Chronic wounds represent a significant burden to patients, healthcare professionals, and healthcare systems, affecting over 40 million patients and creating costs of approximately 40 billion € annually. The goal of the project MEDILIGHT is to develop a smart, self-adhesive system which will provide personalized light therapy treatment to patients with chronic wounds.

MEDILIGHT Collaborative Project
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 644267, project MEDILIGHT. It is coordinated by the Technical University of Berlin (TUB). The project has started in February 2016 and is conducted over a period of 36 months with an EU contribution of € 1.9M.

MEDILIGHT builds on the competencies of the following seven partners: Technische Universität Berlin (TUB), Germany; URGO Recherche Innovation et Développement, France; Ruprecht-Karls-Universität Heidelberg, Germany; Centre Suisse d’Electronique et de Microtechnique SA (CSEM), Switzerland; Simulianex Ltd, Cyprus; Microsemi Semiconductor Limited, United Kingdom; and AMRIS s.r.o., Czech Republic.

The first technological approach to bring light into the wound is based on waveguide materials and LEDs

Waveguide Design
- Diffraction-grating light focusing
- Optically microstructured light scattering and remultiplexing

Selection of Waveguide Material
- High optical density
- Low scattering
- Good optical quality
- Highly (flexible)
- Bendable
- Not sensitive to humidity (watering, etc.)
- Easy to be embossed / injection molded

Measuring of Waveguide Efficiency
- Mechanic of light source + measuring probe
- Mechanical

Biological results of blue light on cutaneous cells

Analysis of keratinocyte proliferation under blue light: 2 opposite effects of blue light in function of the light time irradiation: pro-proliferative effects or inhibition of the proliferation

Proliferation is measured by ATTT test, irradiation is done by a blue LED lamp (469 nm) at 23 mW/mm²

Key points

- MEDILIGHT project first results showed promising biological results with blue light on fibroblasts and keratinocytes, key cells for wound healing. Future investigations will focus on the effect of red light on cutaneous cells and the effect of both blue and red light on pathogenic bacteria, in order to eliminate the wound infection.
- Sensors of cooperation and temperature will be developed to adapt the light illumination of the wound in response to the wound healing status.
- Automated control of light stimulation scheme is to be implemented in device, selection of profile and editing of user settings will be possible using smartphone or PC via Bluetooth V4.1.

Gene expression analysis 24h after 30min blue light irradiation. The last four columns present the number of deregulated genes, enrichment score, probability values without adjustment and false discovery rate with adjustment of multiple testing.

<table>
<thead>
<tr>
<th>Name</th>
<th>N° of genes</th>
<th>Enrichment score</th>
<th>P-value</th>
<th>FDR q-value</th>
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<tbody>
<tr>
<td>Basal keratinocytes</td>
<td>496</td>
<td>3.89</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<td>Metabolism of carbohydrates</td>
<td>13</td>
<td>0.06</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<td>Influenza infection</td>
<td>97</td>
<td>0.39</td>
<td>&lt;0.001</td>
<td>0.079</td>
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<td>NF-kB</td>
<td>72</td>
<td>0.61</td>
<td>0.007</td>
<td>1.000</td>
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