Skin Care or Fake News?

What every provider should know about active ingredient pharmacology
Relative Quantities of "Peer Reviewed" PhotoAging Prevention and Treatment Data c.2019
- All natural Retinoids conform to the following configuration with R group variations representing different chemicals with variation in function, stability, and skin irritation.
“Retinoid” is a general term referring to compounds that are recognized by the same receptors in the nucleus of the cell that recognize retinoic acid.

“Retinol” is the alcohol from of Vitamin A, meaning the molecule includes a hydroxyl group (OH).

“Retinoic acid” AKA Tretinoin AKA “Retin A” is the acid form of Vitamin A, meaning the molecule includes a carboxyl group (COOH). This is considered the biologically active form of natural Vitamin A.
Nuclear Retinoid Effects

Epidermis
- Cornified layer
- Clear layer
- Granular layer
- Spinous layer
- Basal layer

Retinoid

- Nucleus
- Cytoplasm
- Fatty Cell Membrane
Retinoids

Profound biological effects on:

- Keratin synthesis
- Sebaceous gland activity
- Proliferation & terminal differentiation of fibroblasts
Topical application causes:

- Epidermal thickening
- Reduction of atypia
- New collagen formation
- New vasculature formation
Collagen 1 Staining in Photoaged Skin Patient 2 - treated with 0.1 Percent Tretinoin Cream

Hydroxy acids

- Most data available: Glycolic, Salicylic and Lactic acids
- Low concentrations (less than 10%) diminish corneocyte cohesion of stratum corneum ("cell stickiness")
- Upregulate genes in fibroblasts to produce type-1 collagen
- Promote glycosaminoglycan synthesis, thus improving the dermal matrix on which collagen is made
- Higher concentrations reduce keratinocyte cohesion, can cause epidermolysis and epidermal separation
Hydroxy acids

- **Glycolic acid** (C₂H₄O₃), Sugar Cane
- **Lactic acid** (C₃H₆O₃), Sour Milk
- **Malic acid** (C₄H₆O₅), Apples
- **Mandelic acid** (C₈H₈O₃), Almonds
- **Salicylic acid** (C₇H₆O₃), Willow Bark
## Comparing acids*

<table>
<thead>
<tr>
<th>Test material</th>
<th>pH</th>
<th>Cell renewal</th>
<th>Irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactic acid, 4%</td>
<td>3</td>
<td>35</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>24</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>13</td>
<td>1.2</td>
</tr>
<tr>
<td>Glycolic acid, 4%</td>
<td>3</td>
<td>34</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>23</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>10</td>
<td>1.1</td>
</tr>
<tr>
<td>Salicylic acid, 4%</td>
<td>3</td>
<td>42</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>28</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>12</td>
<td>1.2</td>
</tr>
<tr>
<td>TCA, 0.5%</td>
<td>3</td>
<td>54</td>
<td>5.0+</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>40</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>14</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Anti-Oxidants

Definitions:

- **Antioxidant** is a molecule that inhibits the oxidation of other molecules.
- **Oxidation** is a chemical reaction where oxygen atoms combine with another atom or molecule.
- **Free radicals** are an atom or molecule that are either missing electrons or have too many electrons.
- **Reactive oxygen species (ROS)** are a class of free radicals containing oxygen atoms that act as oxidizing agents.
Anti-Oxidants

Stable (Happy) oxygen atom

Un-Stable (Un-Happy) oxygen atom (Reactive Oxygen Specie)
Most data available: **Vitamin C** (L-Ascorbic acid and esters)

- Major aqueous-phase anti-oxidant in the body
- Required co-factor for collagen and norepinephrine synthesis, tyrosine catabolism, peptide activation
- Modest photo-protectant
- Acid solutions have limited stability
- Esters have improved stability, penetration and clinically-confirmed collagen enhancing efficacy
Anti-Oxidant

Vitamin E

- Major lipid-phase anti-oxidant in the body
- Protects the cell membrane
- Regenerated by Vitamin C and Glutathione
- "d" form (Dextrorotatory) is most biologically active
EGCG is approximately 100 times more active as an anti-oxidant than Vitamin C and 25 times more active than Vitamin E.

Topical application has a range of biological effects:

Thank you!