This double-blind, placebo-controlled clinical study compared multiple applications of the Antimicrobial Photodynamic Therapy (aPDT) treatment protocol, to systemic doxycycline as an adjuvant to scaling and root planning (SRP) on type 2 diabetic patients on clinical, systemic and immune-inflammatory outcomes.

Thirty two patients were considered eligible for the study purpose. Two patients declined to participate and were excluded from randomization (figure 1). Demographic data can be seen on table 1.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Age (±)</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRP+aPDT</td>
<td>48.9±9.5</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>SRP+Dox</td>
<td>49.3±7.4</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 1. Demographic data

Study design
Both groups received scaling and root planing (SRP) within 48 hours. Systemic antibiotic group (SA) received 15 capsules of Doxycycline 100mg (2 capsules 1 hour before SRP, and 1 capsule/day for 13 days) and a sham procedure for antimicrobial photodynamic therapy. Antimicrobial photodynamic therapy group (aPDT) procedure included irrigation with saline after SRP, gentle application of phenotiazinium chloride 10mg/mL (HELBO® Theralite Laser, Bredent Medical GmbH & Co, Germany), a pre irradiation time of 5 minutes, followed by irrigation with saline and irradiation with 670nm (HELBO® Theralite Laser, Bredent Medical GmbH & Co, Germany) for 10 seconds each site (70 mW of power, and a power density of 28mW/cm²), with an optic fiber angled 60°, 0.06mm diameter, 8mm length, delivering a total energy of 2.79J/cm² per site (16.72 J/cm² per tooth). This application was repeated at 2, 7 and 14 days post SRP.

Results
Both therapies successfully reduced periodontal parameters (Table 2) and no statistical difference could achieved on inter-group analysis. Numerical, but not statistically significant difference could be noted on ΔHbA1c.

Desirable clinical outcome was considered when a site end up the experimental time with probing pocket depth (PPD) < 4mm. When this data was analyzed (Table 3), there were significant difference favouring aPDT, in unirradiated teeth with moderate pockets.

The cytokine profile can be seen on figure 2. There was only statically significant difference in IL-1β, favouring aPDT, at 3 months post SRP.

Discussion and Conclusions
Despite the lack of statistical difference between them, both therapies successfully reduced initial periodontal parameters. The use of aPDT can be a feasible substitute to systemic antibiotics in treatment of periodontal treatment in type 2 uncontrolled diabetic patients. In addition, the aPDT seem to reduce surgical, or additional therapy necessity on aesthetic areas (unirradiated teeth). Both treatment significantly reduced HbA1c levels. APDT shown nearly clinical significant reductions (9.9% of initial levels).

Substitution of commonly used systemic antibiotics maybe an important strategy to overcome the treat caused by antimicrobial resistance. More clinical study to confirm the best protocol to be used.