**Background:**

Convolutional Neural Networks(CNNs) have the capability to reliably identify features from digital images. In the field of dermatology, convolutional neural networks have demonstrated potential for image classification and malignancy prediction by learning features directly from image data, rather than relying on analytically extracted features. For this reason, CNNs seem well-suited for predicting the efficacy of treatments for PWS, as treatment efficacy has been linked to image cues like birthmark’s area and skin colour. However, training CNNs from scratch using a small sample size can be challenging. To address this issue, transfer learning can be utilized to extract PWS information from medical images using CNNs that have been pretrained for nonmedical tasks, thus eliminating the need for large datasets.

**Study Design and methods:**

This study looked at 44 Caucasian patients ranging from 8-59 years old who received treatment with 3 to 29 laser sessions. Standardized 3D photographic imaging was done before and after treatment with the 532nm laser with large spot and contact cooling.

Using a pre-trained, state-of-the-art ResNet-50 Convolutional Neural Network (CNN), an Artificial Intelligence (AI) model was trained to predict the numerical improvement (total clearence) of patients based on 2D snapshots of their 3D digital images prior to treatment.

**Results:**

The AI demonstrated consistent 71% accuracy in categorizing previously unseen patients into buckets like "less than 62% improvement" or "more than 62% improvement ". Several models, data augmentation strategies, and groupings were evaluated, providing slightly different results with a consistent correlation towards correct predictions. Training and validation losses showed convergence throughout the multiple training runs (cross-validation)

**Conclusion:**

The study conducted has shown the capability of an AI to make predictions concerning the effectiveness of a PWS's treatment by using convolutional neural networks (CNN) and transfer learning. Since it is challenging to pinpoint the exact accuracy of this assessment as data is limited, the level of accuracy may vary slightly. With further data being added to the AI model, it has the potential to provide a precise numerical prediction of the success of the treatment.