



A Novel Extracorporeal CO₂ Removal System

Results of a Pilot Study of Hypercapnic Respiratory Failure in Patients With COPD

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e-Table 1.

| Site and IRB Protocol Code | Ethics Committee |
|---|--|
| Artemis Health Institute Code QSD-230-023, HL-CA-2000 | Artemis Health Sciences IRB Artemis Health Institute Sector 51, Gurgaon, Harayna India |
| Thoraxklinik Heidelberg Code 09/2176, HL-CA-1000 | Freiburger Ethik-Kommission GmbH International Mozartstraße 21 D-79104 Freiburg |
| Asklepios Barmbek Hamburg Code 09/2176, HL-CA-1000 | Ethik-Kommission der Ärztekammer Hamburg Humboldtstr. 67a 22083 Hamburg |
| Ruhrlandklinik Essen Code 09/2176, HL-CA-1000 | Ethik-Kommission der Medizinische Fakultät der Universität Duisberg-Essen Universitätsklinikum Robert-Koch-Strasse 9-11, 2. Stock 45147 Essen |
| Klinik Donaustauf Donaustauf Code 09/2176, HL-CA-1000 | Ethikkommission der Medizinischen Fakultät der Universität Regensburg Klinikum der Universität Regensburg Franz-Josef-Strauß Allee 11 93053 Regensburg |
| Krankenhaus Bethanien Solingen Code 09/2176, HL-CA-1000 | Ethik-Kommission der Universität Witten/Herdecke Alfred-Herrhausen-Str. 50 58448 Witten |

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e-Table 2. Blood Values at Baseline (BL) and subsequent time points after institution of ECCO2R

Hemoglobin Levels (g/dL)
(Normal range Males 13.5 – 17.2 G/dL; Females 12.0 – 15.2 G/dL)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|-------|-------|-------|-------|-------|------|-------|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| Group 1 | | | | | | | | |
| 1 | 9.30 | 8.40 | 7.99 | | X | X | X | X |
| 2 | 13.79 | 11.91 | 10.51 | X | X | X | X | X |
| 3 | 13.00 | 8.80 | 11.80 | 10.80 | 9.20 | 9.00 | 5.90 | X |
| 4 | 8.60 | 7.70 | 9.20 | 9.40 | 9.20 | 9.20 | 8.90 | X |
| 5 | 12.09 | 11.50 | 10.30 | 9.86 | 9.80 | 8.30 | X | X |
| 6 | 10.80 | X | X | X | X | X | X | X |
| 7 | 14.90 | 13.20 | 13.50 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 10.40 | 8.10 | 9.50 | X | X | X | X | X |
| 2 | 9.90 | | 9.60 | 8.50 | 9.70 | 9.70 | 8.70 | 10.30 |
| GROUP 3 | | | | | | | | |
| 1 | 9.40 | 10.40 | 10.30 | 9.60 | 9.70 | 9.20 | 9.70 | 9.60 |
| 2 | 10.50 | 10.10 | 9.70 | 8.70 | 10.40 | 10.70 | 9.60 | 10.20 |
| 3 | 9.70 | 7.60 | 7.10 | 9.80 | 8.10 | X | X | X |
| 4 | 8.70 | X | X | X | X | X | X | X |
| 5 | 9.99 | 8.06 | 7.73 | 7.73 | X | X | X | X |
| 6 | 7.70 | 10.80 | 10.01 | 9.89 | 9.35 | 9.51 | 8.89 | 8.60 |
| 7 | 8.80 | 9.39 | X | X | X | X | X | X |
| 8 | 10.01 | | | 7.40 | 9.30 | 9.01 | 9.10 | 8.89 |
| 9 | 10.10 | 7.49 | 8.60 | 8.89 | 10.80 | 10.70 | X | X |
| 10 | 9.35 | 9.10 | 9.39 | 9.39 | X | X | X | X |
| 11 | 10.80 | 9.60 | 9.70 | 8.80 | 9.01 | 8.30 | X | X |

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Platelet Count (Gpt/l)
(Normal range 140 – 380/nL)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|-----|-----|-----|-----|-----|-----|-----|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| GROUP 1 | | | | | | | | |
| 1 | 320 | 270 | 199 | X | X | X | X | X |
| 2 | 140 | 85 | 70 | X | X | X | X | X |
| 3 | 135 | 106 | 84 | 97 | 94 | 88 | 45 | X |
| 4 | 246 | 168 | 161 | 134 | 112 | 114 | 93 | X |
| 5 | 276 | 142 | 119 | 112 | 108 | 85 | X | X |
| 6 | 177 | X | X | X | X | X | X | X |
| 7 | 223 | 138 | 116 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 277 | 146 | 108 | X | X | X | X | X |
| 2 | 334 | | 297 | 256 | 199 | 217 | 212 | 167 |
| GROUP 3 | | | | | | | | |
| 1 | 235 | 242 | 231 | 213 | 219 | 218 | 224 | 233 |
| 2 | 276 | 171 | 156 | 136 | 109 | 113 | 101 | 99 |
| 3 | 190 | 177 | 160 | 93 | 98 | X | X | X |
| 4 | 281 | X | X | X | X | X | X | X |
| 5 | 182 | 89 | 103 | 94 | X | X | X | X |
| 6 | 270 | 202 | 178 | 150 | 129 | 110 | 104 | 110 |
| 7 | 437 | 299 | X | X | X | X | X | X |
| 8 | 413 | | | 228 | 204 | 198 | 200 | 194 |
| 9 | 235 | 137 | 97 | 106 | 97 | 71 | X | X |
| 10 | 160 | 161 | 130 | 106 | X | X | X | X |
| 11 | 345 | 221 | 247 | 226 | 158 | 148 | X | X |

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Plasma Free Hemoglobin (mg/dL)
(Normal <40mg/dL)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|------|------|------|------|------|------|------|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| GROUP 3 | | | | | | | | |
| 1 | 15.8 | 17.6 | 27.1 | 29.1 | X | X | X | X |
| 2 | 37.5 | 24.1 | 25.6 | X | X | X | X | X |
| 3 | 20.0 | 30.0 | 23.0 | 21.0 | 16.0 | 18.0 | X | X |
| 4 | | 10.0 | 8.0 | 9.6 | 8.0 | 27.0 | 18.0 | X |
| 5 | 6.5 | 1.3 | 0.9 | 1.0 | | 4.2 | X | X |
| 6 | 17.1 | X | X | X | X | X | X | X |
| 7 | | 5.3 | 45.0 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 7.0 | | 10.0 | X | X | X | X | X |
| 2 | | | 12.0 | 22.0 | 14.0 | 16.0 | 13.0 | 13.0 |
| GROUP 3 | | | | | | | | |
| 1 | 9.0 | 16.0 | 10.0 | 9.0 | 10.0 | 10.0 | 17.0 | |
| 2 | | 25.0 | 21.0 | 14.0 | 45.0 | 55.0 | | 25.0 |
| 3 | | | 35.0 | | X | X | X | X |
| 4 | | X | X | X | X | X | X | X |
| 5 | 26.1 | 17.7 | 9.2 | 12.2 | X | X | X | X |
| 6 | | 10.4 | 7.4 | 29.1 | 9.4 | 11.0 | 8.7 | 8.6 |
| 7 | 17.7 | 16.8 | X | X | X | X | X | X |
| 8 | | | | | | | | |
| 9 | | | | | 12.8 | 6.6 | X | X |
| 10 | 2.7 | 2.9 | 6.0 | 6.1 | X | X | X | X |
| 11 | 6.2 | 3.1 | 39.8 | 5.3 | | 4.2 | X | X |

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Serum Creatinine (mg/dL)
(Normal range 0.6 – 1.2 mg/dL)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|-----|-----|-----|-----|-----|-----|-----|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| GROUP 1 | | | | | | | | |
| 1 | 2.1 | 2.2 | 2.1 | 1.8 | X | X | X | X |
| 2 | 0.7 | 0.5 | 0.5 | X | X | X | X | X |
| 3 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | X |
| 4 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 1.0 | 0.9 | X |
| 5 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.8 | X | X |
| 6 | 0.5 | X | X | X | X | X | X | X |
| 7 | 1.0 | 0.6 | 0.5 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 0.4 | 0.5 | 0.4 | X | X | X | X | X |
| 2 | 0.5 | | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.4 |
| GROUP 3 | | | | | | | | |
| 1 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.7 | 0.7 | 0.7 |
| 2 | 1.3 | 1.0 | 0.9 | 1.0 | 1.3 | 1.5 | 1.9 | 1.8 |
| 3 | 0.6 | 0.6 | 1.1 | 1.4 | 1.1 | X | X | X |
| 4 | 0.4 | X | X | X | X | X | X | X |
| 5 | 0.8 | 0.7 | 0.6 | 0.6 | X | X | X | X |
| 6 | 0.6 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 7 | 1.1 | 1.1 | X | X | X | X | X | X |
| 8 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| 9 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | X | X |
| 10 | 0.8 | 1.0 | 0.9 | 0.9 | X | X | X | X |
| 11 | 0.7 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | X | X |

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Serum Alanine Transaminase (ALT) (u/L)
(Normal range Males <50 u/L; Females <35 u/L)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|-------|-------|-------|------|------|-------|-------|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| GROUP 1 | | | | | | | | |
| 1 | 364.7 | 205.8 | 100.2 | 55.8 | X | X | X | X |
| 2 | 25.8 | 18.0 | | X | X | X | X | X |
| 3 | 28.2 | | | | | | X | X |
| 4 | 29.0 | 23.0 | | | | | | X |
| 5 | 15.6 | 17.8 | 15.0 | 18.9 | 31.2 | 34.2 | X | X |
| 6 | 18.7 | X | X | X | X | X | X | X |
| 7 | 18.0 | 138.0 | 115.8 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 13.0 | 10.0 | 11.0 | X | X | X | X | X |
| 2 | 44.0 | | 34.0 | 34.0 | 33.0 | 41.0 | 32.0 | 31.0 |
| GROUP 3 | | | | | | | | |
| 1 | 62.0 | 126.0 | 90.0 | 60.0 | 61.0 | 81.0 | 136.0 | 124.0 |
| 2 | 309.0 | 212.0 | 160.0 | 102.0 | 96.0 | 75.0 | 65.0 | 57.0 |
| 3 | 40.0 | | 96.9 | 75.9 | X | X | X | X |
| 4 | 106.2 | X | X | X | X | X | X | X |
| 5 | 66.0 | 67.8 | 57.0 | 49.2 | X | X | X | X |
| 6 | 22.0 | 27.0 | 27.0 | 22.8 | 25.8 | 31.2 | 37.2 | 34.8 |
| 7 | 64.2 | 37.8 | X | X | X | X | X | X |
| 8 | 18.0 | 13.2 | 10.8 | 10.8 | 10.2 | 10.8 | 13.2 | 16.2 |
| 9 | 54.0 | 48.0 | 39.0 | 49.8 | 60.0 | 63.0 | X | X |
| 10 | 75.0 | 54.0 | 52.8 | 58.2 | X | X | X | X |
| 11 | 12.0 | 10.8 | 10.8 | 9.0 | 9.0 | 13.2 | X | X |

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Serum Aspartate transaminase (AST) (U/L)
(Normal range Males <50 u/L; Females <35 u/L)

| Subject ID | Hours from Hemolung Start | | | | | | | |
|------------|---------------------------|-------|------|------|------|------|-------|-------|
| | BL | 24 | 48 | 72 | 96 | 120 | 144 | 168 |
| GROUP 1 | | | | | | | | |
| 1 | 268.7 | 66.0 | 40.2 | 25.8 | X | X | X | X |
| 2 | 19.8 | 16.8 | | X | X | X | X | X |
| 3 | 31.2 | | | | | | X | X |
| 4 | 20.0 | 19.0 | | | | | | X |
| 5 | 18.6 | 34.6 | 24.6 | 25.8 | 31.2 | 49.2 | X | X |
| 6 | 23.0 | X | X | X | X | X | X | X |
| 7 | 31.8 | 73.8 | 45.0 | X | X | X | X | X |
| GROUP 2 | | | | | | | | |
| 1 | 15.0 | 22.0 | 23.0 | X | X | X | X | X |
| 2 | 27.0 | | 37.0 | 48.0 | 48.0 | 77.0 | 56.0 | 46.0 |
| GROUP 3 | | | | | | | | |
| 1 | 45.0 | 164.0 | 58.0 | 38.0 | 50.0 | 84.0 | 138.0 | 102.0 |
| 2 | 210.0 | 110.0 | 60.0 | 40.0 | 47.0 | 65.0 | 72.0 | 49.0 |
| 3 | 41.0 | | 47.0 | 40.0 | 27.0 | X | X | X |
| 4 | 28.8 | X | X | X | X | X | X | X |
| 5 | 37.2 | 40.8 | 39.0 | 34.8 | X | X | X | X |
| 6 | 14.0 | 29.0 | 25.2 | 21.0 | 25.8 | 25.8 | 31.2 | 25.8 |
| 7 | 46.8 | 37.8 | X | X | X | X | X | X |
| 8 | 16.8 | 13.8 | 9.0 | 12.0 | 10.8 | 13.8 | 13.8 | 16.2 |
| 9 | 31.2 | 34.8 | 28.2 | 43.2 | 46.2 | 39.0 | X | X |
| 10 | 25.2 | 19.8 | 25.2 | | X | X | X | X |
| 11 | 10.2 | 10.2 | 13.8 | 7.8 | 9.0 | 13.2 | X | X |

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Serum Bilirubin, mg/dl
(Normal range 0.1 – 1.2 mg/dL)

| Subject | baseline | 24 Hrs | 48 Hrs | 72 Hrs | 96 Hrs | 120 Hrs | 144 Hrs | 168 Hrs |
|---------|----------|--------|--------|--------|--------|---------|---------|---------|
| Group 1 | | | | | | | | |
| 1 | 0.20 | 0.90 | 1.00 | 1.00 | | | | |
| 2 | 0.90 | 1.00 | | | | | | |
| 3 | 0.42 | | | | | | | |
| 4 | 0.45 | 0.60 | | 1.00 | 0.95 | | | |
| 5 | 0.48 | 1.37 | 0.93 | | | 1.60 | | |
| 6 | 0.67 | | | | | | | |
| 7 | 0.45 | 0.72 | 0.67 | | | | | |
| Group 2 | | | | | | | | |
| 1 | 0.22 | 0.30 | 0.31 | | | | | |
| 2 | 0.37 | | 0.80 | 0.80 | 0.77 | 0.83 | 0.65 | 0.65 |
| Group 3 | | | | | | | | |
| 1 | 0.27 | 0.56 | 0.92 | 1.50 | 1.13 | 0.88 | 0.84 | 0.69 |
| 2 | 0.64 | 0.61 | 0.46 | 0.44 | 0.74 | 0.77 | 1.26 | 1.10 |
| 3 | 0.20 | 0.50 | 0.60 | 0.50 | 0.40 | | | |
| 4 | | | | | | | | |
| 5 | 0.60 | 0.47 | 0.55 | 0.64 | | | | |
| 6 | | 0.24 | 0.22 | 0.21 | 0.23 | 0.23 | 0.21 | 0.24 |
| 7 | 0.30 | 0.40 | | | | | | |
| 8 | | | | | | | | |
| 9 | 0.55 | 0.39 | 0.56 | 0.65 | 1.02 | 0.62 | | |
| 10 | 0.25 | 0.33 | 0.39 | 0.69 | | | | |
| 11 | 0.60 | 0.53 | 0.33 | 0.42 | 0.38 | 0.38 | | |

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