Facial analysis algorithms based on deep neural networks can detect and quantify changes in emotional expression following facial reanimation surgery. These artificial intelligence assessment methods may be a useful adjunct to objectively evaluate patient outcomes. Further exploration with more data and additional algorithms may help explain AI-perceived differences in FN vs. Non-FN emotional classification.

**Introduction**

Facial reanimation outcomes are measured with patient- or provider-rated scales and cephalometric landmarks. These measures are quantitative but may not objectively assess emotional expression.

Novel artificial intelligence and deep neural network algorithms can recognize common facial emotional states in humans.

The study objectives were to:

1. Use a pretrained deep neural network to classify facial emotions
2. Evaluate emotional expression in patients following facial reanimation

**Methods**

Published pre- and post-op photos of facial reanimation patients

Analyzed using a pretrained deep neural network (Microsoft Azure’s Face API) for emotional classification

N = 135 | 83 adults, 52 children | 51M, 84F
120 unilateral, 15 bilateral

Facial Nerve (FN): CFNG + FFMT (43%)
Non-FN: MNTM + FFMT (24%)

**Results**

![Pre- vs. Post-Op Happiness](image)

**FN vs. Non-FN Post-Op Happiness**

FN vs. Non-FN Change in Happiness

**Discussion**

- Significant ↑ in post-operative: happiness
- Significant ↓ in post-operative: anger, contempt, disgust, fear, neutral, sadness, surprise
- No significant difference in post-operative happiness for facial nerve vs. non-facial nerve innervated procedures
- For unilateral cases, only children with Non-FN procedures had a significantly greater increase in happiness scores compared to facial nerve cases

**Conclusions**

Facial analysis algorithms based on deep neural networks can detect and quantify changes in emotional expression following facial reanimation surgery.

These artificial intelligence assessment methods may be a useful adjunct to objectively evaluate patient outcomes.

Further exploration with more data and additional algorithms may help explain AI-perceived differences in FN vs. Non-FN emotional classification.