Legacy drinks......
today's consumption patterns

USA - average annual consumption

- one-quarter of all drinks consumed
- 450 brands
- 2,500,000 vending machines in the USA

The beverage of choice –
kids and teens

Consumption doubled in the last ten years

teenage boys
3+ cans daily
10% - 7+ cans a day

teenage girls
2 cans daily
10% drink more than 5+ cans a day

Beverage consumption
Fast Facts........

1977 - 2001 - children age 6 - 11

increased decreased
- 137% soda consumption  39% milk consumption
- 54% fruit juice  
- 69% fruit drink sugar sweetened beverages - 11% total calories

Changing market shares 1997-2005

Flavored waters....fitness waters

Energy composition
Energy drink consumption - world wide 2006-2012

Non-carbonated energy drinks – What’s different?

- hip names - RockStar, Hype, Tiger, Monster
- branded as dietary supplements
- marketed to students, athletes, seniors
- Coca-Cola Classic - 35 mg of caffeine
- Monster Energy Drink - 120 mg of caffeine

Energy drinks risks

- heart palpitations
- increases blood pressure
- nausea, stomach upsets
- headaches
- psychiatric disturbances
- sleep disturbances
- tooth erosion
- weight gain
- fatigue

Energy drinks - Teens

- widespread consumption - 30% daily use
- strongly associated - alcohol, cigarette and illicit drugs
- users - heightened risk for substance abuse
- users - more physiologic and behavioral adverse effects

Energy drinks - Adults

2010 National Health Interview Survey

- 31.3% - 1 drink past 7 days
- 11.5% - 3+ per week
- age 18-24 10x more likely to consume than those age 40+
- younger adults
- non-Hispanic Blacks & Hispanics
- male
- live in South or West
- current smokers
- engaged in leisure-time physical activity
- unmarried
- highly satisfied with their social activities/relationships

Energy drinks - Teens

- specialized, concentrated
- smaller, 50ml bottles
- same total - caffeine, vitamins, functional ingredients
- marketed - low calorie, "instant energy", one swallow
- 5x more caffeine than an 8oz cola

Energy drinks - World wide 2006-2012

Contents and review

- caffeine
- 80-300 mg per 16-oz
- herbs
- guarana (high in caffeine)
- taurine
- ginseng
- gingko biloba
- other various ingredients


pH and titratable acidity values

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Initial pH</th>
<th>Titratable acidity (amount of NaOH) up to pH 5.5</th>
<th>Titratable acidity (amount of NaOH) up to pH 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fanta</td>
<td>3.46</td>
<td>3.4 ml</td>
<td>6.8 ml</td>
</tr>
<tr>
<td>Lemonade</td>
<td>3.49</td>
<td>2.7 ml</td>
<td>5.7 ml</td>
</tr>
<tr>
<td>Fanta up</td>
<td>3.26</td>
<td>2 ml</td>
<td>5.6 ml</td>
</tr>
<tr>
<td>Apple juice (apple)</td>
<td>3.18</td>
<td>4.4 ml</td>
<td>7.5 ml</td>
</tr>
<tr>
<td>Orange juice</td>
<td>3.06</td>
<td>4.9 ml</td>
<td>6.1 ml</td>
</tr>
<tr>
<td>Pomegranate</td>
<td>4.35</td>
<td>2.7 ml</td>
<td>6.5 ml</td>
</tr>
<tr>
<td>Lemon tea</td>
<td>4.0</td>
<td>0.2 ml</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>Black tea</td>
<td>8.89</td>
<td>0.2 ml</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>Rooibos</td>
<td>7.27</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aloe vera</td>
<td>7.14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Green tea</td>
<td>7.03</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Shorer titratable acidity values

Erosion - lesion depths enamel versus dentin

Marketing trends

- Coca Cola, Sprite, orange juice
- Regular drinks and modified with hydropropyl cellulose
- Bovine teeth exposed to 3 ml drop for 10 min
- Increase viscosity - reduce enamel erosion by 12.6-18.7%
- Erosive potential - dependent chemical properties and viscosity

Marketing to children and teens

Industry growth analysis

<table>
<thead>
<tr>
<th>Segment</th>
<th>2010/11</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Drinks</td>
<td>13.4%</td>
<td></td>
</tr>
<tr>
<td>RTS Drinks</td>
<td>9.1%</td>
<td></td>
</tr>
<tr>
<td>Soft Beverages</td>
<td>8.0%</td>
<td></td>
</tr>
<tr>
<td>Bottled Water</td>
<td>4.1%</td>
<td></td>
</tr>
<tr>
<td>Carbonated Soft Drinks</td>
<td>1.7%</td>
<td></td>
</tr>
<tr>
<td>Value-Added Water</td>
<td>-1.7%</td>
<td></td>
</tr>
<tr>
<td>Fruit Beverages</td>
<td>0.1%</td>
<td></td>
</tr>
<tr>
<td>TOTAL IUS</td>
<td>6.9%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Beverage Marketing Corporation
They’re on to us

> Wellness is driving growth. The “quintessential wellness” brand image of V8...striking a chord with consumers.

> The core V8® line...household penetration of about 36 percent, rising 6 points in two years.

> A reflection of the loyalty this brand has engendered as a reliable “better-for-you beverage choice.”

> As the health and wellness trend took off, Campbell recognized how well the V8 franchise was positioned to build category sales, and has worked hard to “migrate their positioning.”

retailwire.com

2013 – Brand Market Share – Energy drinks

Red Bull - $3.4 BILLION
Monster - $3.1 BILLION


Effects on dental materials

Effects - dental materials

> dental ceramics - surface roughness

168 hour (7 day) exposure

citrate buffer solution, pineapple juice, green mango juice

surface roughness evaluated - 24, 96, and 168 hours

added - typically citric acid

microhardness decreased significantly (p<.05)

Effects - dental materials

> glass ceramic veneer

immersion in pH 2, 4, 7 +
evaluated at 1, 3, 6, 9 months

materials susceptible to corrosion from opposing dentition

Individually fabricated clinical crown system

Effects -
dental materials

GI cement, resin-modified GI cement, resin composite, amalgam

citrate buffer solution, pineapple juice and green mango juice

37°C for 168 hours (7 days)

GI cement highest roughness (p<.05) > by resin modified GI cement

minor changes to other materials

mango juice - greatest degradation

Solutions

http://indd.com
Remineralization strategies

- non-fermentable sweeteners
- arginine products
- metabolic inhibitors - fluoride
- stimulate saliva
- anti-adhesion - xylitol
- raise pH

Fluoride platforms

Professional

Home

Varnish recommendations

Varnish application
- 2+ times a year
- caries prevention
- high risk populations

Application benefits
- less time
- less patient discomfort
- patient acceptance
- preschool / adolescents / geriatrics

Varnish recommendations

- 0.21% sodium fluoride
- uses TCP chemistry
- not an Rx
- Amazon or 3M ESPE

Fluoride platforms

Professional

Home

Tubule

- Stannous fluoride
- High fluoride
- Precipitating salts
- Restorative materials
- Laser

Theobromine - f
- growth of larger
- occlusion - 7 day
- FDA GRAS (general
- does not contain
Increase in surface micro hardness - 7 days

ACP – Amorphous calcium phosphate
- releases calcium and phosphorus
- highly soluble compound - prolonged substantivity
- building block of apatite

CPP-ACP compounds
- contains casein phosphopeptide (Recaldent)
- adheres to soft tissue, plaque, teeth
- calcium and phosphate – released during acid challenge
- contraindicated with milk allergy

Xylitol products

The magic of xylitol xylitol.org
- interferes with Strep Mutans metabolism
- disrupts biofilm integrity
- promotes neutral pH
- stimulates salivary flow
- shifts equilibrium to enhance remineralization
- increases available calcium and phosphate

Can be fatal to dogs and ferrets

The magic of xylitol xylitol.org
- interferes with Strep Mutans metabolism
- disrupts biofilm integrity
- promotes neutral pH
- stimulates salivary flow
- shifts equilibrium to enhance remineralization
- increases available calcium and phosphate

Can be fatal to dogs and ferrets

Arginine - mode of action

- surface negatively charged
- attracts arginine's positive charge
- arginine and calcium carbonate
- CaCO3 promotes precipitation into tubules
- Arginine raises pH to 7

Precoxt (Nov. 14) & Co. [According to the data shown in the graph, your data product containing L-arginine and calcium carbonate works to deliver effective relief at various levels of exposure.]


Arginine bicarbonate calcium carbonate - keeping saliva neutral

Basic Bite Chew - 20 calories
20% RDA calcium
2g of sugar alcohols
0 fats
5g carbohydrates
Kosher
Gluten-free

Understanding labels
✓ “ose” words - sugar
✓ “ate” words - acid
✓ corn syrup
✓ ascorbic acid

July 27, 2015
New label proposal
FDA proposing to include a percent daily value for added sugars!

Slow down erosion
- use a straw
- drink quickly
- beverages during add ice
- avoid snacks/drinks
**Slowing down erosion**

- brush before morning juices, etc.
- rinse with water - reduces titratable acidity, not pH
- soft bristle brushes / low abrasion paste

![Image](image1)

**Summary - factors that affect erosion**

- chemical - FI level, pH, titratable acidity, calcium & phosphorus
- biological - saliva composition, flow, buffering capacity, pellicle formation and tooth composition
- behavioral - drinking habits, frequency, duration, timing of exposure

![Image](image2)

**Erosion - a multifactorial condition**

![Image](image3)

**What do we owe our patients?**

- current, in-depth
- assess total needs
- tell the truth
- provide all options