Using Skin Phototype to Assess Risk of Vitamin D Insufficiency in Young Women of Color

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**Introduction**

Vitamin D sufficiency supports cardiovascular health and lower cancer risk. Rates of vitamin D insufficiency vary by racial/ethnic group, in part because skin pigment limits sunlight penetration. However race/ethnicity is an unreliable marker of vitamin D deficiency, given individual differences in skin pigment, or phototype, and other characteristics. Clarifying associations between skin phototype and vitamin D levels will permit researchers to identify other important root causes of these racial/ethnic disparities. This study seeks to investigate whether there is a link between vitamin D insufficiency and skin phototype.

**What Factors Influence Vitamin D Levels?**

- Sunlight Exposure
- Vitamin D Levels
- Vitamin Pills
- BMI
- Diet

**Melanin’s Role in Skin**

**High Melanin**

- Skin contains “natural sunscreen”
- Melanin absorbs UV light, leading to lower vitamin D production
- Melanin protects skin from harmful UV radiation that causes skin cancer

**Low Melanin**

- Sunburning and tanning occur more frequently
- 7-dehydrocholesterol is able to produce vitamin D with less competition
- Skin cancer occurs at higher rates in individuals with lighter skin

**Methods**

- Recruitment (Across 4 seasons)
- Baseline Questionnaire & 1st Blood Sample
- Bi-Weekly Questionnaires
- Final Blood Sample (14 Weeks later)

**Who’s at Risk?**

<table>
<thead>
<tr>
<th>Vitamin D Sufficiency</th>
<th>Vitamin D Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient</td>
<td>≥ 30 μg/mL</td>
</tr>
<tr>
<td>Insufficient</td>
<td>&lt; 30 and ≥ 20 μg/mL</td>
</tr>
<tr>
<td>Deficient</td>
<td>&lt; 20 μg/mL</td>
</tr>
</tbody>
</table>

**Vitamin D in Women of Color**

- Our prior research showed a notable difference between women of color & white/non-Hispanic women

**Taking Supplements?**

- Our prior work shows vitamin D supplement use has a significant effect on sufficiency in women

**Skin Prototype Data**

- Participants were asked questions about their skin’s response to sun exposure
- The responses below will be used to estimate skin melanin content
- Hypotheses will be tested by correlating skin phenotype with vitamin D levels

**Sunburning Self-Report**

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Easily Sunburn With Red or Pink Skin 24 Hours After Being in the Sun</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Tanning Self-Report**

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Never Tan</td>
<td>2.5%</td>
</tr>
<tr>
<td>I Minimally Tan or My Sun-Exposed Skin Becomes Minimally Darker</td>
<td>20%</td>
</tr>
<tr>
<td>I Easily Tan or My Sun-Exposed Skin Easily Becomes Darker</td>
<td>47.5%</td>
</tr>
<tr>
<td>I Always Tan or My Sun-Exposed Skin Always Becomes Darker</td>
<td>30%</td>
</tr>
</tbody>
</table>

**Implications**

The results of this study will help determine whether individuals can accurately assess their risk for vitamin D insufficiency through practical methods. Most people don’t have access to uncommon instruments, such as the spectrophotometer, to evaluate melanin content. The responses to questions about tanning and sunburning can substitute as accessible measures for skin phenotype. Individuals who are classified as “at-risk” can then recognize the need for vitamin D supplements, diet changes and other behaviors to attain sufficiency.

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