

SOLID-ORGAN TRANSPLANTATION AND EXERCISE

WHAT IS SOLID-ORGAN TRANSPLANTATION?

Solid-organ transplant surgery is an accepted life-saving procedure with over 1300 recipients in Australia in 2015⁽¹⁾. The most common organ transplanted is the kidney, followed by the liver, lungs, heart and pancreas. Often, the major indications for organ transplantation are chronic end-stage diseases specific to each organ (e.g. end-stage kidney disease). Following transplantation, patients are treated with immunosuppression therapy to prevent organ rejection. Consequently, these medications may result in significant loss of fitness and weight gain, contributing to the development of the metabolic syndrome and cardiovascular disease⁽²⁾.

THE IMPORTANCE OF EXERCISE TRAINING

There are several benefits for all who participate in exercise training. These include:

- Improving cardiorespiratory fitness and physical function
- Increasing muscular strength, muscle size and bone density
- Assisting with weight loss and weight maintenance
- Improving cardiometabolic risk profile (e.g. reducing blood pressure, regulating glucose control, improving lipid profile) and;
- Improving symptoms associated with depression and anxiety



HOW DOES EXERCISE HELP WITH ORGAN TRANSPLANT CANDIDATES?

Patients awaiting solid-organ transplantation are often severely deconditioned, exhibiting a wide variety of health-related physiological and psychological complications. Research suggests that impaired cardiorespiratory fitness and reduced muscle mass are associated with poor outcomes before and after solid-organ transplant surgery⁽³⁻⁵⁾. Exercise training appears safe in this population and it is recommended that patients remain physically active while listed for transplantation to minimise any further disease-related deconditioning.

WHAT ABOUT ORGAN TRANSPLANT RECIPIENTS?

A recent systematic review and meta-analysis (the highest level of evidence) examined 15 studies comprising of over 600 patients investigating the impact of exercise training across all solid-organ transplant recipients compared to standard care⁽⁶⁾. The majority of studies were in heart transplant recipients, but also included patients who have received a lung, liver and kidney transplant. Across the studies, participants performed a wide variety of aerobic (cycling, walking), resistance and stretching exercises. The authors concluded that exercise training is effective in improving cardiovascular health in solid organ transplant recipients.

WHAT EXERCISE IS BEST FOR SOLID ORGAN TRANSPLANT CANDIDATES AND RECIPIENTS?

The most common modes of exercise training that have been used in both solid-organ transplant candidates and recipients include aerobic (endurance), resistance (strength) and flexibility (stretching)⁽⁶⁾. People that are awaiting or have received a solid-organ transplant are often deconditioned and should begin exercising slowly with gradual progression. It is recommended that people aim to achieve 20-60 minutes of aerobic exercise on 3-6 days per week at an intensity that suits the individual's current condition. Resistance training should be performed on 2-3 days a week, with 8-10 different exercises, focusing on major muscle groups. It is suggested to perform one to three sets of 8-12 repetitions, with a weight requiring a moderate effort (50-80% of one-repetition maximum). Additionally, flexibility training can also be incorporated 2-3 times per week for 10 minutes.

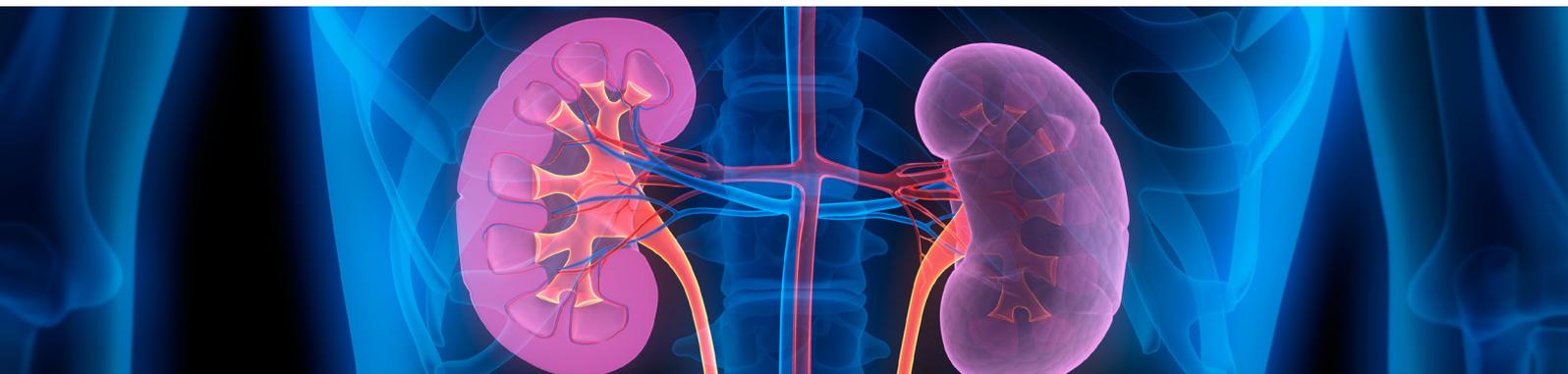
WHEN CAN ORGAN TRANSPLANT RECIPIENTS START EXERCISING AFTER TRANSPLANTATION?

It is important to seek medical approval prior to engaging in any exercise following solid-organ transplantation. Transplant recipients have commenced aerobic exercise training in as little as 8 weeks following surgery ⁽⁷⁾. It is suggested that exercise-induced improvements in health are maximised if patients commence exercise training within the first year after surgery ⁽⁶⁾.

WHEN CAN ORGAN TRANSPLANT RECIPIENTS START EXERCISING AFTER TRANSPLANTATION?

The following factors should be considered when designing an exercise program:

- Patients should be medically stable, compliant with medication use and seek medical approval before commencing exercise.
- During exercise, patients with chronic heart failure may experience low blood pressure, which can cause light-headedness, sweating, fainting, distress, anxiety and abnormal heart rhythms.
- Exertional breathlessness is common in people with chronic obstructive pulmonary disease that may lead to hypoxemia (low oxygen in the blood).
- Patients receiving haemodialysis for end-stage kidney disease should restrict upper limb activity with temporary or healing fistula. Additionally, exercise should be performed in the first two hours of haemodialysis to avoid significant alterations in blood pressure.
- Gastroesophageal varices (abnormally enlarged veins due to liver cirrhosis) in end-stage liver disease must be managed prior to exercise. These patients may experience significant abdominal ascites (excess fluid accumulation), which can result in abdominal pain, discomfort and shortness of breath.
- Heart and lung transplant recipients should be cautious regarding upper body resistance training. It is recommended that patients do not perform strenuous upper body and arm training for 8 to 12 weeks or until clearance is obtained from the transplant surgeon.
- When performing resistance training, advise patients to maintain normal breathing and avoid holding their breath. The Valsalva maneuver (exhaling against a closed airway) may cause excess pressure in the chest and abdomen.
- In the unfortunate instance of organ rejection, it is recommended to reduce exercise intensity and duration but maintain low-levels of physical activity.
- If diabetic, monitor blood pressure and blood glucose before and after exercise.
- Common complications associated with a standard immunosuppression regime can include an increased infection susceptibility, high blood pressure, high blood glucose and increased risk of osteoporotic-related vertebral and hip fractures. Please consult a medical professional regarding these complications before commencing exercise. Exercise management for these conditions can be found at www.exerciseismedicine.com.au/public/factsheets



REFERENCES AND FURTHER INFORMATION

Exercise is Medicine Australia

www.exerciseismedicine.com.au

Exercise Right www.exerciseright.com.au

Find an AEP www.essa.org.au

1. ANZOD Registry 2015 Annual Report. Available at: <http://www.anzdata.org.au>
2. Vicennati V et al. *Endocrinol Metab Synd*; 4(1): 1-14
3. Bernal W et al. *LiverTranspl*; 20 (1): 54-62
4. Mancini et al. *Circulation*; 83 (3); 778-786
5. Ting et al. *PLoS ONE*; 8 (5); e64335
6. Didsbury M et al. *Transplantation*; 95(5): 679-687
7. Krasnoff et al. *Am JTransplant*; 6(8): 1896-1905