

## УСПЕШНАЯ ТРАНСПЛАНТАЦИЯ СЕРДЦА С ИСПОЛЬЗОВАНИЕМ АЛЛОГРАФТА ЧЕРЕЗ 17 ЧАСОВ ПОСЛЕ ЕГО ИЗЪЯТИЯ И ПЕРФУЗИИ EX-VIVO В СИСТЕМЕ СОХРАНЕНИЯ ОРГАНОВ

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### АБСТРАКТ.

Гипотермическая консервация является стандартным, но ограниченным по времени методом сохранения аллогraftов для выполнения трансплантации сердца. Использование системы для экстракорпоральной нормотермической перфузии трансплантата позволяет расширить пул донорских органов, нивелируя ограничение по времени и расстоянию, а также имея возможность улучшить функцию сердечного аллогraftа. В данном сообщении описывается клинический случай успешной трансплантации сердца пациенту с искусственным левым желудочком с использованием аллогraftа через 17 часов после его изъятия и перфузии ex-vivo в Системе Сохранения Органов TransMedics.

**КЛЮЧЕВЫЕ СЛОВА:** трансплантация сердца, система сохранения органов, Казахстан, перфузия ex-vivo

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## SUCCESSFUL HEART TRANSPLANTATION WITH ALLOGRAFT AFTER 17 HOURS EX-VIVO TIME USING THE ORGAN CARE SYSTEM

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### ABSTRACT

Cold storage preservation is the standard but a time-limited method of care for heart transplantation. Ex-vivo heart perfusion expands the donor pool due to negating the time and distance restrictions with the possibility to improve graft function. We report the successful transplantation of a heart following an ex-vivo time of 17 hours using the Organ Care System into a patient with left ventricular assist device.

**KEYWORDS:** heart transplantation, organ care system, Kazakhstan, ex-vivo perfusion

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# АҒЗАНЫ САҚТАУ ЖҮЙЕСІН (OCS) ПАЙДАЛАНА ОТЫРЫП, 17 САҒАТ EX-VIVO KEЙІН АЛЛОТРАНСПЛАНТАТПЕН СӘТТІ ЖҮРЕК ТРАНСПЛАНТАЦИЯСЫ

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## АБСТРАКТ

Гипотермиялық консервация стандартты, бірақ уақыт бойынша шектеулі, жүрек трансплантациясын орындау үшін аллографтарды сақтау әдісі болып табылады. Трансплантаттың экстракорпоралдық нормотермиялық перфузиясы үшін жүйені пайдалану уақыт пен қашықтық бойынша шектеуді нивелируя отырып, сондай-ақ жүрек аллографтының функциясын жақсарту мүмкіндігіне ие донорлық органдар пулын кеңейтуге мүмкіндік береді. Бұл хабарламада жасанды сол жақ қарыншасы бар пациентке сәтті жүрек трансплантациясының клиникалық жағдайы, оны алғаннан кейін 17 сағаттан соң аллографтты қолдану және TransMedics органдарын сақтау жүйесінде ex-vivo перфузиясы сипатталады.

**ТҮЙІН СӨЗДЕР:** жүрек трансплантациясы, органдарды сақтау жүйесі, Қазақстан, перфузия ex-vivo

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## INTRODUCTION.

According to some publications, normothermic ex-vivo perfusion of donor hearts is now a clinically approved method in heart transplantation (HTx) program [1, 2]. Our Center established a mechanical circulatory support program in Kazakhstan in 2011 and initiated HTx program in 2012. Kazakhstan is the 9<sup>th</sup> largest country in the world, therefore the using of Organ Care System (OCS) Transmedics is the important option for the development of HTx program in our country. We report the case of successful HTx with allograft after 17 hours out-of-body time using the Transmedics OCS.

## CASE REPORT.

At the end of December 2017, we received information about donor in the city, which is located approximately 500 km from Astana. Unfortunately, due to extreme weather conditions flight was impossible, so the team went for a donor heart by the train, which was the 3<sup>rd</sup> case in our clinical practice with this type of transport. Donor was a 60-year-old woman after hemorrhagic stroke with B (III) blood group and negative Rh factor.

Cardiac function was normal by echocardiography. The heart was explanted and attached to the OCS (TransMedics, Inc, USA). Transportation time by train was 8 hours. Pre- and post-train transportation time by car was 1 hour. Pacing of the heart was used due to sinus bradycardia and ultrafiltration in the OCS to reducing circulating inflammatory mediators (Ultrafiltr, Sorin Group, USA). Levosimendan (Orion Corporation, Finland) was continuously infused with the perfusor. Recipient is a man with the same blood group and Rh factor. He underwent mitral valve replacement and tricuspid valve repair 15 years ago, and mitral valve redo replacement, aortic valve replacement, HeartMate 3 left ventricular assist device (LVAD) (Abbott Inc, USA) implantation 1 year ago. LVAD-specific deep driveline infection had been developing 2 months ago. In total, the preservation time in the OCS was 16 hours (Figure 1). During all this time the mean aortic pressure and coronary blood flow were normal. Throughout the ex-vivo perfusion process, the highest level of lactate was 8.7 mmol/l. Orthotopic bicaval HTx was performed. Total cross clamp time was 17 hours

and 20 minutes. Postreperfusion transoesophageal echocardiography demonstrated mild-moderate hypokinesis of the heart, so the subsequent attempted weaning from cardiopulmonary bypass was impossible. Central veno-arterial extracorporeal membrane oxygenation (ECMO, Dideco, Sorin Group, Italy) was initiated. Recipient had 2 revisions due to bleeding, and was successfully weaned from the ECMO on the 3<sup>rd</sup> day. During these days 15 liters of fresh frozen plasma and 7 liters of packed red blood cells were transfused. He was in the intensive care unit during 2 weeks due to respiratory insufficiency and dependence from moderate doses of inotrops. After the extubation, clinical status stabilization patient was transferred to a normal ward and 1 month after the HTx he was discharged from the hospital. The recipient is over 9 months posttransplant with well clinical status and has returned to a normal life.

## DISCUSSION.

OCS Transmedics allows to overcome time boundaries (geographical features, redo operations) and manage the marginal donor hearts to improve its function as well [3]. In Australia, a donor heart was successfully transplanted after 10 hours out-of-body time using the Transmedics OCS [4]. To our knowledge, our report describes the longest ex-vivo perfusion of the donor heart in the OCS Transmedics with subsequent successful HTx. Mean venous lactate at the end of perfusion of all OCS cases in our Center (n=46, 74%) was  $7.1 \pm 1.1$  mmol/l, and we used these allografts due to the severe shortage of donor hearts with outcomes



**Figure 1.** OCS parameters before the cardiac allograft explantation from the device.

comparable to results of other centers [5]. This case report demonstrates that the OCS platform is the safe method for myocardial protection in distant harvesting and preservation of donor hearts, and the pool of allografts can be expanded with this technology.

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