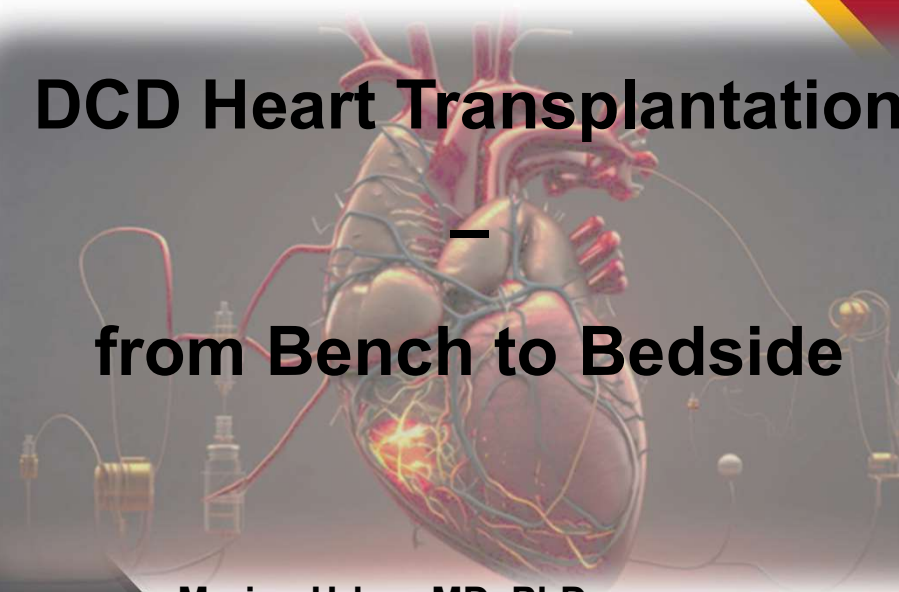


# DCD Heart Transplantation

## from Bench to Bedside



Marian Urban MD, PhD

3/8/2024

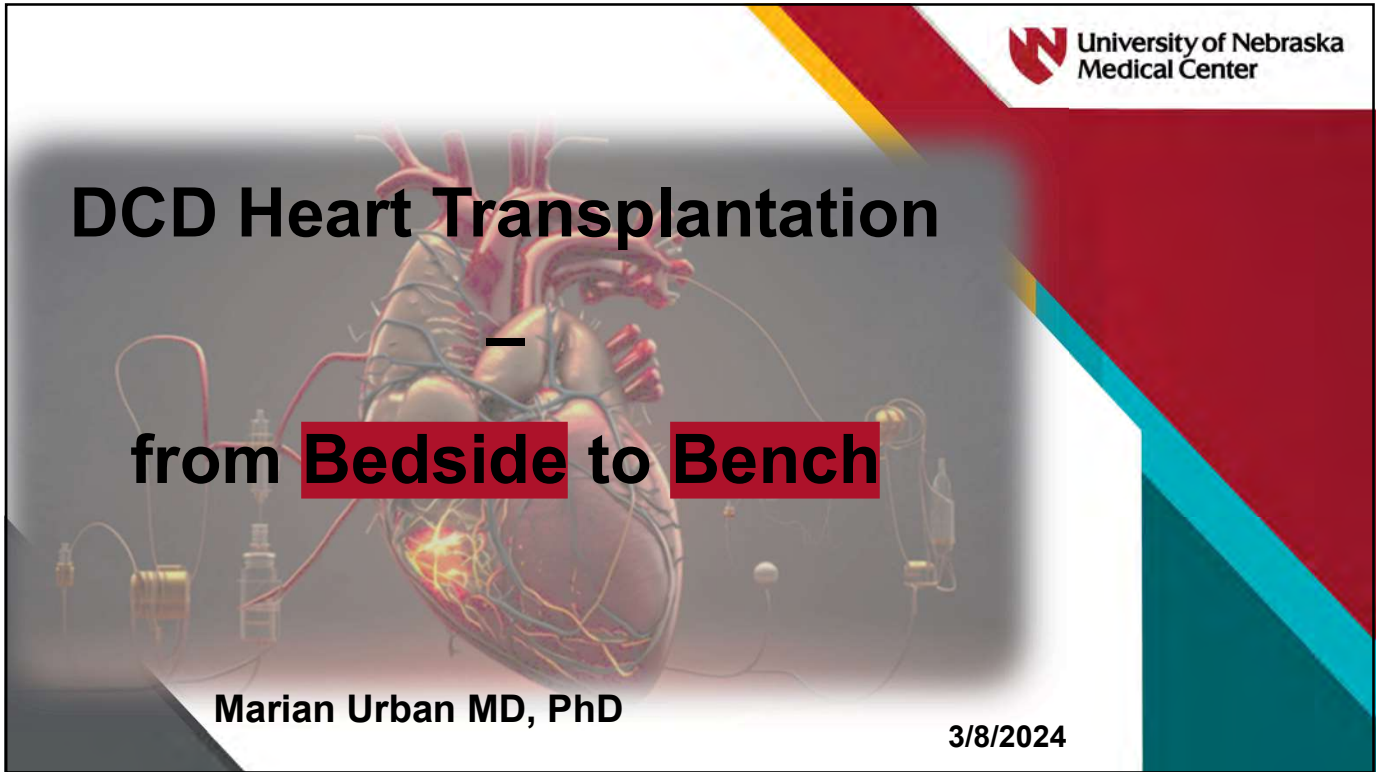
1



versus



2



The slide features a central 3D anatomical illustration of a human heart with various tubes and wires connected to it, set against a dark, semi-transparent background. The text is overlaid on this background. The University of Nebraska Medical Center logo is in the top right corner. The title 'DCD Heart Transplantation' is in large black font, followed by 'from Bedside to Bench' where 'Bedside' and 'Bench' are highlighted in red boxes. The presenter's name 'Marian Urban MD, PhD' and the date '3/8/2024' are at the bottom.

University of Nebraska Medical Center

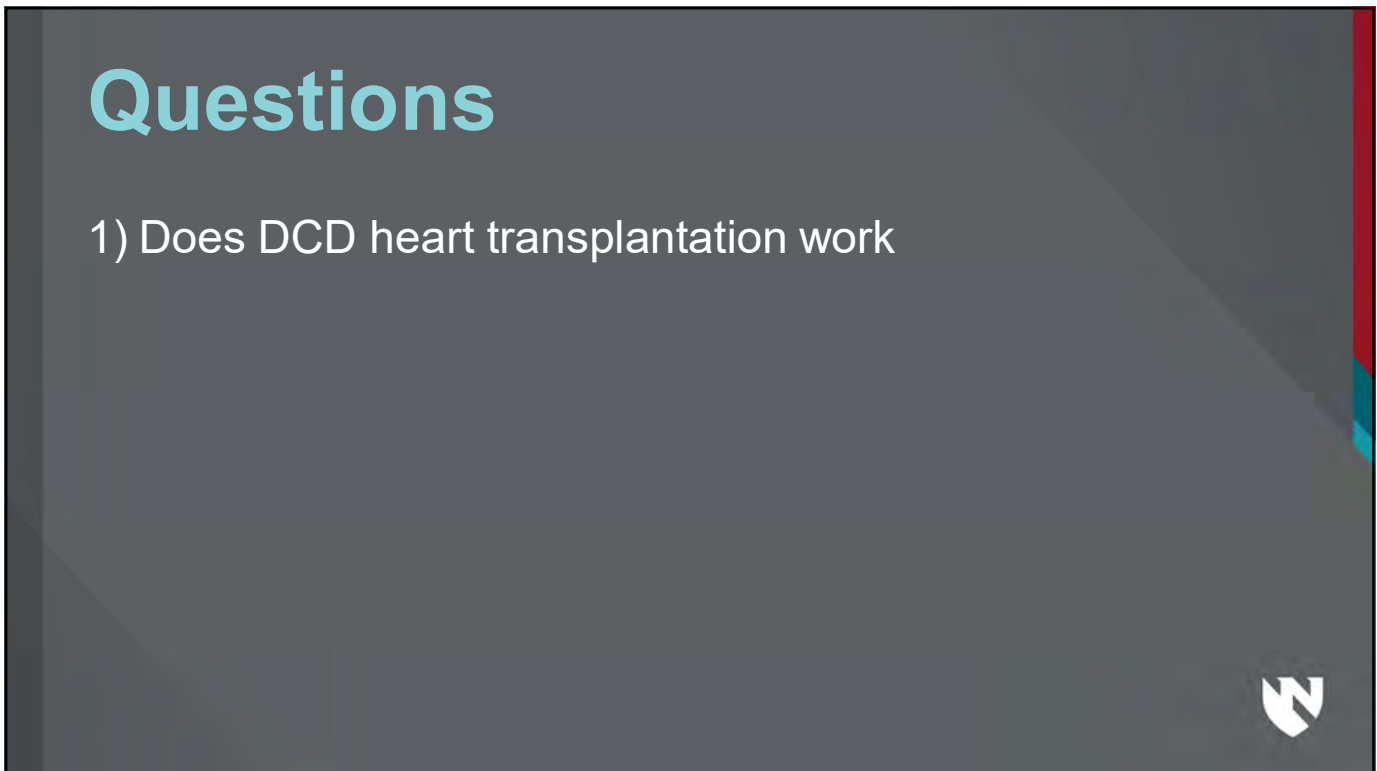
# DCD Heart Transplantation

from **Bedside** to **Bench**

Marian Urban MD, PhD

3/8/2024

3



The slide has a dark grey background with a white 'N' logo in the bottom right corner. The word 'Questions' is written in a large, light blue font. Below it, a single question is listed in white text.

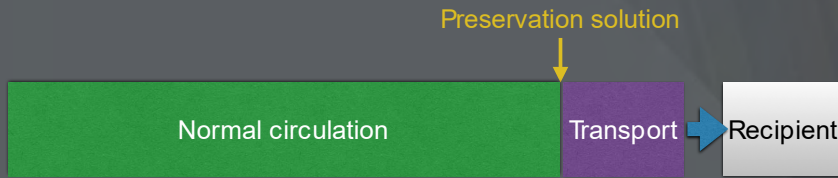
## Questions

1) Does DCD heart transplantation work

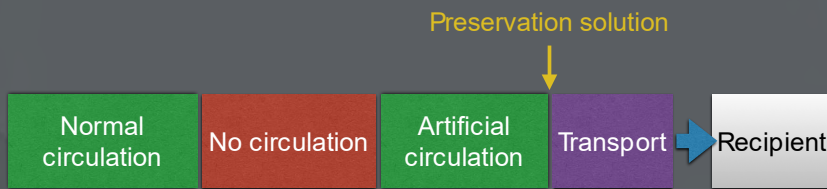
4

# Background

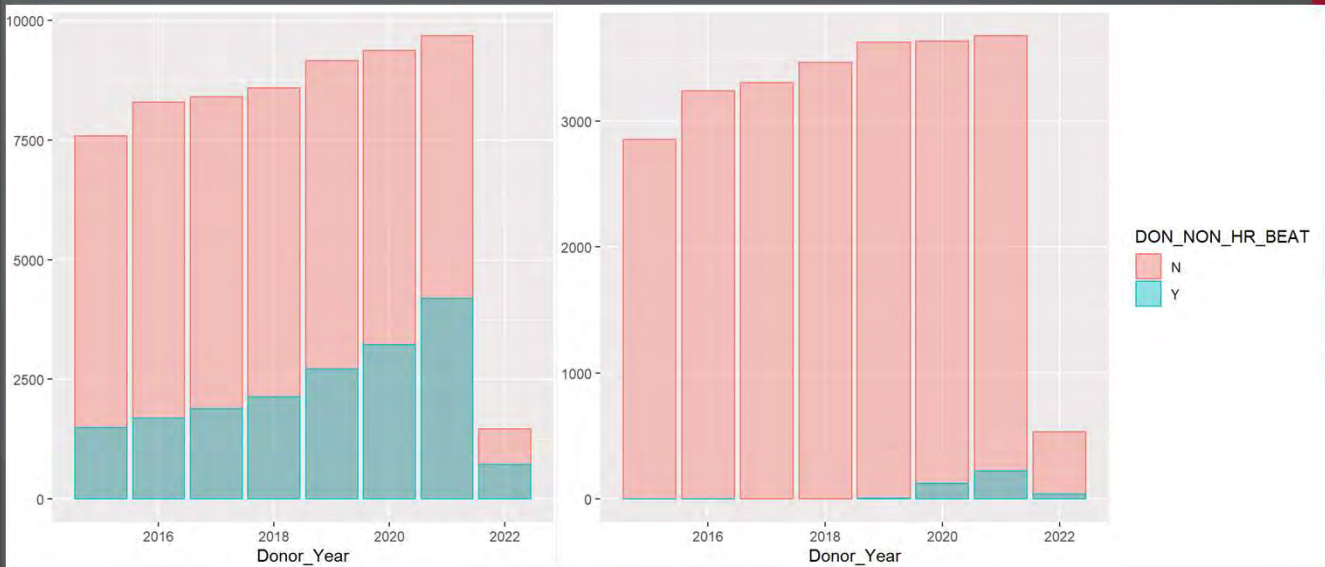
## Donation After Brain Death



## Donation After Circulatory Death



5



6

# Questions

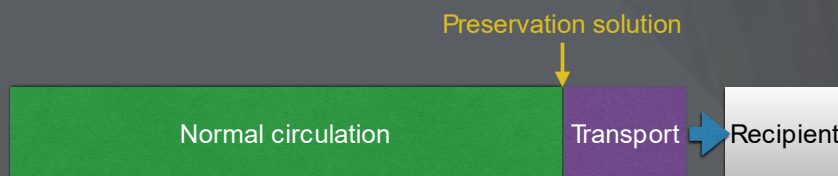
- 1) Does DCD heart transplantation work?
- 2) What are the parameters under which the DCD heart transplantation works? Do DCD heart grafts need to be resuscitated?



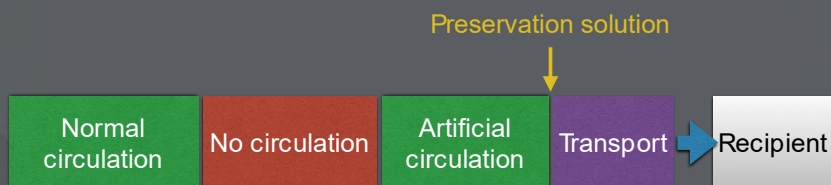
7

# Background

## Donation After Brain Death



## Donation After Circulatory Death



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TIME	HEART RATE/ RHYTHM	BLOOD PRESSURE/MAP	RR/SaO2
2117	85 SR	114/101	71 91
2118	85 SR	101/101	70 91
2119	85 ST	113/85	70 91
2120	85 ST	114/87	82 88 88
2121	85 ST	105/101	83 82 84
2122	85 ST	102/102	83 80 86
2123	107 ST	104/101	87 80 80
2124	107 ST	105/100	85 80 80
2125	85 ST	101/100	82 80 82
2126	85 ST	103/101	82 80 82
2127	105 ST	113/87	81 80 86
2128	105 ST	117/87	81 80 86
2129	101 ST	117/85	82 80 84
2130	105 ST	118/101	83 80 84
2131	105 ST	119/88	81 80 83
2132	105 ST	115/94	81 80 82
2133	105 ST	119/88	82 80 82
2134	110 ST	104/100	85 80 87
2135	112 ST	104/100	85 80 87
2136	117 ST	113/80	83 80 84
2137	85 ST	110/88	83 80 84
2138	85 ST	100/79	82 80 82
2139	118 ST	110/80	82 80 82
2140	116 ST	104/87	85 80 84
2141	112 ST	103/100	83 80 80
2142	108 ST	103/100	84 80 80
2143	118 ST	103/100	84 80 80
2144	117 ST	117/80	83 80 82
2145	118 ST	117/85	81 80 80
2146	118 ST	107/100	83 80 80
2147	112 ST	104/100	85 80 84
2148	118 ST	104/102	102 83 82
2149	111 ST	103/100	81 80 82
2150	115 ST	104/105	83 80 85
2151	120 ST	109/104	100 80 82
2152	117 ST	105/107	82 80 80
2153	118 ST	101/100	80 80 80
2154	114 ST	103/107	80 80 80

TIME	HEART RATE/ RHYTHM	BLOOD PRESSURE/MAP	RR/SaO2
2155	114 ST	107/105	81 80 82
2156	121 ST	102/104	114 80 118
2157	118 ST	117/101	100 80 104
2158	121 ST	101/100	100 80 104
2159	120 ST	100/111	114 80 110
2200	124 ST	101/100	95 80 100
2201	112 ST	100/102	90 80 110
2202	113 ST	100/100	98 80 108
2203	115 ST	100/100	101 80 107
2204	117 ST	101/104	100 80 105
2205	121 ST	100/100	110 80 104
2206	123 ST	101/107	112 80 112
2207	124 ST	102/104	112 80 112
2208	128 ST	102/105	110 80 105
2209	123 ST	100/104	107 80 104
2210	121 ST	100/100	102 80 105
2211	120 ST	100/104	100 80 104
2212	118 ST	100/107	98 80 104
2213	117 ST	101/107	98 80 104
2214	118 ST	100/107	95 80 104
2215	120 ST	100/105	94 80 104
2216	119 ST	100/102	94 80 107
2217	117 ST	100/104	90 80 104
2218	117 ST	100/103	91 80 104
2219	118 ST	101/100	93 80 104
2220	118 ST	100/103	91 80 104
2221	118 ST	100/103	90 80 104
2222	118 ST	100/102	90 80 104
2223	120 ST	100/102	89 80 105
2224	120 ST	100/102	88 80 107
2225	120 ST	100/101	87 80 104
2226	118 ST	100/101	87 80 104
2227	118 ST	100/101	87 80 104
2228	118 ST	100/101	85 80 107
2229	118 ST	100/100	84 80 104
2230	118 ST	100/100	83 80 104
2231	118 ST	100/101	83 80 104
2232	118 ST	100/102	83 80 104

TIME	HEART RATE/ RHYTHM	BLOOD PRESSURE/MAP	RR/SaO2
2233	121 ST	100/100	87 80 104
2234	123 ST	100/100	98 80 102
2235	123 ST	101/100	98 80 101
2236	123 ST	101/100	97 80 101
2237	124 ST	100/107	98 80 100
2238	124 ST	101/100	98 80 100
2239	124 ST	101/100	97 80 100
2240	124 ST	100/100	94 80 100
2241	123 ST	101/102	95 80 101
2242	123 ST	101/102	92 80 100
2243	123 ST	100/102	92 80 100
2244	123 ST	100/100	93 80 100
2245	123 ST	100/100	93 80 100
2246	123 ST	100/100	93 80 100
2247	123 ST	100/100	91 80 100
2248	125 ST	100/100	92 80 100
2249	125 ST	100/107	91 80 100
2250	125 ST	100/105	90 80 100
2251	125 ST	100/100	92 80 100
2252	128 ST	100/100	92 80 100
2253	128 ST	100/100	90 80 100
2254	128 ST	100/102	90 80 100
2255	128 ST	100/102	87 80 100
2256	128 ST	100/103	87 80 100
2257	128 ST	100/100	86 80 100
2258	128 ST	100/100	85 80 100
2259	128 ST	100/100	84 80 100
2300	128 ST	100/100	82 80 100
2301	128 ST	100/100	84 80 100
2302	128 ST	100/100	82 80 100
2303	128 ST	100/100	82 80 100
2304	128 ST	100/100	85 80 100
2305	128 ST	100/100	83 80 100
2306	128 ST	100/100	84 80 100
2307	128 ST	100/100	84 80 100
2308	128 ST	100/100	84 80 100
2309	128 ST	100/100	84 80 100
2310	128 ST	100/100	82 80 100

TIME	HEART RATE/ RHYTHM	BLOOD PRESSURE/MAP	RR/SaO2
2311	112 ST	81/100	57 80 48
2312	110 ST	78/103	54 80 52
2313	105 ST	74/104	51 80 54
2314	105 ST	67/100	46 80 54
2315	98 ST	67/100	39 80 54
2316	98 ST	63/100	35 80 54
2317	53 SR	50/101	32 80 54
2318	50 SR	46/100	30 80 54
2319	47 SR	38/103	25 80 42
2320	48 SR	28/101	21 80 54
2321	48 SR	23/100	21 80 54
2322	112 SR	110/100	12 80 54
2323	112 SR	110/100	12 80 54



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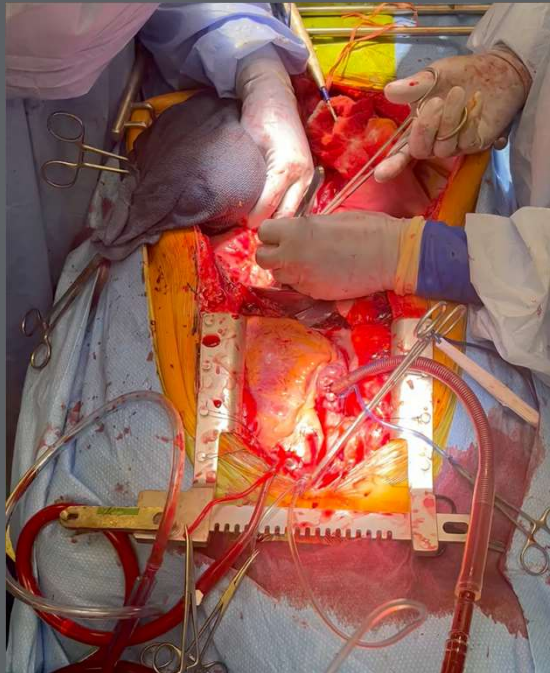


10

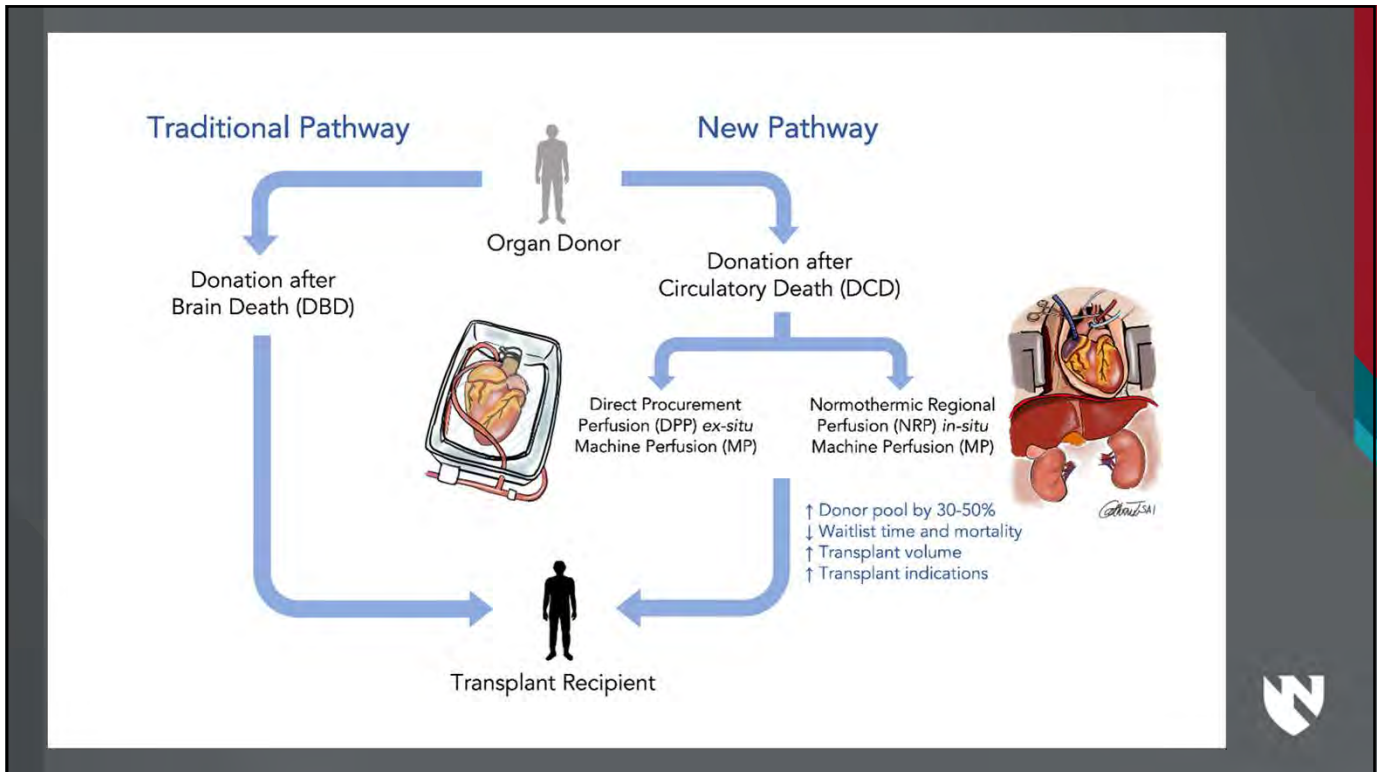
DCU Grid				
e/Time	Heart Rate	Blood Pressure	MAP	O2 Sat
06:37	91	113 / 71	85	97
06:38	91	114 / 72	86	97
06:39	94	113 / 72	86	97
06:40	99	112 / 71	85	95
06:41	101	100 / 52	68	93
06:42	104	103 / 61	75	77
06:43	102	88 / 48	61	56
06:44	84	55 / 27	36	51
06:45	54	43 / 21	28	47
06:46	46	40 / 23	29	48
06:47	50	61 / 53	56	46
06:48	43	70 / 56	61	47
06:49	54	83 / 69	67	44
06:50	57	85 / 59	68	43
06:51	35	91 / 56	68	44
06:52	35	87 / 55	66	43
06:53	39	50 / 50	50	43
06:54	28	47 / 40	42	47
06:55	25	28 / 28	28	0
06:56	19	28 / 28	28	0
06:57	0	0 / 0	0	0
07:01		/	0	
08:32		/	0	



11



12



13

## Questions

- 1) Does DCD heart transplantation work?
- 2) What are the parameters under which the DCD heart transplantation works? Do DCD heart grafts need to be resuscitated?
- 3) What is the best procurement technique?

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# Transport/ Storage

Preserve the organ during transport from a recovery hospital to an implant center



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# Ischemic heart preservation

Static cold storage with ice



Controlled static cold storage



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# Non - Ischemic heart preservation

## Normothermic

Trans-medics



## Hypothermic

XVIVO



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# Questions

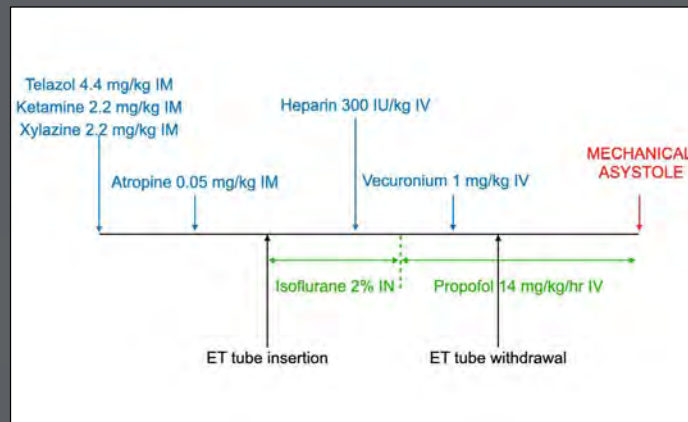
- 1) Does DCD heart transplantation work
- 2) What are the parameters under which the DCD heart transplantation would work. Do DCD heart grafts need to be resuscitated
- 3) What is the best procurement technique?
- 4) What is the optimal transport method of DCD grafts?



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# Methods

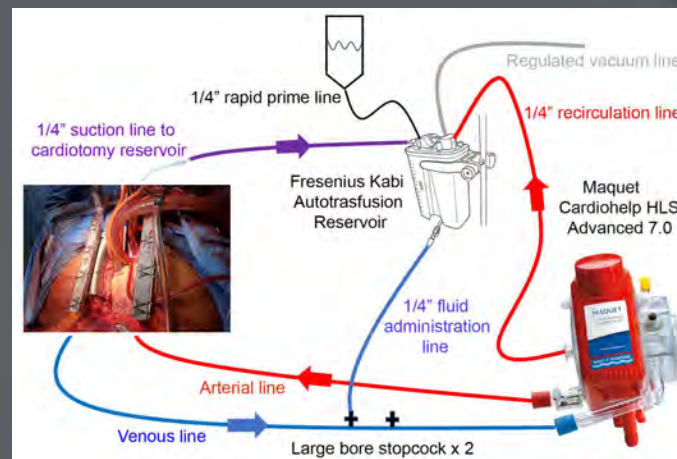
## Porcine model of hypoxic cardiac arrest



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# Methods

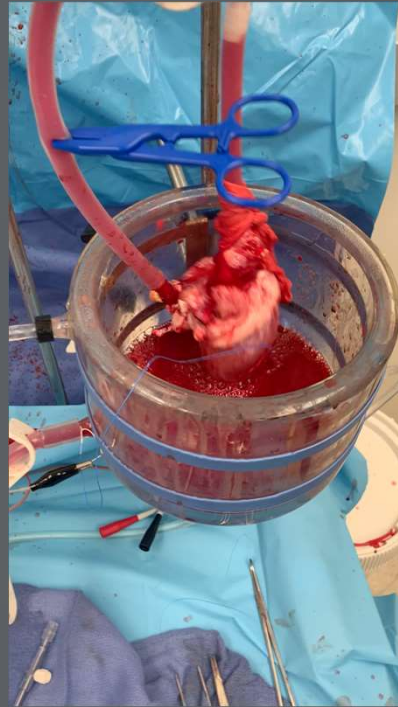
## In-situ DCD heart reanimation



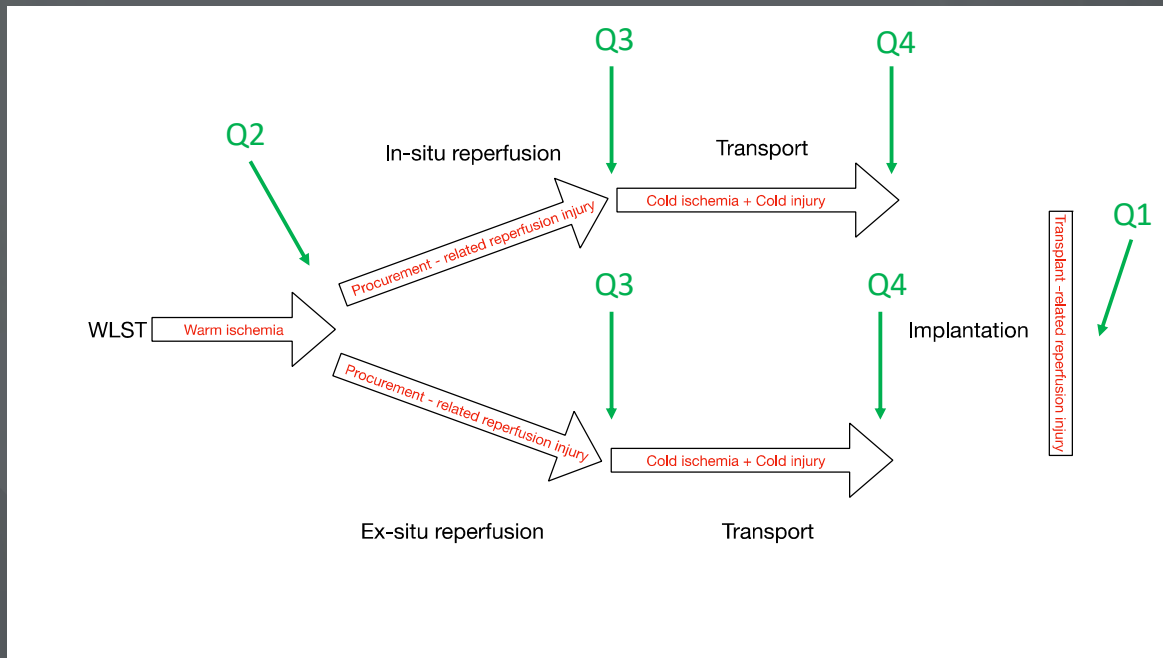
20

# Methods

Ex-situ DCD heart reanimation



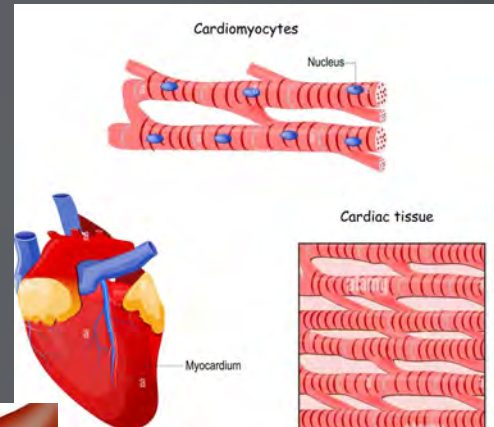
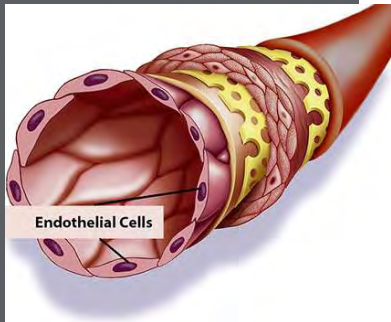
21



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# Graft function

- 1) Happy functioning cardiomyocyte
- 2) Endothelium



23

# Methods

1. Cell morphology and structure
2. Cell function
3. Cell energetics



24

