The Vascular Inflammation in Psoriasis (VIP) Trial: FDG PET-CT is a Novel Tool for Quantification of Skin Inflammation

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Introduction

Psoriasis is a chronic inflammatory disorder of the skin that affects 2-3% of the population. While there are several clinical measures of psoriasis disease activity, no objective biomarkers of disease activity currently exist. 18-Fluorodeoxyglucose positron emission tomography-computed tomography (FDG PET-CT) is a powerful molecular imaging technique that highlights metabolically active tissues labeled by preferential uptake of 18-FDG by high-glucose-utilizing cells such as cancer and inflammatory cells. Thus, FDG PET-CT is a promising tool for imaging chronic inflammatory conditions such as psoriasis.

In this proof-of-concept study, we present preliminary data quantifying the metabolic activity of psoriatic skin as measured by FDG PET-CT in a subject enrolled in the Vascular Inflammation in Psoriasis (VIP) trial and randomized to the open label phototherapy arm.

Methods

The VIP study is a multi-center, 3-arm (narrow-band UVB vs. adalimumab vs. placebo), randomized, double-blind, placebo-controlled, 12-week clinical trial enrolling 96 subjects with moderate to severe psoriasis at 6 sites (University of Pennsylvania as coordinating center).

The primary endpoints are vascular inflammation as measured by FDG PET-CT and sophisticated biomarkers of CV risk.

As an exploratory endpoint (data presented here), inflammatory and metabolic activity of the skin was measured by FDG PET-CT using 3DViewnix software. Mean metabolic volume product (MVP$_\text{mean}$) was calculated for the lower extremities. MVP$_\text{mean}$ = (total volume of psoriatic plaques) x (mean standard uptake value (SUV) of all psoriatic lesions) = index of overall psoriasis extent and activity.

Results

Week 0: Baseline

Week 12: After 33 sessions of nb-UVB

Table 1. Mean metabolic volume product (MVP$_\text{mean}$) vs. BSA vs. PASI scores for the lower extremities.

<table>
<thead>
<tr>
<th></th>
<th>MVP$_\text{mean}$ (SUV-mL)</th>
<th>BSA</th>
<th>PASI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 0</td>
<td>234.3</td>
<td>67.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Week 12</td>
<td>67.6</td>
<td>13</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Conclusions

In a subject with moderate to severe psoriasis treated with 33 sessions of nb-UVB phototherapy over 12 weeks, changes in BSA (53.8% decrease) and PASI (83.3% decrease) are paralleled by a similar change in MVP$_\text{mean}$ (71.1% decrease) as determined by FDG PET-CT.

In general, preliminary MVP$_\text{mean}$ values of our psoriasis study subjects are similar to what is observed in patients with osteo- and rheumatoid arthritis.

FDG PET-CT can be used to objectively quantify psoriasis skin activity and may be a powerful biomarker of psoriasis activity.

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