NHS BLOOD AND TRANSPLANT

CARDIOTHORACIC ADVISORY GROUP – HEART

DCD HEART ACTIVITY

SUMMARY

INTRODUCTION

1 DCD heart retrieval and transplantation began in February 2015, initially with two centres; Harefield and Papworth. Since then, other centres have joined the programme and on 7 September 2020, national allocation of DCD hearts was introduced as part of the Joint Innovation Fund (JIF) UK-wide DCD heart pilot. This paper presents activity from 1 February 2015 to 28 February 2023 and patient outcomes and offer data from 7 September 2020 to 28 February 2023.

KEY RESULTS

2 **Activity**
Two DCD Heart Passport forms were outstanding for the analysis period. Between 1 February 2015 and 28 February 2023, there were 427 DCD heart retrieval attendances, proceeding to 263 heart retrievals and 229 transplants. Of the 229 DCD heart transplants, 104 were performed since the start of the JIF pilot. Since the start of the JIF pilot, the conversion from retrieval to transplanted increased to 91% from 84% pre-JIF and 66% of transplants were retrieved and transplanted by a different team compared with 6% pre-JIF. The highest number of transplants were performed between January-March 2022, July-September 2022, and October-December 2022 (15 in each).

3 **Utilisation of other organs**
Since 7 September 2020, the utilisation rate (transplanted out of offered) of lungs, livers and pancreases was higher in DCD heart donors than from the general DCD donor population (22% vs 13% for lungs, 54% vs 44% for livers, 29% vs 20% for pancreases), whereas the rates were similar for kidneys (96% vs 94% for kidneys).

4 **Post-transplant survival and support**
Of the 104 DCD heart transplants since 7 September 2020, there have been 11 recorded deaths post-transplant; 4 within 30 day and 7 between 30 days and one year, although two recipients transplanted in February 2023 had missing survival data. The 1-year post-transplant survival rate since the start of the JIF was 83.2% which is comparable with the DBD heart survival rate (85.9%). The percentage of recipients requiring mechanical support post-transplant in the JIF period was 38%, with some evidence that this is higher than the DBD rate of 29% across the same period.

5 **DCD heart offering**
Between 7 September 2020 and 28 February 2023, 392 hearts were offered from potential DCD heart donors across the 6 heart allocation zones; the highest number of offers came from the Harefield and Newcastle zones. The national utilisation (transplanted out of offered) rate was 27%, however offer acceptance rates varied across centres with 2-11% of offers being accepted and transplanted. Common reasons for decline were no suitable recipients, donor past history and poor function.

ACTION

6 This report is for monitoring and assurance purposes, there is no specific action, but teams are reminded to return DCD Heart Passport forms in a timely manner.

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Statistics and Clinical Research **April 2023**

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CARDIOTHORACIC ADVISORY GROUP – HEART

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INTRODUCTION

1 The UK DCD heart programme began in February 2015 with an initial 15-month evaluation period involving two centres, Harefield and Papworth. After the initial evaluation period ended, other centres joined the programme including Manchester in December 2016, Newcastle in October 2018 and Glasgow in July 2019. Great Ormond Street Hospital transplanted their first DCD heart in February 2020.

2 On 7 September 2020, national retrieval of DCD hearts was introduced as part of the Joint Innovation Fund (JIF) UK-wide DCD heart pilot. Under the JIF pilot, three teams were initially responsible for retrieving DCD hearts (Harefield, Manchester and Papworth) but due to resource constraints, Manchester's involvement in the service became limited, and so a Hybrid Team of Harefield and Papworth was formed to maintain the service. On 19th September 2022, the Hybrid Team was discontinued and Glasgow began retrieving.

3 Prior to the JIF pilot, DCD hearts were locally allocated, but since 7 September 2020, DCD hearts have been allocated according to the non-urgent DBD heart allocation sequence. See https://nhsbtdbe.blob.core.windows.net/umbraco-assets-corp/26633/pol228.pdf.

4 This report presents DCD heart retrieval and transplant activity between 1 February 2015 and 28 February 2023 and patient outcomes after DCD heart transplant. Data on DCD heart offering and utilisation of other organs from DCD heart donors between 7 September 2020 and 28 February 2023 is also presented.

DATA

5 The DCD Heart Supplementary Form was introduced for the initial evaluation period to collect specific data relating to DCD heart retrievals and transplants. For the JIF DCD heart pilot, this form was discontinued and a new DCD Heart Passport (FRM6356) was introduced. The data presented in this paper are a combination of the information collected on these forms and other data held on the UK Transplant Registry (UKTR).

6 **Table 1** shows the number of forms outstanding for the period 7 September 2020 to 28 February 2023, as of 5 April 2023. There were two forms outstanding for the analysis period. A form is required to be completed whenever a team goes out to a donor with the intention of DCD heart retrieval. For transplanted DCD hearts, the form should be returned after 30 days of transplant in order to capture key details about the short-term outcome of the recipient.

Table 1 Outstanding DCD heart supplementary forms and DCD heart passports for the period 7 September 2020 – 28 February 2023, as of 5 April 2023

Financial year	Centre	Attended not retrieved	Retrieved not transplanted	Transplanted	Total forms outstanding
1 April 2022 - 31 March 2023	Birmingham	0	0	1	1
1 April 2022 - 31 March 2023	Papworth	0	0	1	1

RESULTS

Activity

7 Between 1 February 2015 and 28 February 2023, 427 DCD heart retrieval attendances were recorded, of which 263 proceeded to DCD heart retrieval and 164 did not. There was a total of 229 DCD hearts successfully transplanted, including one heart-lung transplant, one heart-kidney transplant and 15 paediatric transplants (eight by Great Ormond Street Hospital and seven by Newcastle). This activity is broken down by centre and time period in **Table 2**. Since the start of the JIF DCD Heart pilot to 28 February 2023 there have been 104 DCD heart transplants. Conversion from retrieval to transplanted has improved from 84% pre-JIF to 91% since the JIF. Since the JIF, 66% of transplants were retrieved and transplanted by a different team compared with 6% pre-JIF.

Table 2 DCD heart activity by period and centre, 1 February 2015 – 28 February 2023

Period	Centre	Attended	Retrieved	Transplanted (retrieved by own team)	Transplanted (retrieved by another team)
1 February 2015 – 6 September 2020	Glasgow	2	2	1	0
	Great Ormond Street	0	0	0	5
	Harefield	80	28	20	0
	Manchester	14	10	9	0
	Newcastle	2	2	2	2
	Papworth	137	107	86	0
	Total	**235**	**149**	**118**	**7**
7 September 2020 – 31 March 2022	Birmingham	0	0	0	3
	Glasgow	1	1	1	2
	Great Ormond Street	0	0	0	4
	Harefield	33	15	12	1
	Hybrid – Harefield/Papworth	26	15	0	0
	Manchester	6	4	1	0
	Newcastle	0	0	0	16
	Papworth	40	27	8	7
	Total	**106**	**62**	**22**	**33**
1 April 2022 – 28 February 2023	Birmingham	0	0	0	5
	Glasgow	10	8	2	4
	Great Ormond Street	0	0	0	1
	Harefield	9	8	5	10
	Hybrid – Harefield/Papworth	16	6	0	0
	Manchester	0	0	0	6
	Newcastle	0	0	0	5
	Papworth	51	30	6	5
	Total	**86**	**52**	**13**	**36**
1 February 2015 – 28 February 2023	Birmingham	0	0	0	8
	Glasgow	13	11	4	6
	Great Ormond Street	0	0	0	10
	Harefield	122	51	37	11
	Hybrid – Harefield/Papworth	42	21	0	0
	Manchester	20	14	10	6
	Newcastle	2	2	2	23
	Papworth	228	164	100	12
TOTAL		**427**	**263**	**153**	**76**

Notes:
- Non-proceeding attendances are identified by return of the DCD Heart Supplementary form/DCD heart passport or where information on the Retrieval Team Information form suggests that DCD heart retrieval was intended
- Papworth performed one DCD heart-kidney transplant and one DCD heart-lung transplant
- 7 of the transplants performed at Newcastle were in paediatric patients
- Excluded from the total attendances is a case where a donor was changed to DBD after retrieval
- 18 hearts from hybrid team retrievals were transplanted, these are counted in the "Transplanted (retrieved by another team)" numbers for Newcastle (3), Birmingham (2), Manchester (1) and Papworth (5) and "Transplanted (retrieved by own team)" for Harefield (7)
- One of Glasgow's retrievals was performed with members of the Papworth team during the JIF period

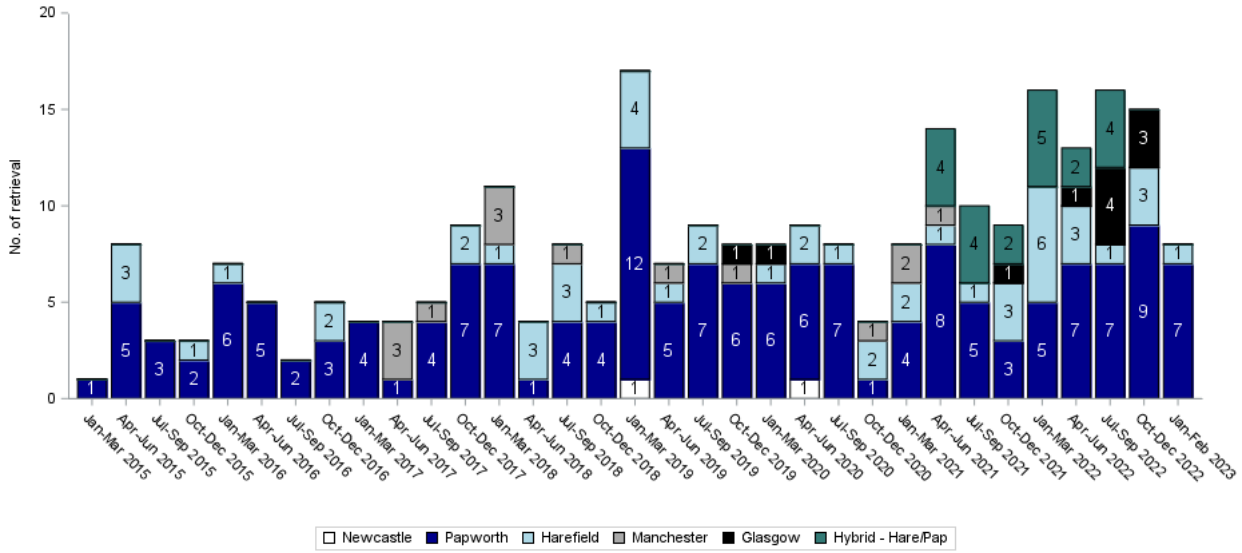
8 Since the start of the JIF, 10 (9%) DCD hearts were retrieved but not transplanted (note for reference, the discard rate for DBD hearts is 3%). The reason for non-use for each is seen below in **Table 3**. This information was primarily taken from the DCD Heart Passport, but where this was not available (as the form was returned incomplete), the reason was taken from the Hub Operations records.

Table 3 **Reasons for non-use of hearts retrieved from DCD donors, 7 September 2020 – 28 February 2023**

Centre intending to transplant	Donation Date	Reason for non-use
Glasgow	June 2021	Abnormal cardiac anatomy
	July 2022	Liver malignancy
Harefield	October 2021	Low aortic pressure
	May 2022	Poor function on OCS
Newcastle	January 2023	Poor function
Papworth	November 2020	Deemed un-transplantable
	December 2020	Deemed un-transplantable
	September 2021	Poor function
	October 2021	Offers withdrawn after team arrived at Addenbrookes
	January 2022	Heart on OCS, CAD identified

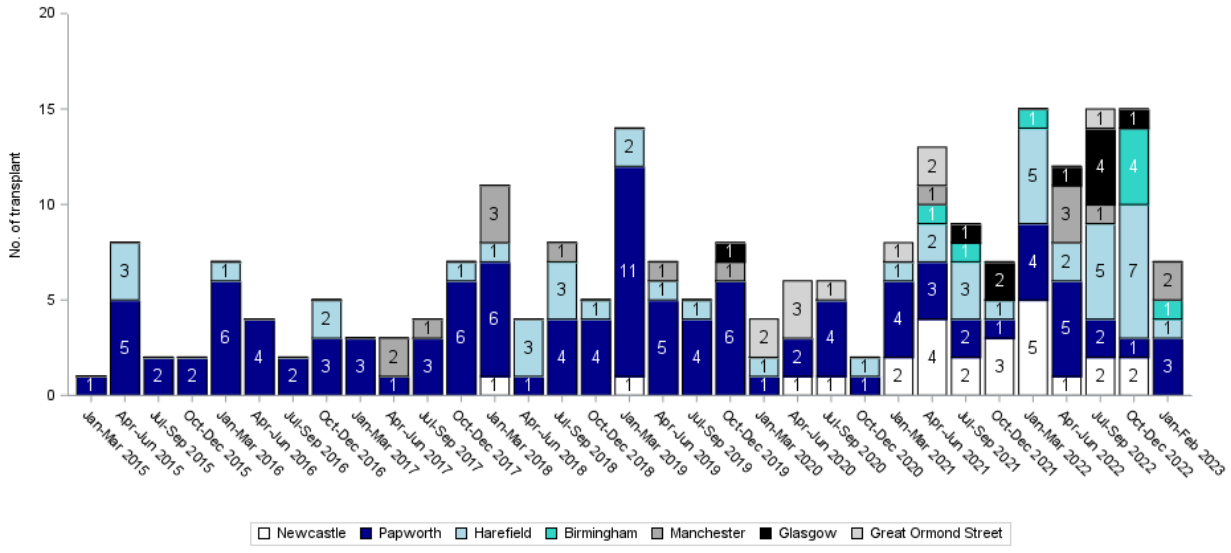
9 **Figure 1** shows the number of DCD heart retrievals by quarter and retrieval team. There has been a general increase over time. There have been 8 retrievals in the most recent quarter so far (January-February).

Figure 1 DCD heart retrieval activity, 1 February 2015 to 28 February 2023, by quarter and retrieval team



10 **Figure 2** shows the number of DCD heart transplants by quarter and transplanting centre. The highest number of transplants were performed between January-March 2022, July-September 2022, and October-December 2022 (15). The latest quarter is incomplete since data for March 2023 have not been included.

Figure 2 DCD heart transplant activity, 1 February 2015 to 28 February 2023, by quarter and transplant centre



Utilisation of other organs

11 Of the 114 DCD heart donors since the start of the JIF, one only donated their heart. Utilisation of other organs from these donors are displayed in **Table 4**, where utilisation rates are compared to the general DCD donor population who donated at least one organ. Overall, the transplantation rate of lungs, livers and pancreases was higher in DCD heart donors than from the general DCD donor population, whereas the rates were similar for kidneys.

Table 4 Abdominal and lung offer outcomes from 114 DCD heart donors during the period 7 September 2020 – 28 February 2023

Outcome	Lungs[1]	Kidney[1]	Liver	Pancreas
Offered	79	112	109	103
Retrieved	20	111	85	65
Transplanted (% of offered)	17 (22%)	108 (96%)	59 (54%)	30 (29%)
National DCD organ transplant rate (% of offered)[2]	13%	94%	44%	20%

[1] at least one
[2] DCD donors between 7 September 2020 – 28 February 2023, aged 16-50

Post-transplant survival and support

12 The 30-day outcomes of the 104 DCD heart transplant recipients since 7 September 2020 are summarised in **Table 5**. There have been four deaths within 30 days. Two recipients transplanted in February 2023 had missing survival data.

Table 5 DCD heart patient outcomes at 30 days post-transplant, by centre, for transplants performed 7 September 2020 – 28 February 2023

Centre	Alive at 30 days	Died within 30 days	Unknown
Birmingham	6	1	1
Glasgow	9	0	0
Great Ormond Street	5	0	0
Harefield	26	2	0
Manchester	7	0	0
Newcastle	20	1	0
Papworth	25	0	1
Total	**98**	**4**	**2**

13 **Figure 3** shows the Kaplan-Meier patient survival curves up to one year for DCD heart transplants since the start of the JIF. Survival for adult DBD heart only transplants is shown for comparison. Two patients with unknown post-transplant survival were excluded, nine paediatric transplants and two patients who had had a previous heart transplant were included. The survival rates at one year are presented in **Table 6**. There was no difference in one year survival for DCD transplants compared with DBD transplants (p=0.92).

Figure 3 Patient survival post- DCD heart transplant with DBD comparison, 7 September 2020 – 28 February 2022

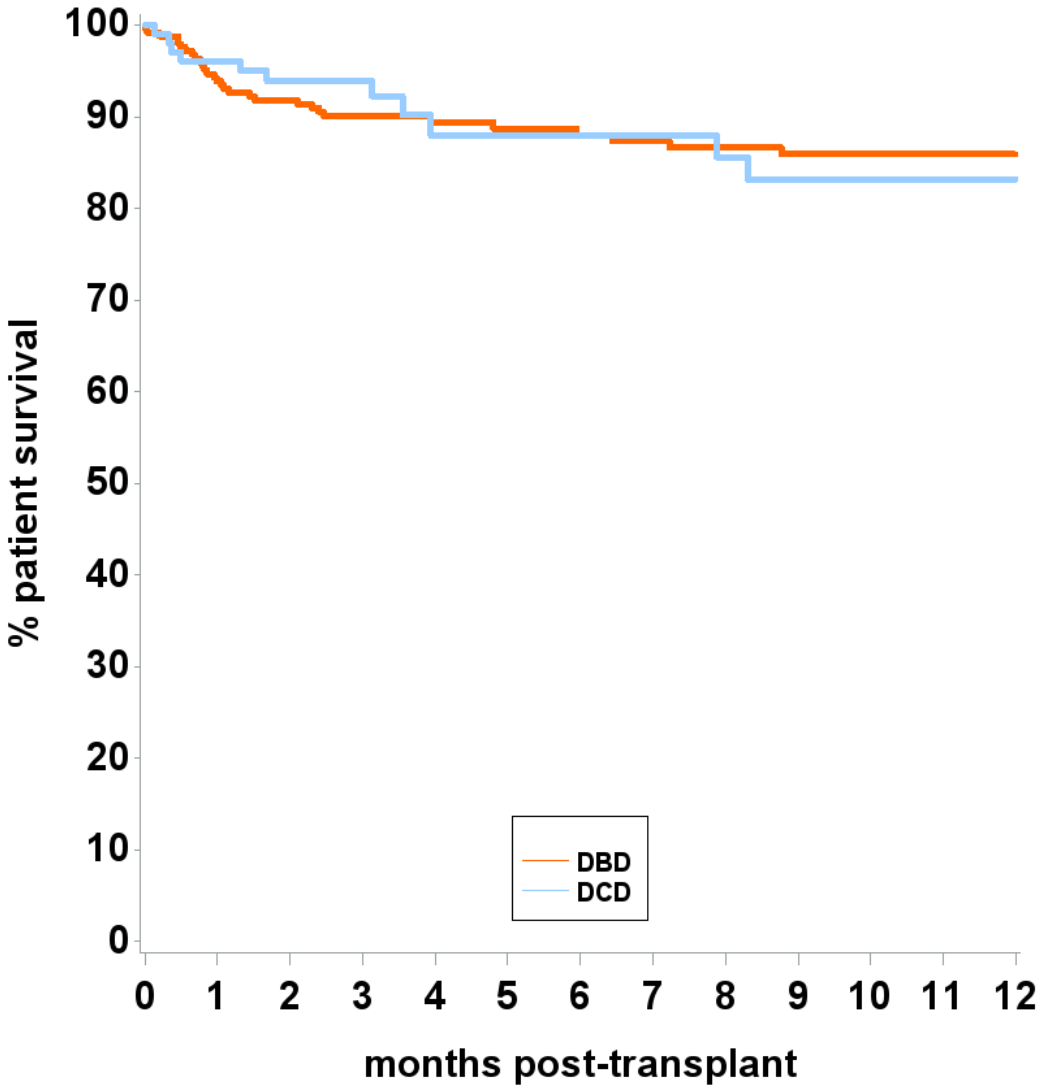


Table 6 1-year patient survival rates after DCD heart transplant compared with adult DBD heart transplant survival, 7 September 2020 – 28 February 2023

Donor type	Number of transplants	Number of deaths	1-year survival (95% CI)
DCD[1]	102	11	83.2 (70.3 – 90.8)
DBD[2]	245	30	85.9 (80.2 – 90.1)

[1] Includes 9 paediatric transplants and 2 re-transplants; excludes two patients with unknown survival
[2] Excludes paediatric recipients, re-grafts and multi-organ transplants

14 **Table 7** gives a breakdown of the urgency status of DCD heart recipients at the time of transplant for the period 7 September 2020 – 28 February 2023, split by centre. Overall, 62% of DCD heart transplants in this period were performed in urgent or super-urgent recipients, which is a lower proportion than DBD transplants (80%).

Table 7 Urgency status of DCD heart recipients, by centre, 7 September 2020 – 28 February 2023

Transplant centre	Non-urgent (%)	Urgent (%)	Super-urgent (%)	(% DBD* transplant urgent/super-urgent)
Birmingham	2 (25)	5 (63)	1 (12)	(85)
Glasgow	5 (56)	2 (22)	2 (22)	(69)
Great Ormond Street	3 (60)	0 (0)	2 (40)	(81)
Harefield	8 (29)	15 (54)	5 (18)	(84)
Manchester	2 (29)	5 (71)	0 (0)	(91)
Newcastle	8 (39)	9 (43)	4 (19)	(87)
Papworth	12 (46)	9 (35)	5 (19)	(69)
Total	**40 (38)**	**45 (44)**	**19 (18)**	**(80)**

* Includes paediatric recipients

15 The need for post-transplant mechanical support within 30 days is shown in **Table 8** along with the devices used. Information on whether mechanical support was needed was received for 101 of the 104 DCD heart transplants. Of these, 40 (38%) required support (including IABP only). There is some borderline evidence that this is higher than in DBD transplants (29%, p=0.07).

Table 8 Use of mechanical support within 30 days post-transplant, for DCD and DBD heart transplants performed 7 September 2020 – 28 February 2023

Mechanical support post-transplant	DCD	DBD*
Yes	40 (38%)	85 (29%)
-IABP only	6	27
-ECMO only	28	39
-VAD only	1	3
-ECMO and IABP	0	6
-VAD and IABP	0	0
-ST VAD and ECMO	3	9
-ST VAD, ECMO and IABP	0	1
-Unknown	2	0
No	61	211
Unknown	3	0
Total	**104**	**296**

* Includes paediatric recipients

DCD heart offering

16 **Table 9** shows a breakdown of the number of potential DCD donors whose heart was offered between 7 September 2020 and 28 February 2023 by heart allocation zone and whether the heart was accepted, retrieved, transplanted and if transplanted whether it was within zone. The 392 potential donors include 81 who did not donate any organs, it also includes 14 aged less than 16 whose heart was offered to paediatric centres first. Of the 392 hearts offered, 244 (62%) were accepted, 114 (29%) were retrieved and 104 (27%) were transplanted. The highest number of offers came from the Newcastle and Harefield zones.

Table 9 DCD hearts offered, accepted, retrieved, transplanted, and transplanted by heart allocation zone, 7 September 2020 – 28 February 2023

Allocation zone	Number of hearts offered	Number accepted	Number retrieved	Number transplanted	Number transplanted by zonal centre
Birmingham	47	27	12	12	5
Glasgow	28	12	7	4	2
Harefield	99	62	33	31	18
Manchester	55	29	14	12	5
Newcastle	99	68	28	27	14
Papworth	64	46	20	18	15
Total	**392**	**244**	**114**	**104**	**59 (57%)**

17 The 392 DCD hearts offered between 7 September 2020 and 28 February 2023 generated 1,598 offers. The results of these offers are shown in **Table 10**, split by centre. Each centre received 160-260 DCD heart offers, with all centres utilising at least one offer. The highest utilisation of offers was for Harefield and Papworth (11%).

Table 10 DCD heart offers made during 7 September 2020 – 28 February 2023, by centre and result

Centre	Offers	Declined		Accepted, not used		Accepted and used	
	N	N	%	N	%	N	%
Birmingham	200	171	86	21	11	8	4
Glasgow	165	145	88	11	7	9	5
Great Ormond Street	250	237	95	8	3	5	2
Harefield	255	183	72	44	17	28	11
Manchester	228	215	94	6	3	7	3
Newcastle	256	206	80	29	11	21	8
Papworth	244	168	69	50	20	26	11
Total	**1598**	**1325**	**83**	**169**	**11**	**104**	**7**

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Statistics and Clinical Research **April 2023**