

NHS BLOOD AND TRANSPLANT

RESEARCH, INNOVATION AND NOVEL TECHNOLOGIES ADVISORY GROUP

AVAILABILITY OF ORGANS FOR RESEARCH

SUMMARY

BACKGROUND

- 1 This paper investigates the pathway of organs that have been retrieved and not transplanted to assess the availability of organs for research. It also identifies the number of organs received by research studies within the last year.

DATA AND METHODS

- 2 Organs that were retrieved and not transplanted were analysed for UK deceased donors between 1 January 2010 and 31 December 2019. Research outcome was split into three categories: No research consent, used for research and organ disposed of with research consent.
- 3 Livers isolated for hepatocytes (transplanted or not transplanted) have been excluded from this analysis.

CONCLUSION

- 4 Overall, the total number of organs retrieved and not transplanted has steadily increased over time. In addition, the proportion of these organs that have consent/authorisation for research has increased to 95% in 2019. In the last year, the number of available hearts for research has increased to 21 compared with 5 in 2018.
- 5 In 2015, the number of organs used for research was at an all-time high, 531, since then, it has steadily declined to 399 in 2018. In the last year, the number of utilised research organs rose to 441 where the number of livers increased to 146, the highest in 6 years.
- 6 The proportion of discarded organs where research consent/authorisation was ascertained is substantially higher than in previous years; 13% in 2015 to 52% in 2019. Kidneys and pancreases tend to have higher discard rates.
- 7 Utilised research organs were distributed across many studies which suggests that studies that were ranked lower through the allocation scheme were still able to obtain research organs.

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BACKGROUND

- 8 This paper investigates the pathway of organs that have been retrieved and not transplanted; these organs have the potential to be available for research purposes. However, some research organs are discarded due to a lack of consent/authorisation or for other reasons. Within this paper we assess the availability of organs for research and identify the number of organs received by each research study.

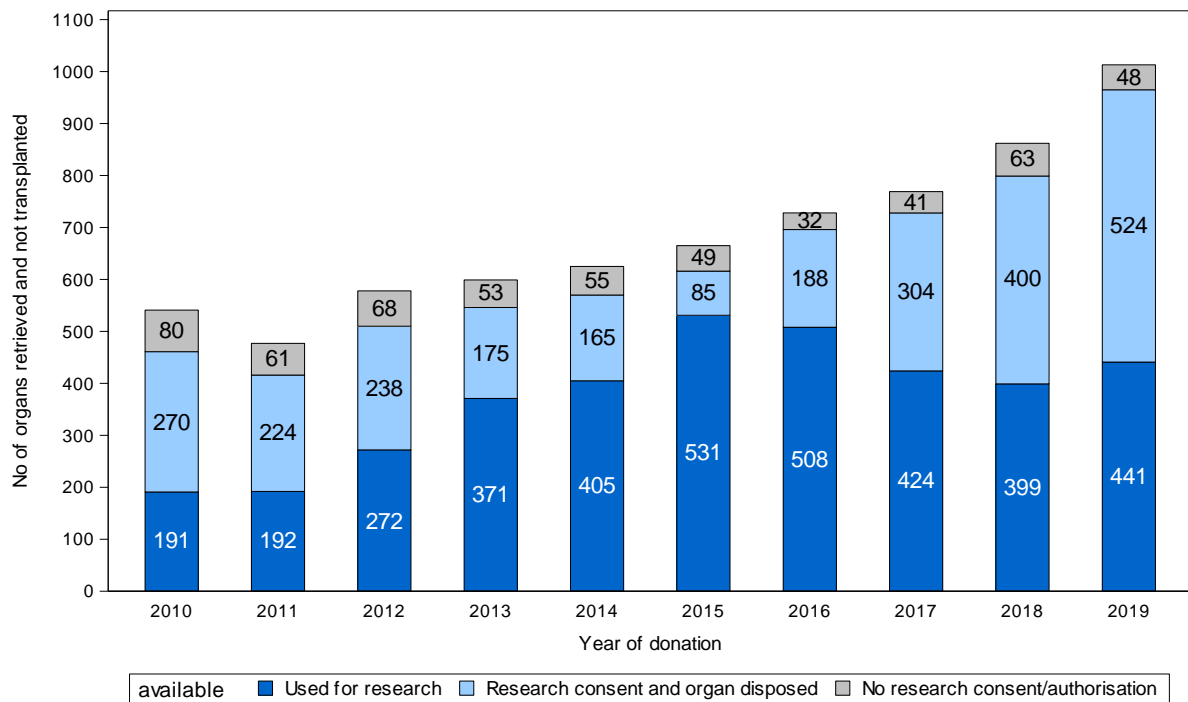
DATA AND METHODS

- 9 Organs that were retrieved and not transplanted were analysed for UK donors between 1 January 2010 and 31 December 2019. Research outcome was split into three categories: No research consent, used for research and organ disposed of with research consent.
- 10 Organs that were used for research in 2019 are presented in terms of which research study they went to. Details on each of these research studies are listed in the **Appendix**. Study rankings are as at April 2019 (last re-ranked in October 2019).
- 11 Livers isolated for hepatocytes (transplanted or not transplanted) have been excluded from this analysis.

RESULTS

- 12 **Figure 1** shows the research outcome of UK donor organs that were retrieved and not transplanted between 1 January 2010 and 31 December 2019. Overall, the total number of organs retrieved and not transplanted has steadily increased since 2010. The availability of organs for research was at an all-time high in 2019.
- 13 The proportion of potential organs available for research due to being retrieved and not transplanted are shown in **Figure 2**, by research outcome from 1 January 2010 to 31 December 2019. Consent/authorisation for research has been fairly constant in the last few years and so the proportion of organs discarded due to a lack of research consent/authorisation is relatively small ranging from 4% to 7%.
- 14 In 2015, the number of organs used for research was at an all-time high, 531, since then, it has steadily declined to 399 in 2018. In the last year, the number of utilised research organs rose to 441. Discard rates for organs with research consent/authorisation have increased over the last few years to 52%.

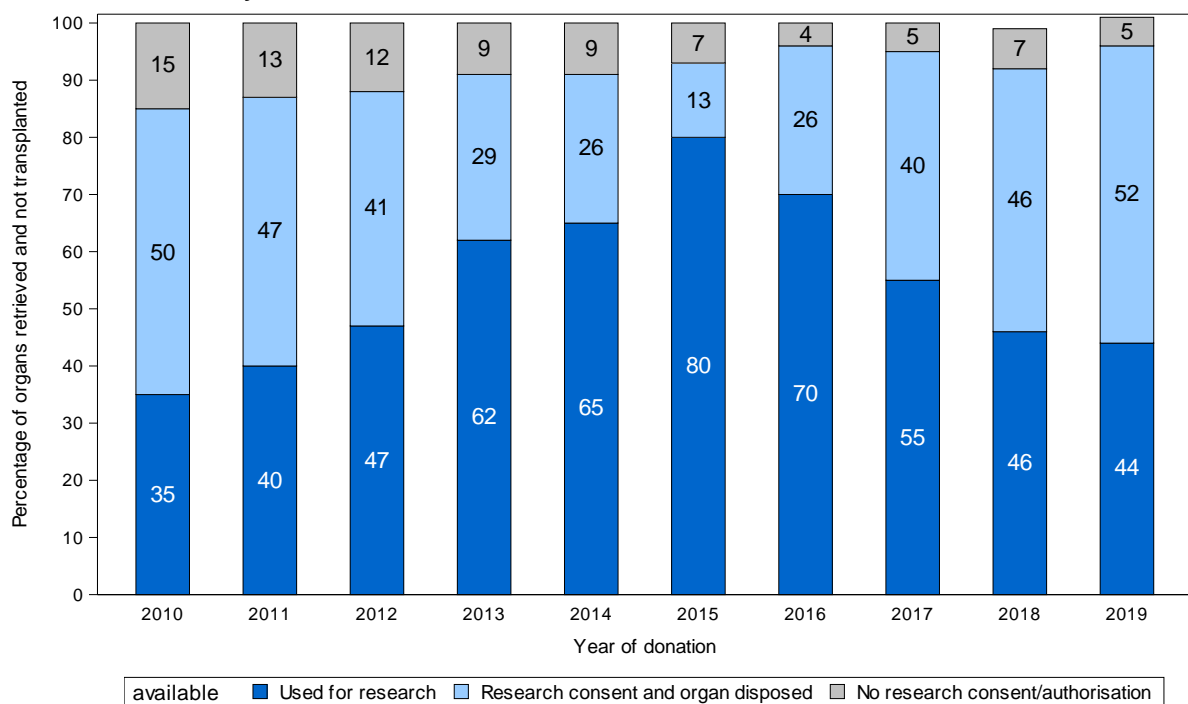
Figure 1 Number of organs that were retrieved and not transplanted by research outcome, 1 January 2010 - 31 December 2019



Note: On the 20th February 2017 a research prioritisation allocation scheme was introduced

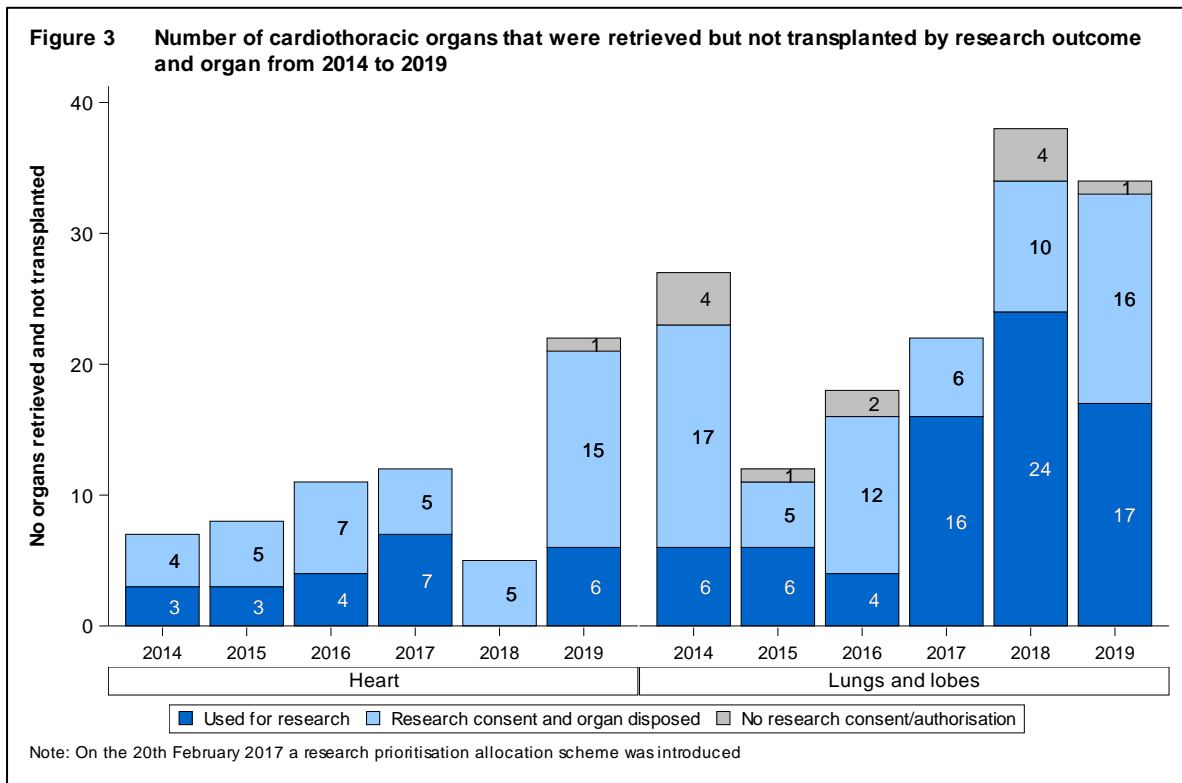
15 The same information from **Figure 1** (number of organs retrieved and not transplanted) is broken down by organ and illustrated in terms of cardiothoracic organs in **Figure 3** and abdominal organs in **Figure 4**.

Figure 2 Percentage of organs that were retrieved but not transplanted by research outcome, 1 January 2010 - 31 December 2019



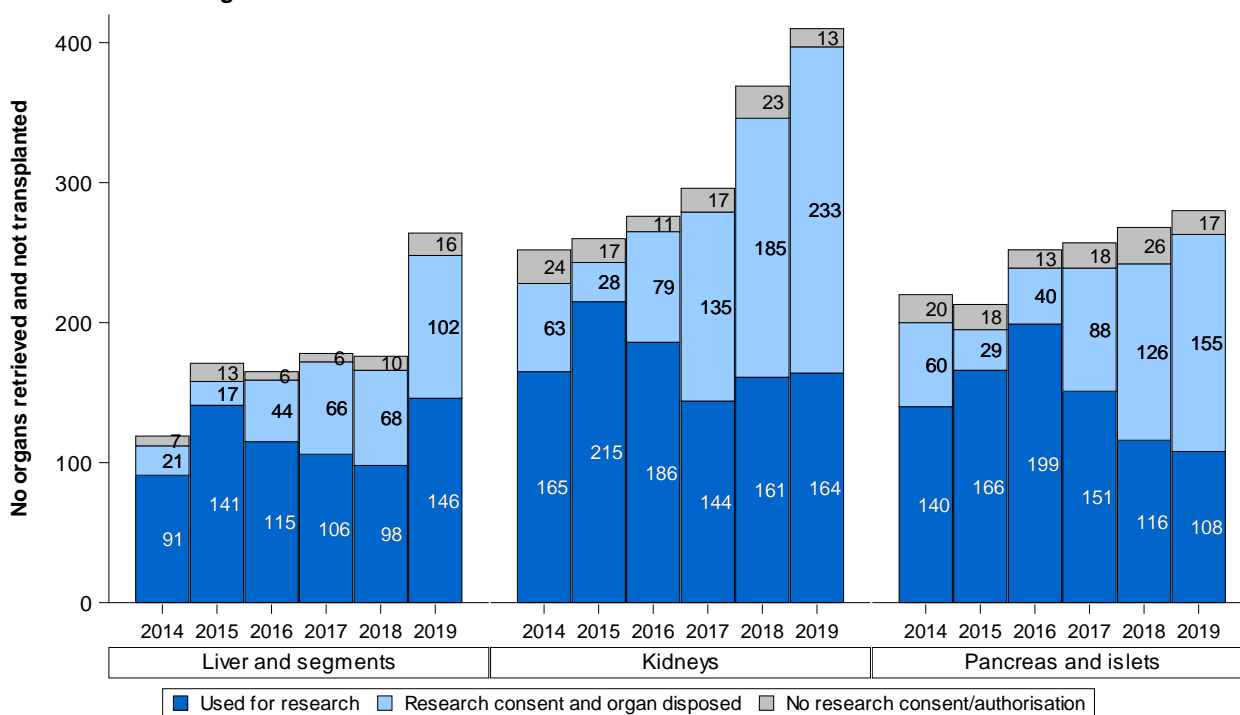
Note: On the 20th February 2017 a research prioritisation allocation scheme was introduced

16 The number of cardiothoracic organs available for research is small, as seen in **Figure 3**. In 2019, the number of hearts available for research has increased to 21 compared with 5 in the previous year and overall, six hearts have been utilised for research. The availability of lungs for research has slightly fallen in the last year and the utilisation rate was 50%.



17 **Figure 4** shows that the number of abdominal organs available for research has increased, particularly for livers and kidneys. In 2019, the number of livers utilised for research was 146, the highest in 6 years. For kidneys, it has remained constant in comparison to the previous year and for pancreases, the number utilised continues to fall (N=108).

Figure 4 Number of abdominal organs that were retrieved and not transplanted by research outcome and organ from 2014 to 2019



Note: On the 20th February 2017 a research prioritisation allocation scheme was introduced

18 **Table 1** and **2** show the total number of organs received by research studies from 1 January 2019 to 31 December 2019, for cardiothoracic and abdominal organs, respectively. The tables show that research organs utilised were distributed across many studies as such lower ranked studies were still able to obtain research organs overall.

Table 1 Cardiothoracic organs received by study from 1 January 2019 to 31 December 2019

Organ	Study Number	Ranking as at April 2019	Start year	End year	Organs received	
					N	%
Hearts	83	1	2019	2020	1	17
	67	2	2017	2022	5	83
	Total				6	100
Lungs	58	1	2017	2021	8	47
	66	1	2017	2020	6	35
	Unknown study	NA	NA	NA	3	18
Total					17	100
Cardiothoracic organs	Total				23	100

Table 2 Abdominal organs received by study from 1 January 2019 to 31 December 2019

Organ	Study Number	Ranking as at April 2019	Start year	End year	Organs received	
					N	%
Liver and segments	3	1	2017	2022	1	1
	21	1	2014	2020	8	5
	52	2	2015	2020	10	7
	35	3	2014	2024	17	12
	50	4	2014	2021	1	1
	56	5	2016	2020	10	7
	33	6	2013	2020	69	47
	84	6	2019	2023	1	1
	36	Tissue bank	NA	NA	5	3
	33/84	Birmingham	NA	NA	10	7
	Unknown study			14	10	
	Total			146	100	
Kidneys	53	1	2015	.	1	1
	2	2	2012	2021	53	32
	48	2	2015	2020	7	4
	23	3	2012	2022	15	9
	73	3	2018	2021	4	2
	63	4	2016	2020	3	2
	19	5	2006	2021	30	18
	40	6	2014	2024	1	1
	93	7	2019	2021	2	1
	31	Tissue bank			26	16
	36	Tissue bank			9	5
	43	Tissue bank			2	1
		Unknown study			11	7
	Total			164	100	
Pancreas and Islets	20	1	2005	2020	10	9
	3	1	2017	2022	28	26
	50	2	2014	2021	2	2
	85	2	2019	2022	10	9
	82	3	2019	2022	5	5
	36	Tissue bank			5	5
	43	Tissue bank			2	2
	45	Islet lab	2009	2017	4	4
47	Islet lab	2002		15	14	
	Unknown study			27	25	
	Total			108	100	
Total abdominal organs					418	100

CONCLUSION

- 19 Overall, the total number of organs retrieved and not transplanted has steadily increased over time. In addition, the proportion of these organs that have consent/authorisation for research has increased to 95% in 2019. In the last year, the number of available hearts for research has increased to 21 compared with 5 in 2018.
- 20 In 2015, the number of organs used for research was at an all-time high, 531, since then, it has steadily declined to 399 in 2018. In the last year, the number of utilised research organs rose to 441 where the number of livers increased to 146, the highest in 6 years.
- 21 The proportion of discarded organs where research consent/authorisation was ascertained is substantially higher than in previous years; 13% in 2015 to 52% in 2019. Kidneys and pancreases tend to have higher discard rates.
- 22 Utilised research organs were distributed across many studies which suggests that studies that were ranked lower through the allocation scheme were still able to obtain research organs.

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APPENDIX – Research studies ranking as at April 2019 (re-ranked October 2019)

Organ	Study	Rank	Location	Study Title
Heart	83	1	Newcastle	Evaluation of Hypothermic Oxygenated Perfusion (HOP) Ex-Vivo Heart Perfusion to Expand the Donor Pool and Improve Transplant Outcomes
Heart	67	2	Imperial	Structural and functional analysis of intact myocardium and isolated cells from explanted hearts
Lung	58	1	Edinburgh	ENLIGHTEN - Multiplexed Optical Molecular Imaging and Sensing during Ex Vivo Lung Perfusion (EVLN)
Lung	66	1	Newcastle	Further Evaluation of Ex Vivo Lung Perfusion to Improve Transplantation Outcomes
Liver	21	1	Cambridge	Development of pre-transplant normothermic perfusion reconditioning for human livers donated after circulatory death
Liver	52	2	Newcastle	Establishing ex-vivo normothermic and hypothermic perfusion of livers for transplantation
Liver	35	3	Birmingham	Normothermic Liver Perfusion Study (The development of NMLP for improvement of marginal human donor liver quality)
Liver	68	3	King's	Hepatocyte Transplantation Project: Studies on isolated hepatocytes
Liver	50	4	Royal Free	Organ regeneration and disease modelling using 3D biological scaffold
Liver	56	5	Edinburgh	Human Hepatic Progenitor Cells as a Source of Liver Regeneration
Liver	33	6	Birmingham	Expression and Function of Immune Regulatory Proteins in Human Liver
Liver	84	6	Birmingham	Investigating how inflammation determines the development and outcome of inflammatory liver diseases, and whether new targets for drug therapies can be identified
Pancreas	20	1	Newcastle	Process development for islet isolation targeted at enhancing islet yield and viability
Pancreas	3	1	Cambridge	Study of Pancreas Function, Physiology, Pathology and Therapeutics
Pancreas	34	2	Worcester	A pre-clinical study of human islet function to improve long-term graft survival
Pancreas	50	2	Royal Free	Organ Regeneration and Disease Modelling Using 3D Biological Scaffold
Pancreas	85	2	Edinburgh	Use of deceased donor pancreata to optimise and improve the clinical islet isolation process in a research environment
Pancreas	82	3	Oxford	Development of an ex-vivo endocrine pancreas for the investigation and treatment of diabetes
Pancreas	40	4	Royal Free	Identification of genes involved in renal, electrolyte and urinary tract disorders
Kidney	53	1	Cambridge	Quality assessment of Human Kidneys by Ex-vivo Normothermic Perfusion prior to Transplantation
Kidney	48	2	Newcastle	Establishing ex vivo normothermic perfusion (EVNP) of kidneys for transplantation
Kidney	2	2	Cambridge	Study of Renal Ischaemia Reperfusion Injury
Kidney	23	3	Cambridge	Characterisation of ischaemia reperfusion injury in human kidneys Non-transplantable Kidneys
Kidney	73	3	Guys	Mobilisation and depletion of passenger leukocytes during warm perfusion of discarded deceased donor kidneys
Kidney	63	4	Guys	Transplanting the untransplantable - extending antibody incompatible transplantation using a normothermic perfusion model with cytoprotective agents
Kidney	19	5	Bristol	Establishment of cultured human glomerular cells for study of glomerular function in vitro
Kidney	40	6	Royal Free	Identification of genes involved in renal, electrolyte and urinary tract disorders
Kidney	93	7	Glasgow	Ex-vivo normothermic perfusion (EVNP) for the resuscitation and assessment of human kidneys prior to transplantation