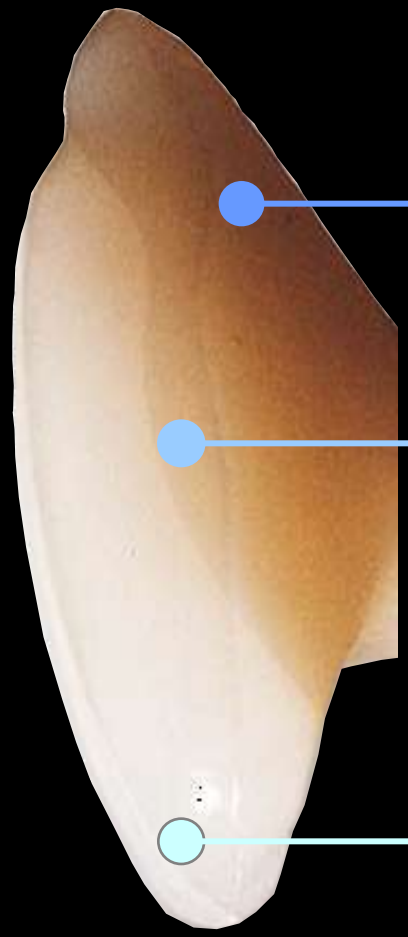
- Presently, there are no spectrophotometric quality control of materials with minimum criteria of performance
- Among the direct materials, composite resins possess the best optical-physical properties regarding esthetics

Technique in 1980



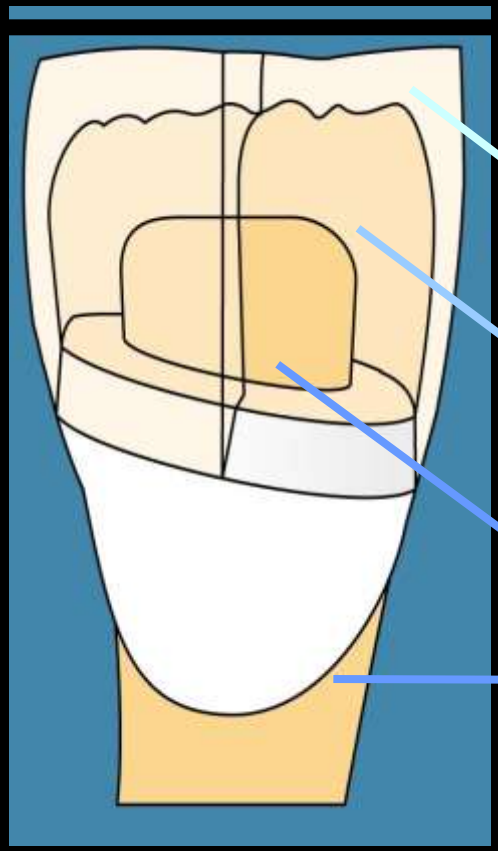
New products in 2004





=Vit-l-escence

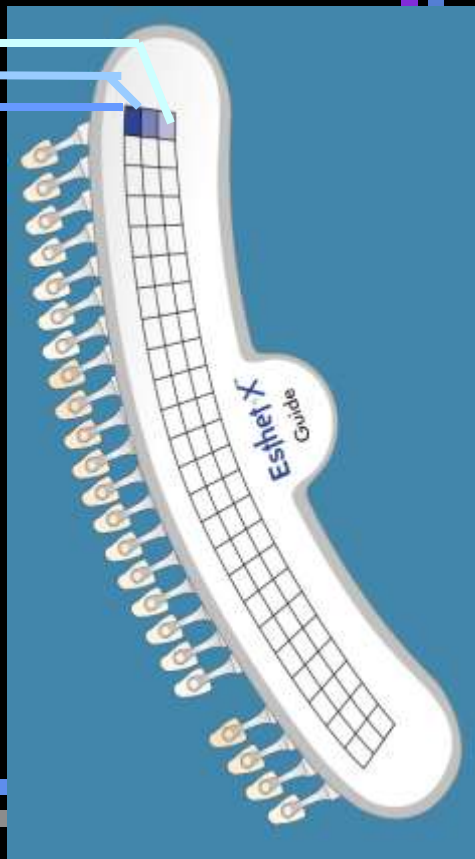
Shade Selection



Enamel

Body

Dentin



Dental Materials- composites, clinical observations

- Most materials become more opaque and lighter after a while intraorally, due to water uptake
  - This varies markedly among different materials

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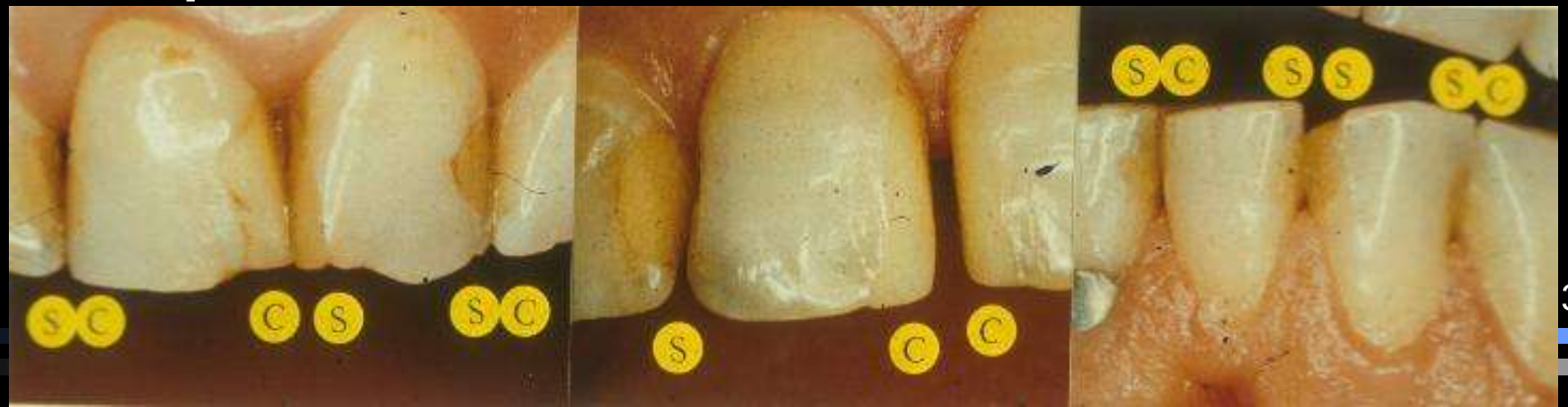
- Chemically polymerised composites discolor more into yellow than the light polymerised due to the polymerisation chemicals in the resin

Dental Materials- composites, clinical observations

- Most materials become more opaque and lighter after a while intraorally, due to water uptake
- Chemically polymerised composites discolor more into yellow than the light polymerised due to the polymerisation chemicals in the resin
- Chemically polymerised composites with microfillers discolor more compared to those with macrofillers.



Composites are tested in laboratory for discoloration potential. E.g.

1. Color Stability, in 60/80°C Water
2. Color Stability, Xenon light
3. Stain Resistance, in 37/80°C Coffee
4. Stain Resistance, in 37/80°C Tea

An absolute requirement is adequate preparation depth!

- The thickness of a restoration / veneer is critical to obtain a correct reflection spectrum and thus acceptable shade
- Not removing enough tooth substance will either result in poor esthetics or to overcontouring with risk for subsequent gingival recession. This is especially critical cervically.

Learning objectives

1. Be familiar with the physical mechanisms of tooth coloring and its measurement
2. Recognize possible etiology for discoloration and best treatment
3. Realize the potentials and limitations of esthetic restorative materials
4. Be acquainted with different shade guides and their characteristics

Shade guides

Producer	Materials	Shade
3M ESPE	Composite / Hybrid	VITA/ Biodent / Own
Bisco	Composite / Hybrid	VITA
Coltène	Composite	VITA
Dentsply	Composite / GIC / Hybrid / Ceram / Prefabricated teeth	Biodent/ VITA/ Own
Discus	Composite	Own
DMG	Composite / Hybrid / GIC	VITA
Ducera	Ceram	Biodent / VITA
GC	Hybrid / GIC / Ceram	VITA
H Kulzer	Composite / Hybrid / Prefab teeth	Biodent/VITA
Jeneric	Composite / Ceram	Bioform/VITA
Kerr	Composite	VITA
Shofu	Ceram	VITA / Vintage Halo
Ultradent	Composite	VITA
VITA	Ceram / Prefabricated teeth	VITA VITA3D
Vivadent	Composite / Ceram	Chromascop/VITA/ Own

Shade guides

- Large deviations between supposedly similar tooth shades from the same producer is not uncommon

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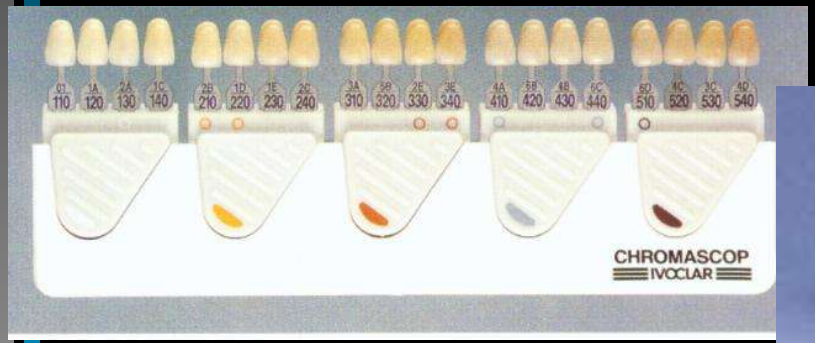
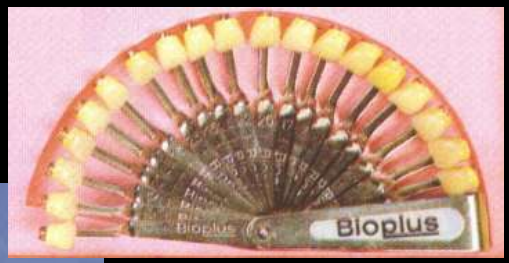
- Custom-made color shades using the actual restorative material is claimed to be better than using a standard color shade

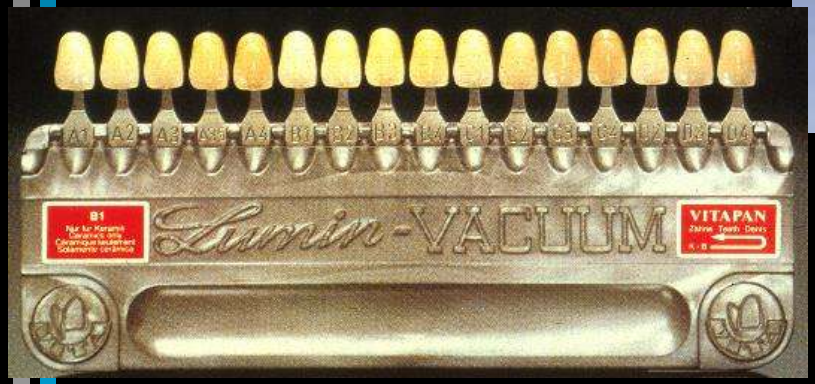
Shade guides

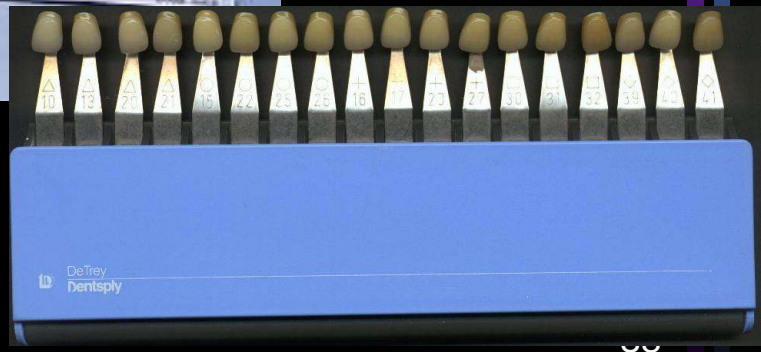
- Large deviations between supposedly similar tooth shades from the same producer is not uncommon
- Custom-made color shades using the actual restorative material is claimed to be better than using a standard color shade
- Some tooth shades changes following immersion in disinfectants. Keep away from chlorine-containing solutions!

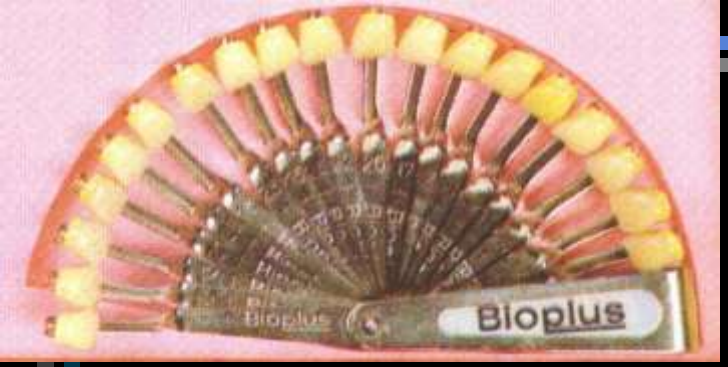
The 5 most common shade guides in use internationally



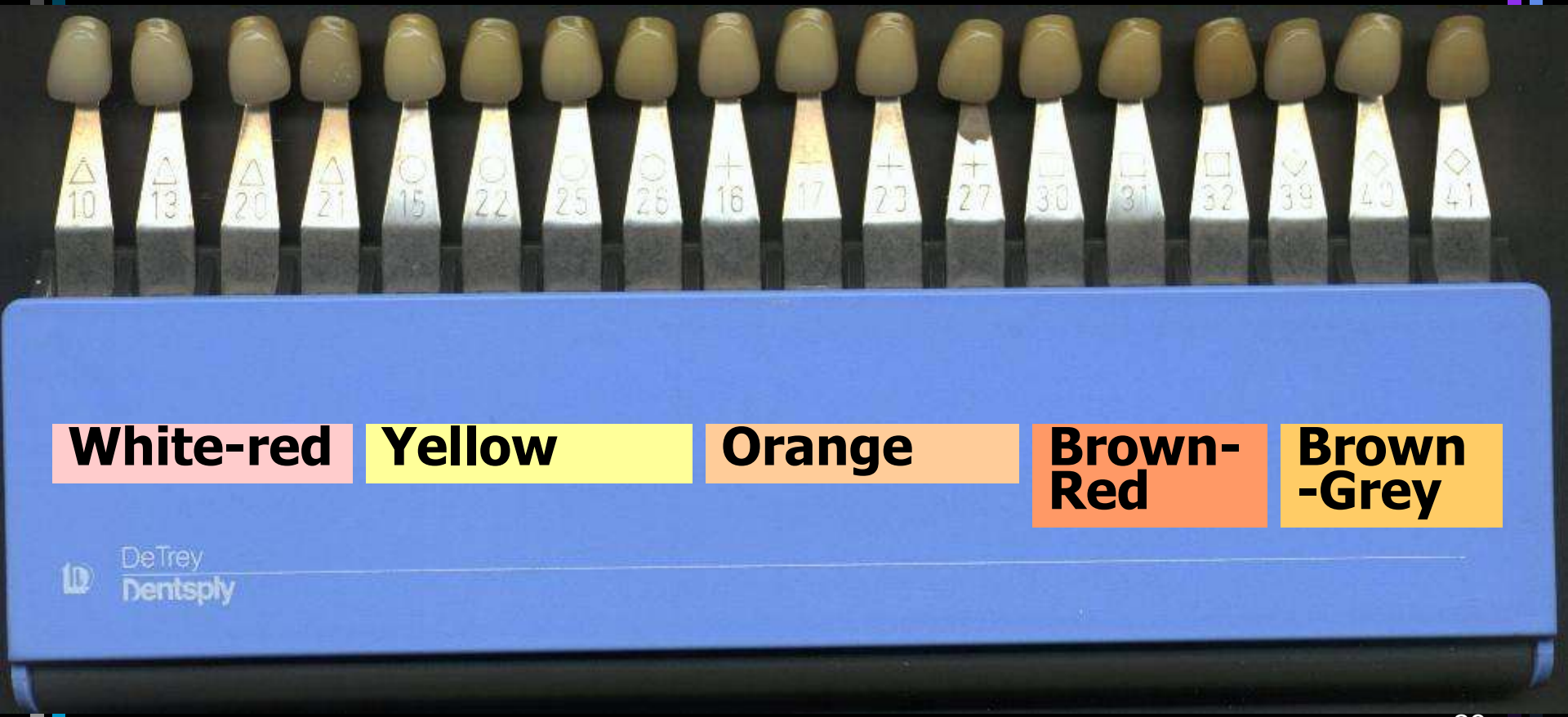


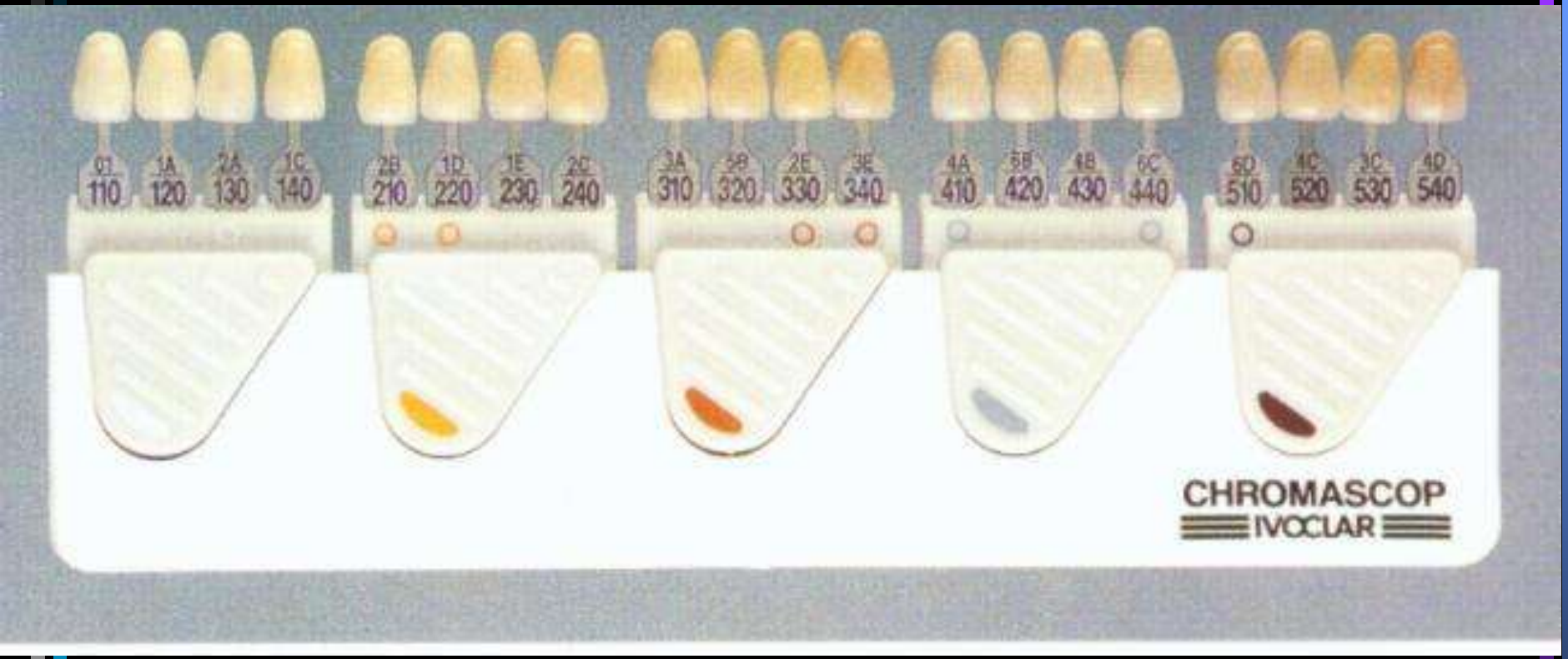






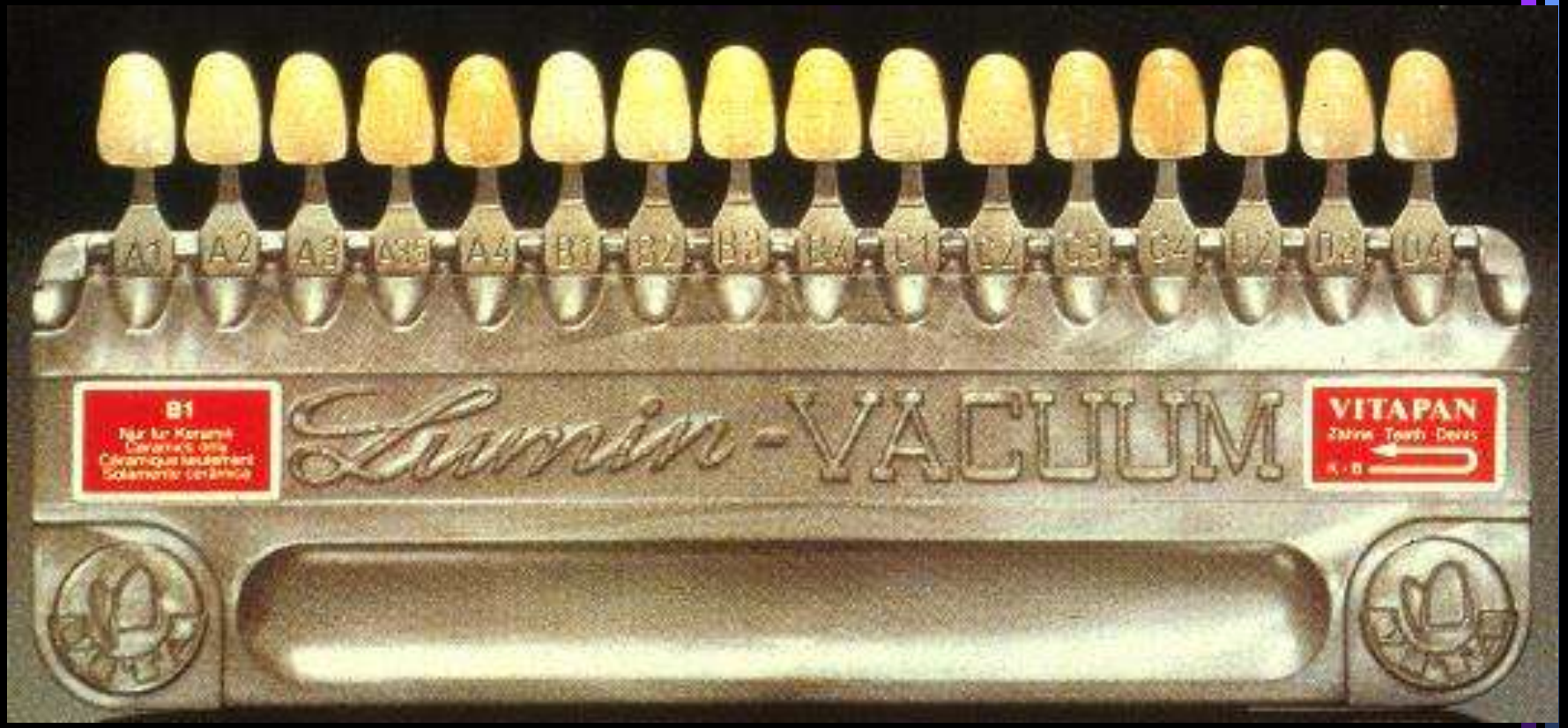
Bioform -> Biotone ->Trubyte
Bioblend -> Portrait IPN





1990; Vivadent -> Kerascop

Reddish-brown	Reddish-Yellow	Grey shades	Reddish-Grey



+/- neck?

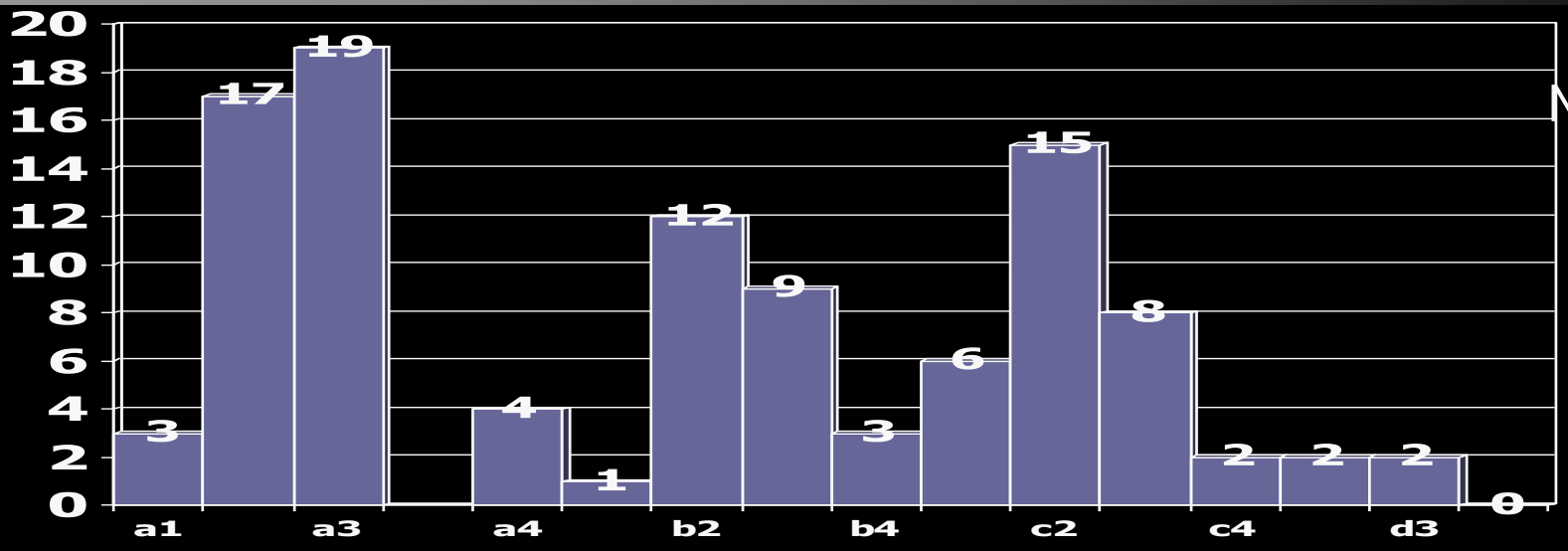
Changed in the mid-seventies

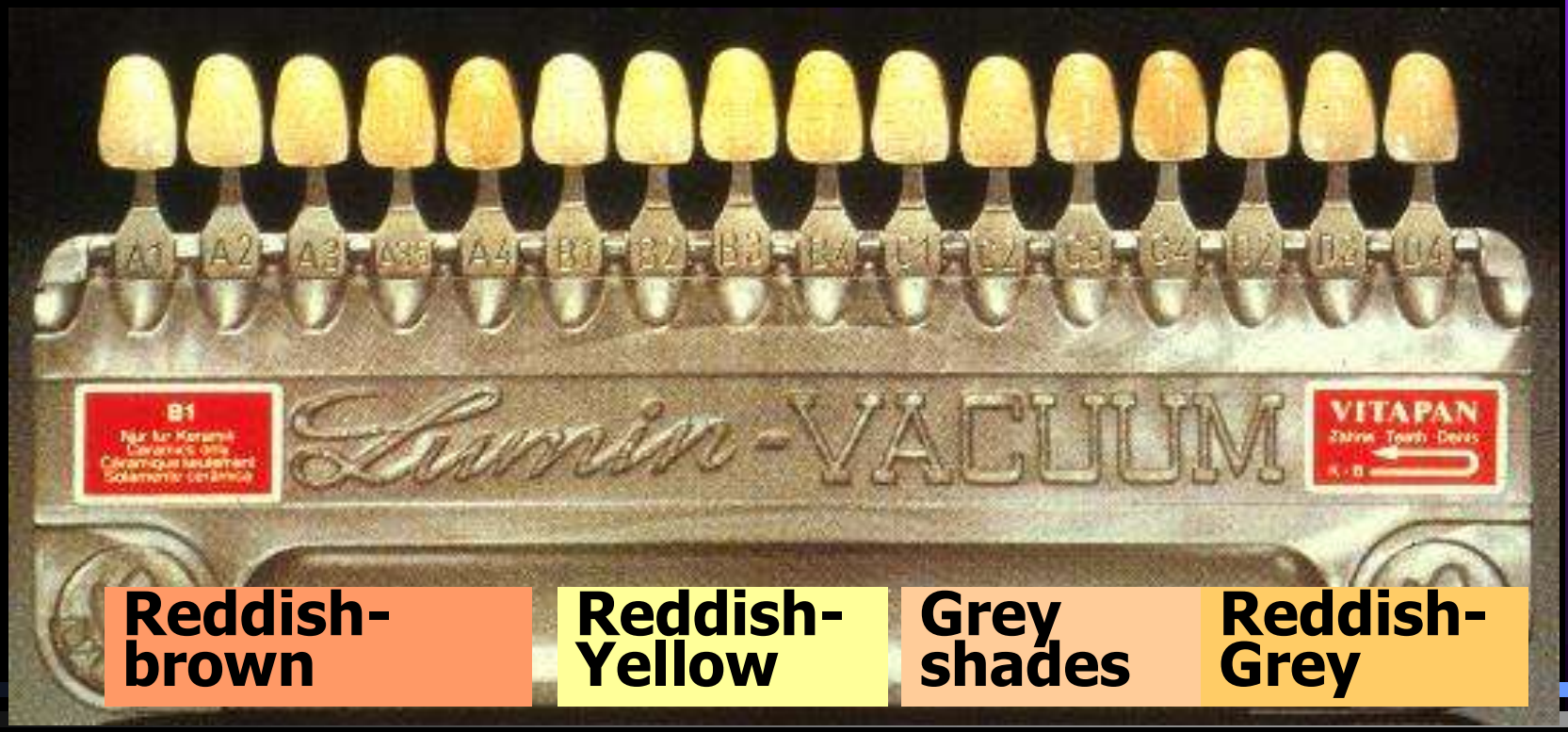
A3.5 & D4 added in 1980

B1 & D1 sometimes excluded

Shade guides

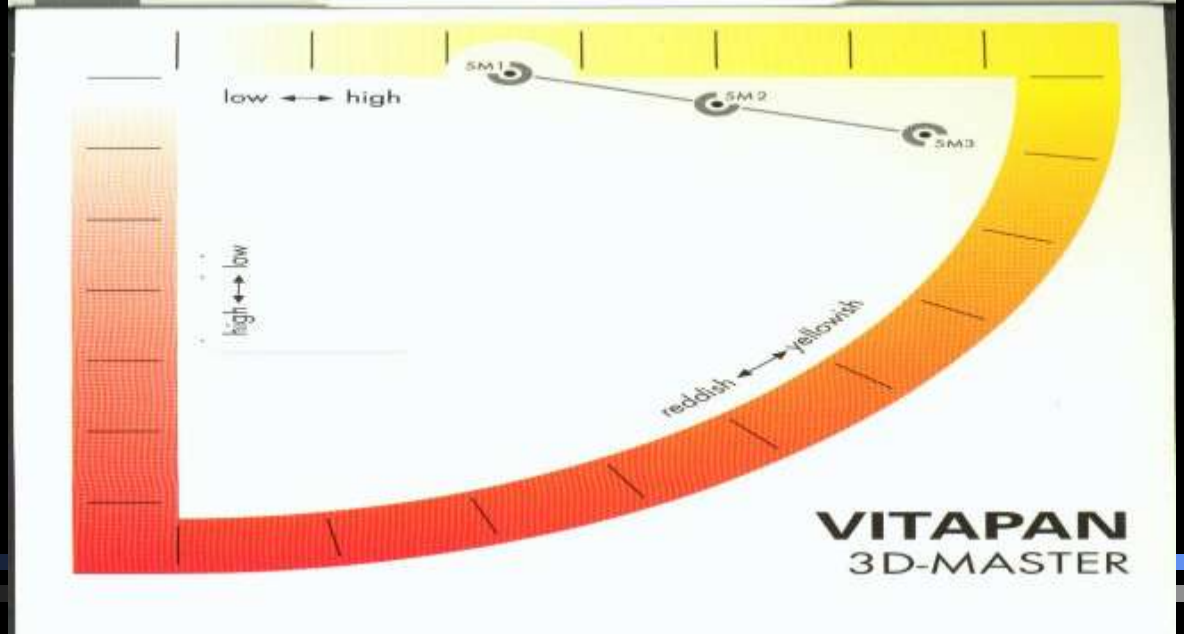
"VITA-Shade" guides from different producers may often differ markedly from the original

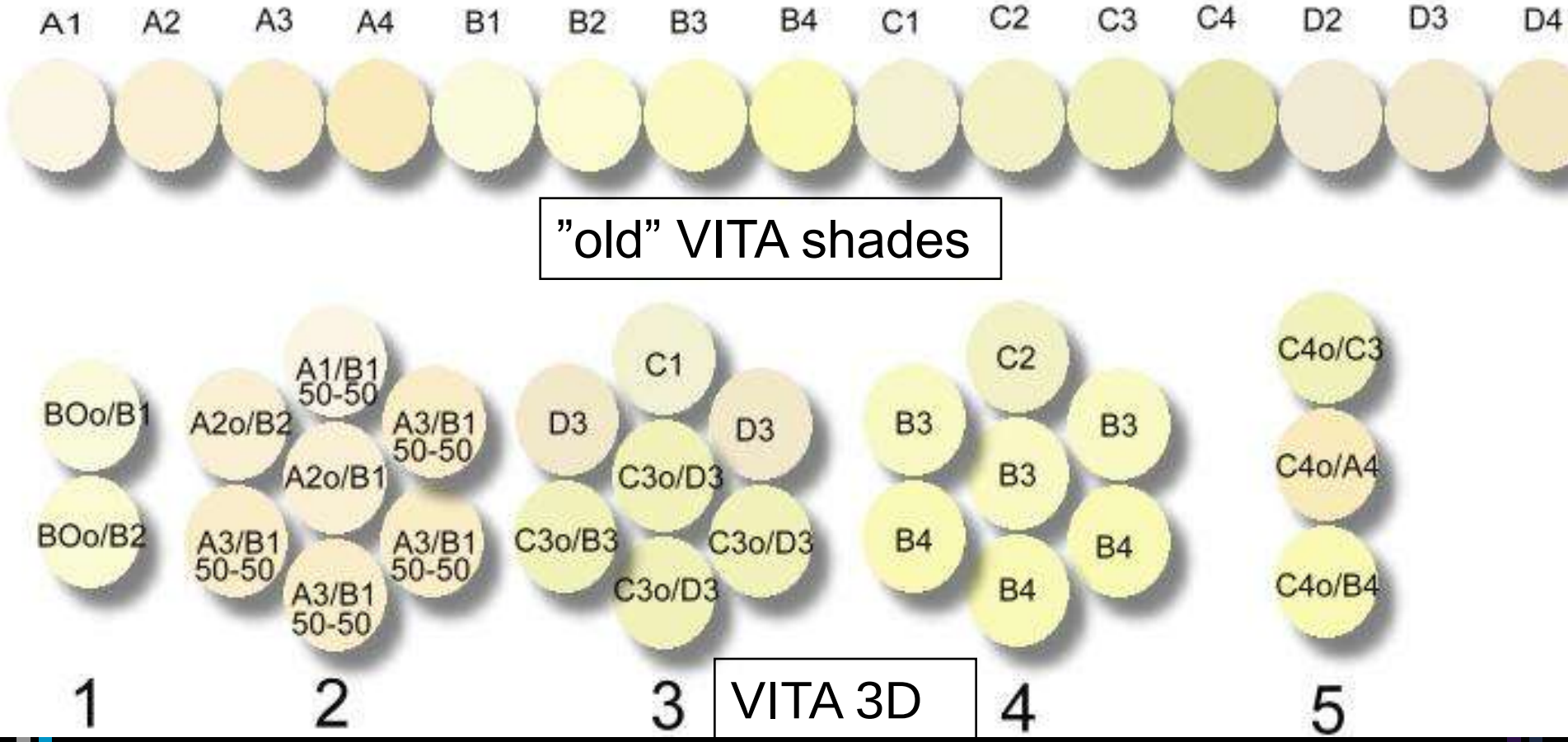

20
18
16
14
12
10
8
6
4
2
0
3
17
19
4
1
12
9
3
6
15
8
2
2
2
0
a1
a3
a4
b2
b4
c2
c4
d3
N=2500

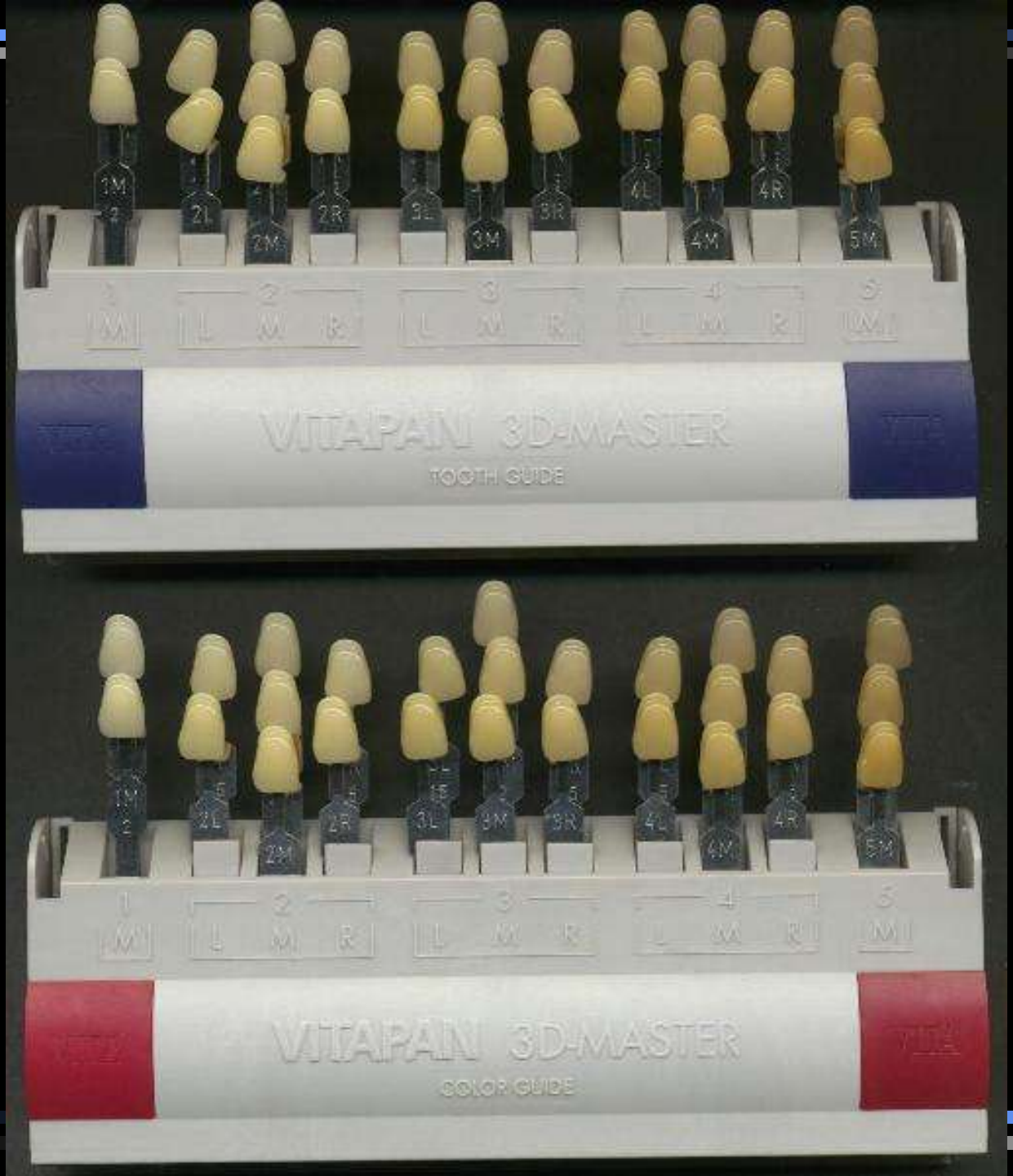

VITAPAN
Reddish-brown
Reddish-Yellow
Grey shades
Reddish-Grey

A more modern principle for a shade guide


VITA
1
2
3
4
5
dark ↔ bright
1M1
1M2
2L1.5
2L2.5
2M1
2M2
2M3
2R1.5
2R2.5
3L1.5
3L2.5
3M1
3M2
3M3
3R1.5
3R2.5
4L1.5
4L2.5
4M1
4M2
4M3
4R1.5
4R2.5


5M1
5M2
5M3
low ↔ high
high ↔ low
reddish ↔ yellowish
VITAPAN
3D-MASTER


A1
A2
A3
A4
B1
B2
B3
B4
C1
C2
C3
C4
D2
D3
D4
”old” VITA shades
BOo/B1
BOo/B2
A2o/B2
A1/B1 50-50
A2o/B1
A3/B1 50-50
A3/B1 50-50
A3/B1 50-50
A3/B1 50-50
D3
C1
D3
C3o/D3
C3o/B3
C3o/D3
C3o/D3
B3
C2
B3
B3
B4
B4
B4
C4o/C3
C4o/A4
C4o/B4
1
2
3
VITA 3D
4
5



VITA 3D-MASTER

With

&

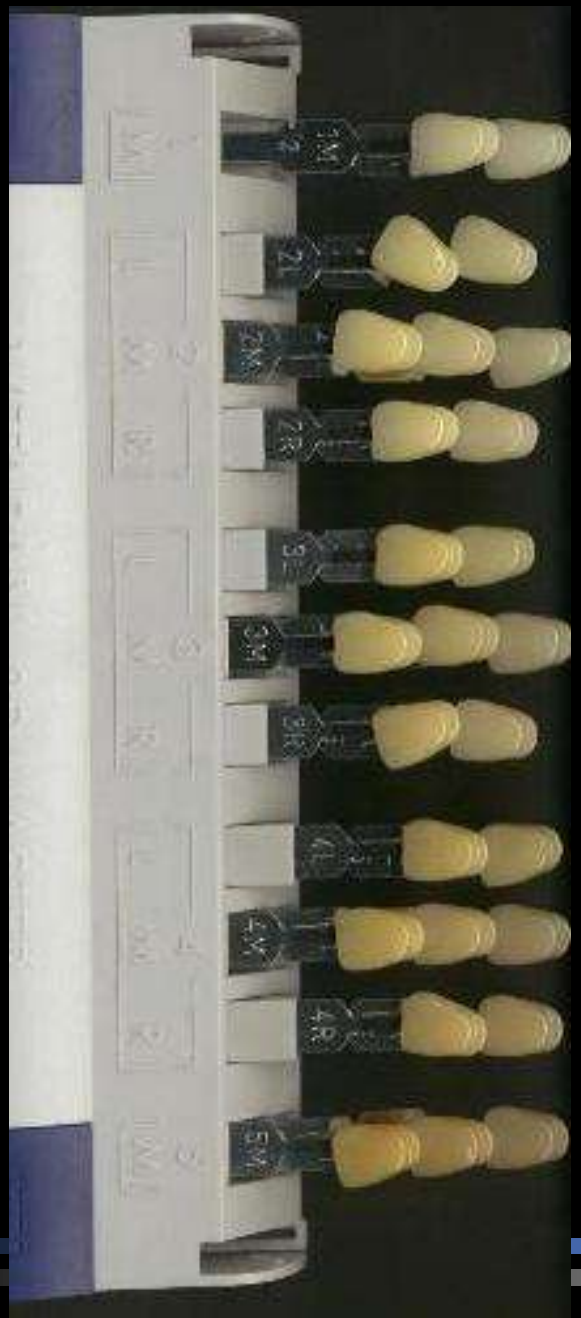
Without

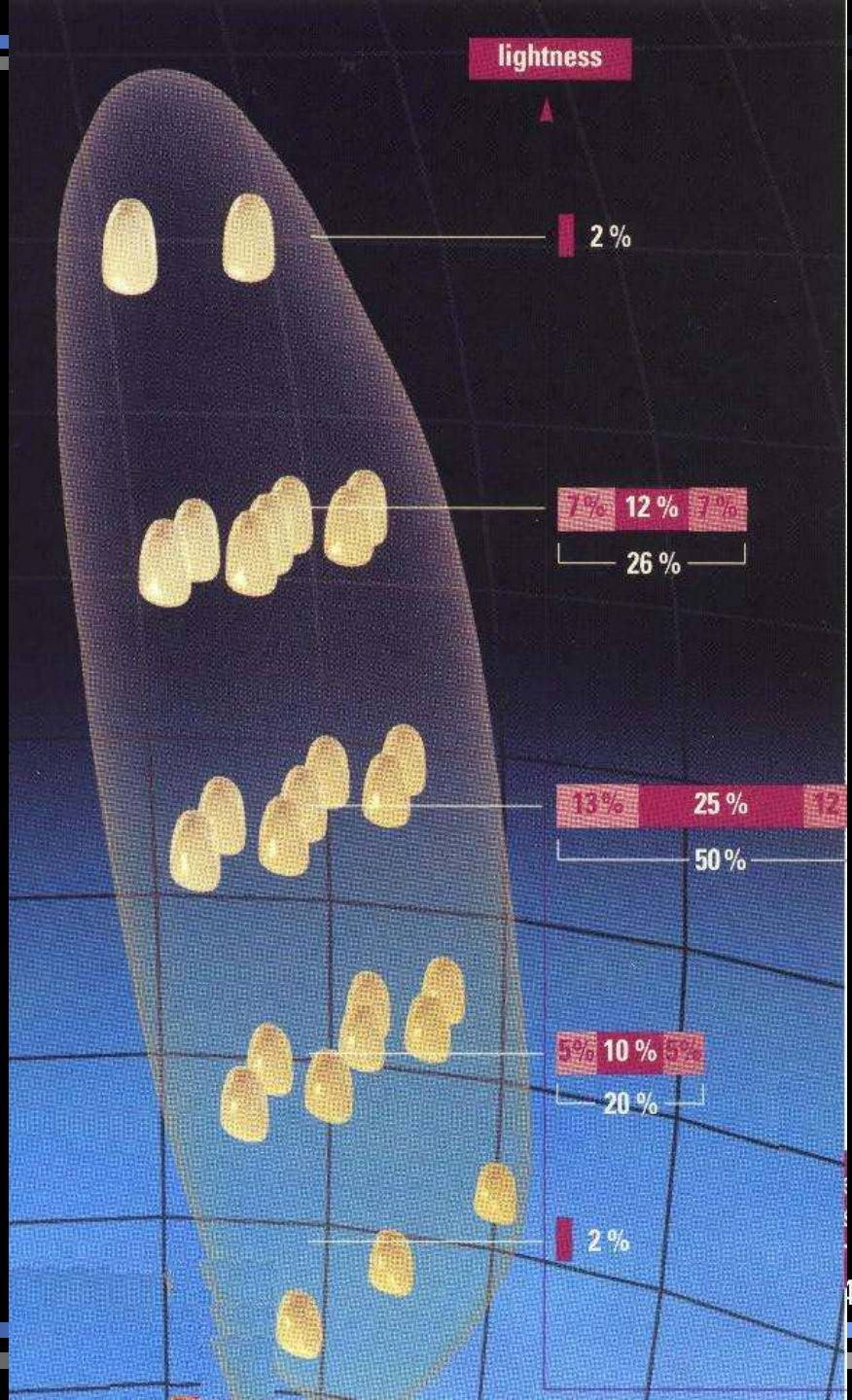
neck Colors

Hue

Chroma

Value





Learning objectives

1. Be familiar with the physical mechanisms of tooth coloring and its measurement
2. Recognize possible etiology for discoloration and best treatment
3. Realize the potentials and limitations of esthetic restorative materials
4. Be acquainted with different shade guides and their characteristics
5. Know of commercially available digital systems for shade matching

Digital Shade Matching Systems

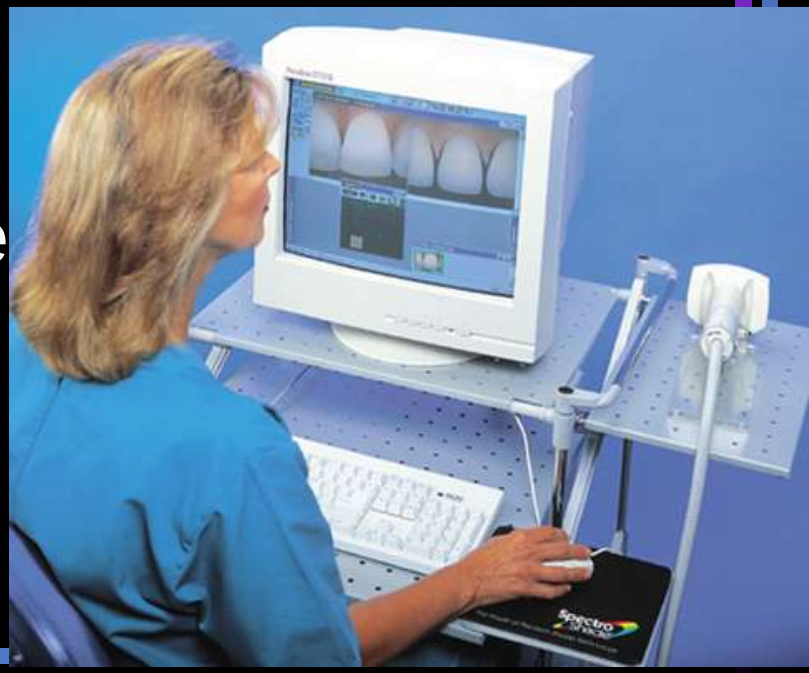
A hand held optic
device with dual light source
connected through fiber optics
to a spectrophotometer

Digital Shade Systems

- Dental Color Analyser (clearlight.com/~aei)
- Metalor-ikam system (metalor-ikam.com)
- Pocketspec (Pocketspec.com)
- ShadeVision /ShadeRite (X-Rite.com)
- Shadescan (Cynovad.com)
- Spectroshade (mhtint.com)
- ShadeEye NCC (Shofu.com)

Digital Shade Systems -Benefits

- Improved communication between dentist and lab
- Can integrate with
  - Intra-oral camera
  - Digital Camera
  - Image enhancing software
  - Mouth Simulator
  - Printer



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6. Know procedures for optimizing correct shade matching & communication

Fixed Prosthetic Dentistry- shade selection

Before you start…

1. Have the patient remove lipstick or bright makeup
2. If patient is wearing bright clothing, drape him or her with a neutral colored cover, i.e. light blue or light gray
3. Keep a surface with a neutral color nearby
4. Clean the teeth if doubt of extrinsic discoloration
5. Don't recline your patient – keep at eye level
6. Do not wear glasses that changes with light

Fixed Prosthetic Dentistry- shade selection

… right environment

1. Do not use direct lights. Lighting should be in the most natural light possible. Incoming light may be altered if the window in your operatory has a lot of greenery around it

Fixed Prosthetic Dentistry- shade selection

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2. Compare your shade selection under varying conditions such as with lip retraction versus lip down and when the patient moves their head in different directions or lighting angles

Fixed Prosthetic Dentistry- shade selection

… right environment

1. Do not use direct lights. Lighting should be in the most natural light possible. Incoming light may be altered by greenery around the window
2. Compare your shade selection under varying conditions such as with lip retraction versus lip down and when the patient moves their head in different directions or lighting angles
3. Have also your patient press their tongue against the lingual surface, when doing an anterior tooth restoration

Light sources

Fluorescent Natural daylight Incandescent

The same teeth look different under different light sources

Fixed Prosthetic Dentistry - shade selection

… right time

1. Select the shade at the beginning of the session before the tooth becomes dehydrated and your eyes fatigued
2. An impression and the use of rubber dam will cause lighter teeth. Retraction cord may influence the tooth color both ways. Anaesthetics too?
3. The canines are good for selecting shade as they have the highest chroma of the dominant color of the teeth
4. Once the tooth is fully prepared, use your guide to select the shade of the dentin in the tooth's body

Important:

1. The first impression is usually the most accurate in shade selection

2. It is important avoid fatiguing the eyes. Do not stare for >3-10 secs. Gazing at a neutral color, e.g. blue or grey for approx. 30 seconds will help to cleanse and refocus the eyes

Fixed Prosthetic Dentistry - shade selection

… the process …

1. Place the shade tab parallel to the facial surface of the teeth, not in front or behind
2. Arrange each tab on the guide so that the incisal edge is facing out or away from the tab holder. Since incisal shading has the greatest influence on value, it is helpful to position the incisal area of the tabs closest to the teeth you are shading. This will also help avoiding color choice being influenced by the hue area of the tab
3. Always select the value reading first. It may help to squint
4. Now that the value reading has been taken, use your hue guide to select the color reading

Fixed Prosthetic Dentistry - shade selection

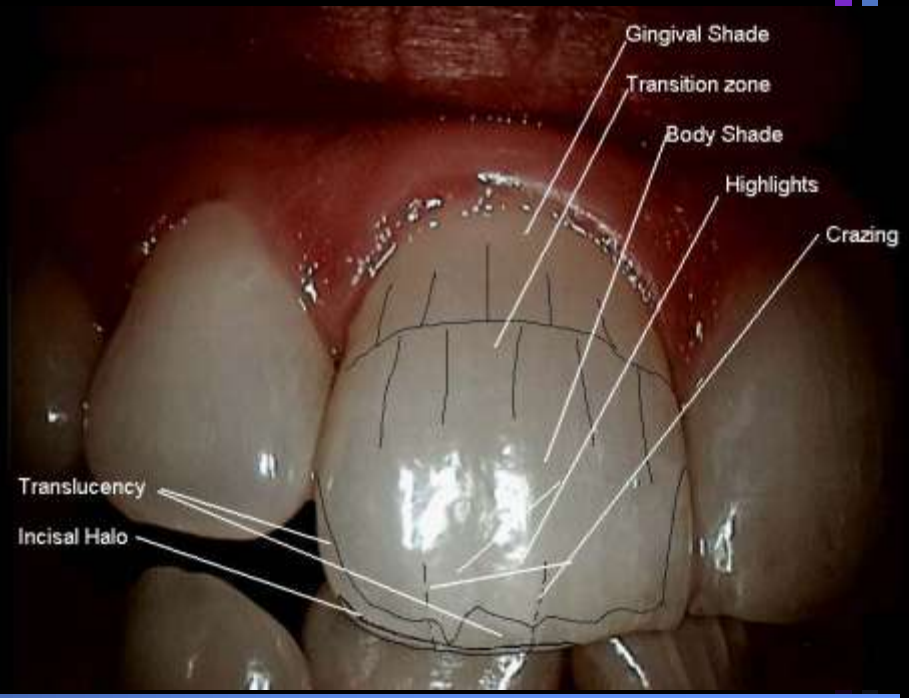
… finalising

1. Make your final shade selection after comparing your selections with those of a staff member and/or ask the patient's opinion on your choice
2. Make a mental note of morphological details
3. If unable to match, choose a lower chroma and higher value
4. Take photo with shade tab if possible

Communicate this to laboratory

Get as detailed as possible with characterization
Every piece of information helps:

- Surface texture
- Glaze
- Translucency
- Wear
- Proximal view with incisal/thickness of enamel
- Any unique color characterizations of the dentine



Thank you for your kind attention