Improving VCA Transplant Outcomes: Optimizing a Procedure to Restore Patient Quality of Life

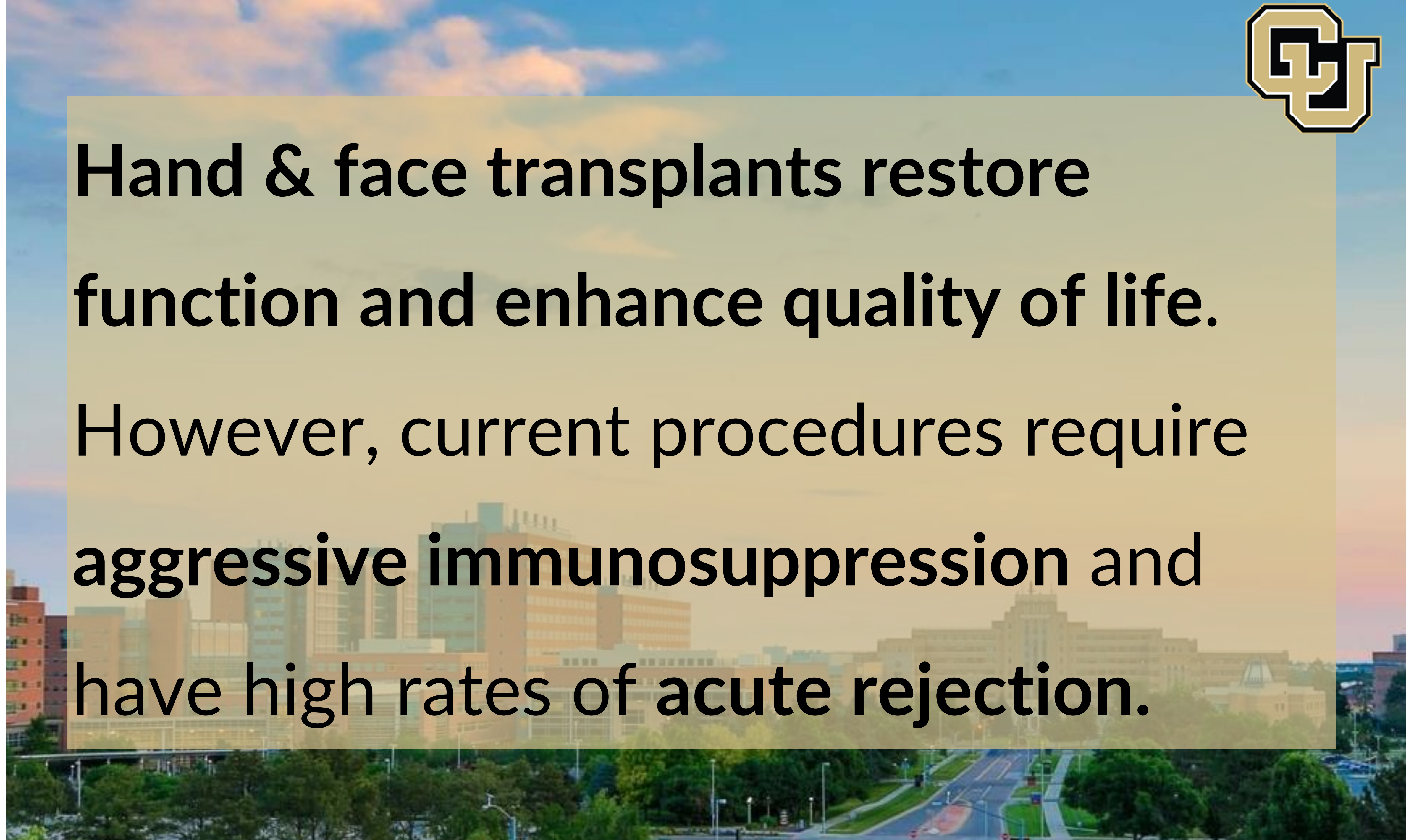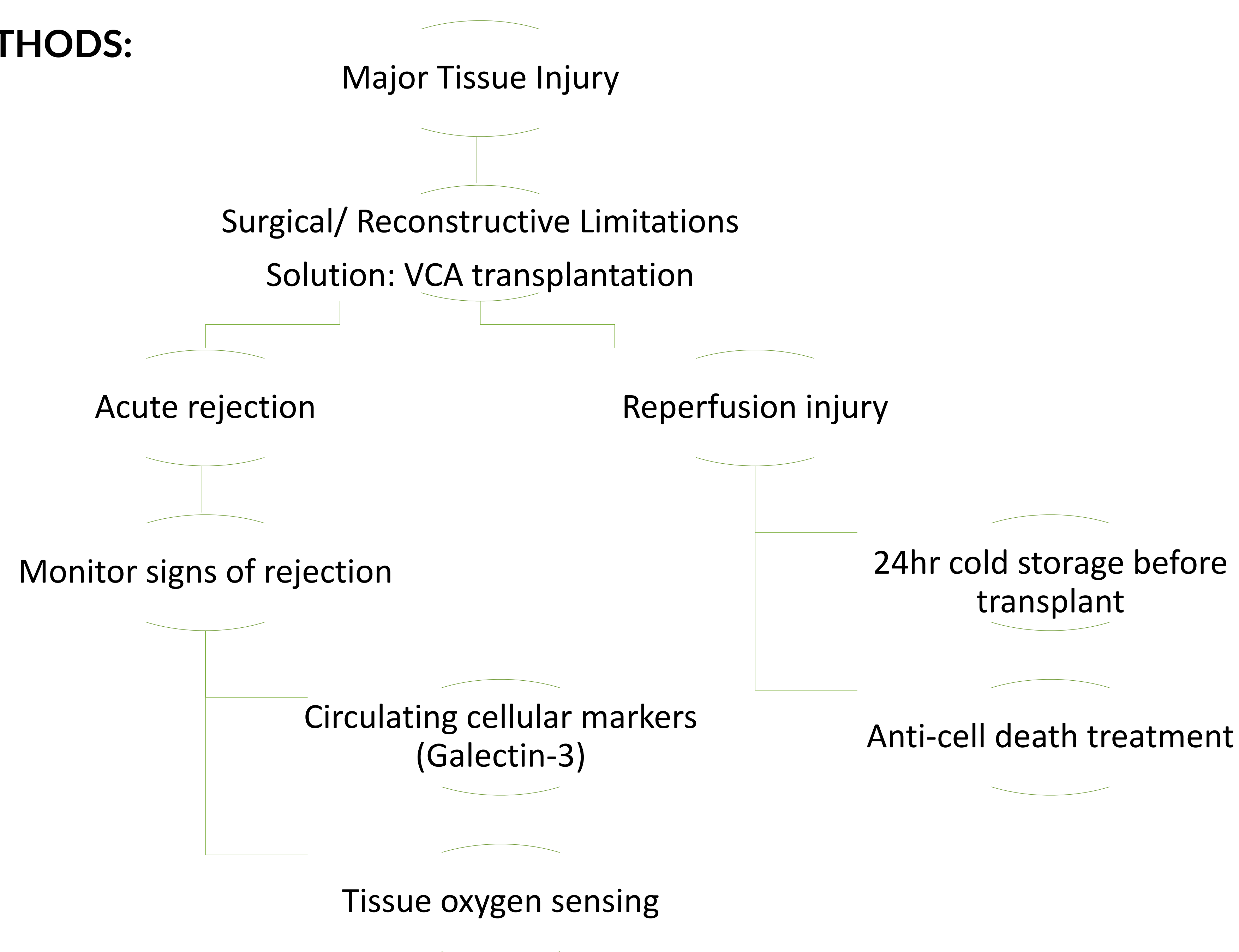**PI:** Christene A. Huang, PhD
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KEY TERMS:

1) **Vascularized Composite Allografts (VCA):** Transplants containing multiple tissue types and their associated vasculature
2) **Ischemia Reperfusion Injury:** inflammatory response triggered upon reconnection of blood supply to transplanted organ
3) **Acute Rejection:** graft rejection that usually begins within 10 days after a graft has been transplanted into a genetically dissimilar host
4) **Non-Invasive Approaches:** Blood biomarkers and changes in tissue oxygenation

BACKGROUND:

1) Over half of all combat related casualties in the US military since 2006 were sustained in improvised explosive device (IED) related incidences
2) Up to 80% of those involved wounds to the hands and or face. Victims of such attacks are often left permanently disfigured and in some cases with extremities and/or portions of their face missing
3) The goal of our research is to improve VCA outcomes. We are investigating ways to reduce the need for extensive immunosuppression by:
   a. Preventing tissue damage associated graft procurement and storage prior to transplantation
   b. Blocking inflammation post-transplantation
   c. Improving non-invasive approaches to detect early signs of tissue rejection

METHODS:

Major Tissue Injury

Surgical/ Reconstructive Limitations

Solution: VCA transplantation

Acute rejection — Reperfusion injury

Monitor signs of rejection — 24hr cold storage before transplant

Circulating cellular markers (Galectin-3) — Anti-cell death treatment

Tissue oxygen sensing

Hand & face transplants restore function and enhance quality of life. However, current procedures require **aggressive immunosuppression** and have high rates of **acute rejection.**
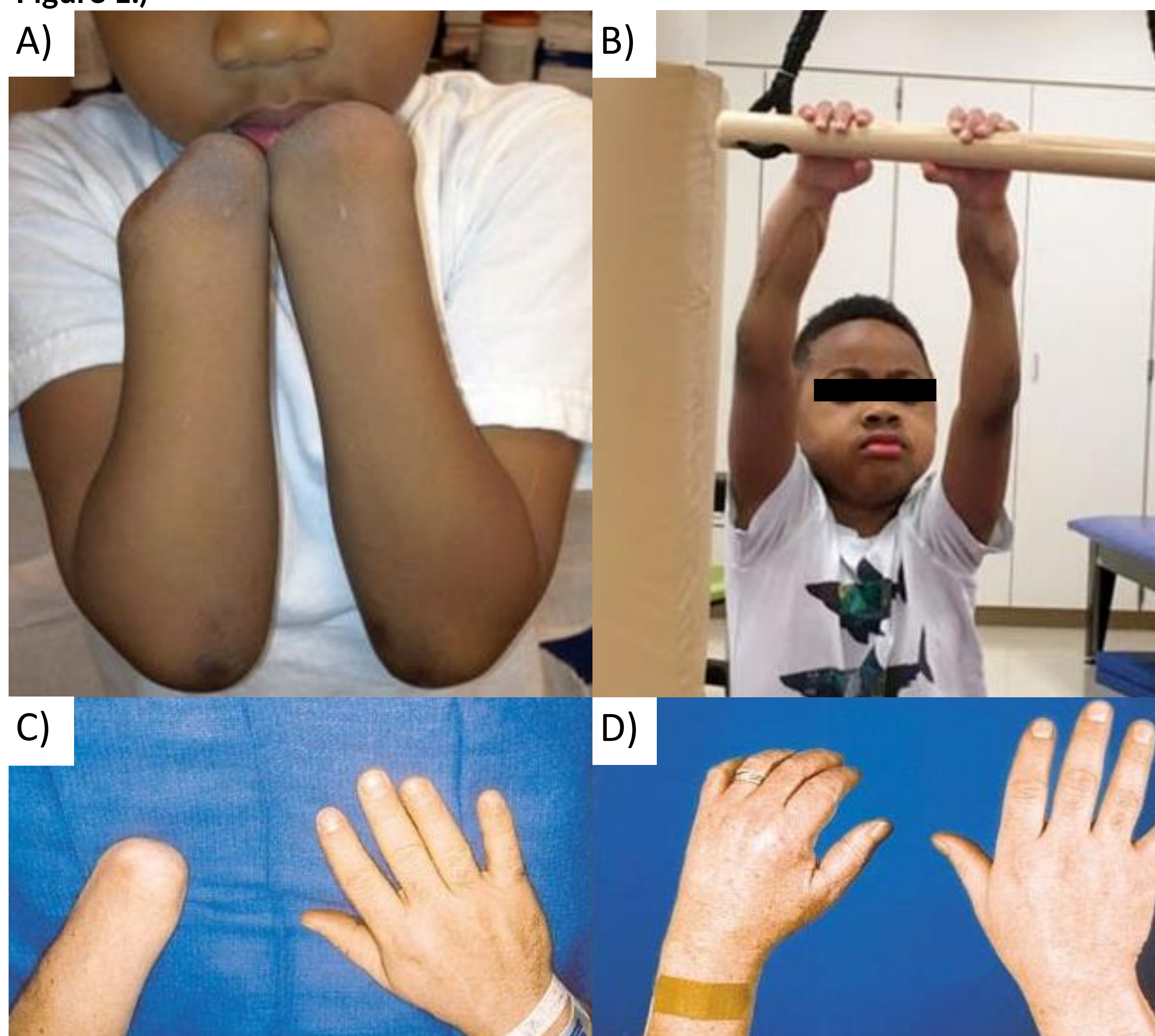
RESULTS:

Figure 1.)

Figure 1: Clinical examples of the benefit of hand transplantation. Before and after images of successful VCA hand transplants performed at different US VCA Centers: A-B dual hand transplantation, C-D single hand transplantation.
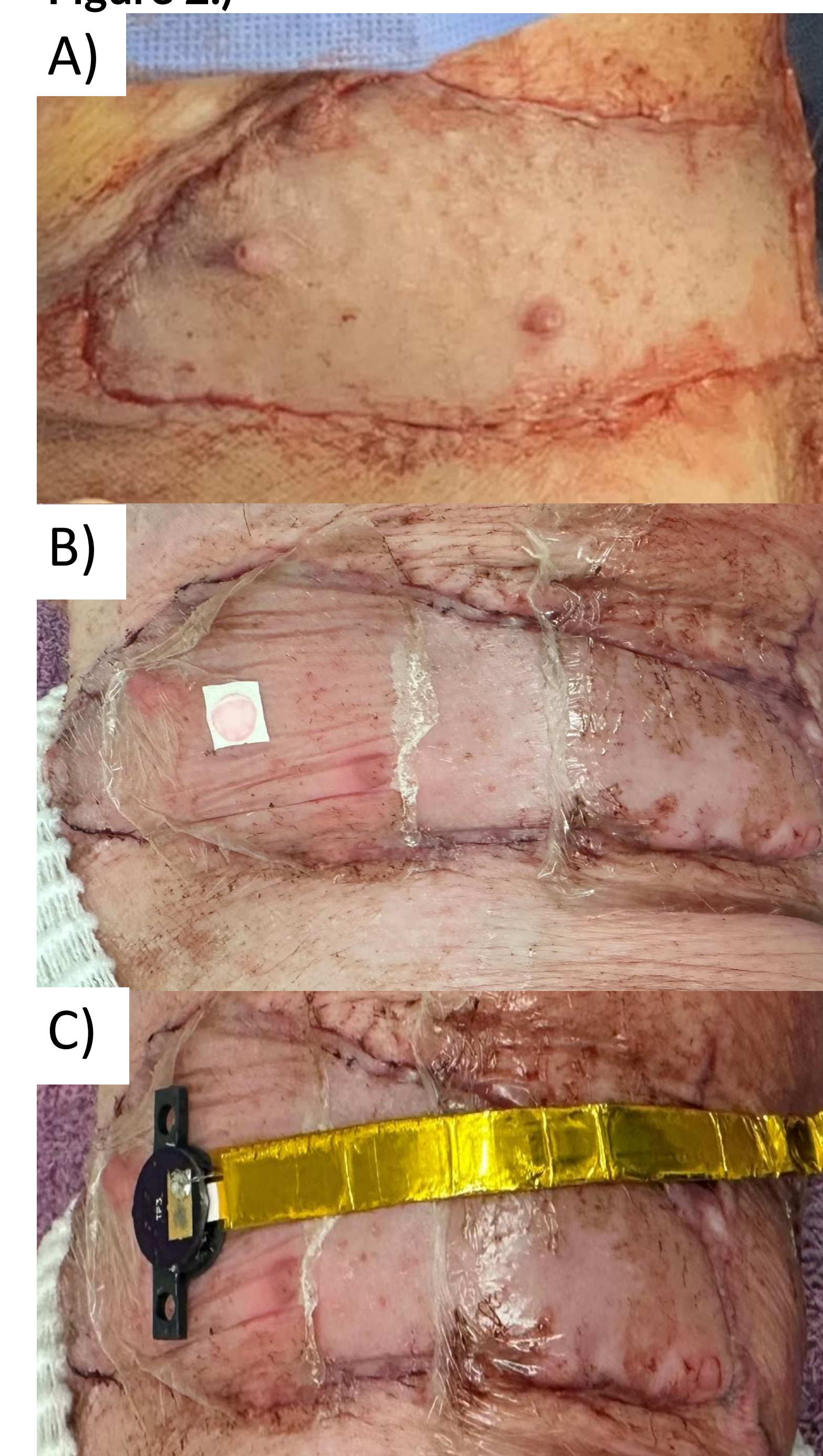
Figure 2.)

Figure 2: Approach to detect early signs of rejection non-invasively: Tissue oxygenation sensor technology applied to full thickness skin and muscle VCA transplants in pig model: A) day of operation, B) day 1, C) day 2