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AWAreness during REsuscitation - II: A multi-center study of consciousness and awareness in cardiac arrest

再生術期間的驚歎 - II：心臟驟停中意識和意識的多中心研究

Sam Parnia[1],Tara Keshavarz Shirazi[2],Jignesh Patel[3],Linh Tran[3],Niraj Sinha[3],Caitlin O'Neill[2],Emma Roellke[2],Amanda Mengotto[2],Shannon Findlay[4],Michael McBrine[5],Rebecca Spiegel[6],Thaddeus Tarpey[7],Elise Huppert[2],Ian Jaffe[2],Anelly M Gonzales[2],Jing Xu[2],Emmeline Koopman[2],Gavin D Perkins[8],Alain Vuylsteke[9],Benjamin M Bloom[10],Heather Jarman[11],Hiu Nam Tong[12],Louisa Chan[13],Michael Lyaker[14],Matthew Thomas[15],Veselin Velchev[16],Charles B Cairns[17],Rahul Sharma[18],Erik Kulstad[19],Elizabeth Scherer[20],Terence O'Keeffe[21],Mahtab Foroozesh[22],Olumayowa Abe[23],Chinwe Ogedegbe[24],Amira Girgis[25],Deepak Pradhan[3],Charles D Deakin[26]

@[1]Critical Care and Resuscitation Research Program, New York University Grossman School of Medicine, NYU Langone Health, New York, NY, USA. Electronic address: sam.parnia@nyulangone.org.

- [2]Critical Care and Resuscitation Research Program, New York University Grossman School of Medicine, NYU Langone Health, New York, NY, USA.
- [3]Division of Pulmonary, Critical Care and Sleep Medicine, Stony Brook University Hospital, Long Island, NY, USA.
- [4]Department of Emergency Medicine, University of Iowa Hospital, Iowa, USA.
- [5]Department of Pulmonary, Critical Care and Sleep Medicine, Tufts University School of Medicine, MA, USA.
- [6]Stony Brook Level 4 Epilepsy Center at the School of Medicine Stony Brook University, Long Island, NY, USA.
- [7]Department of Population Health, New York University Grossman School of Medicine, New York, NY, USA.

- [8]Warwick Clinical Trials Unit, Warwick Medical School, University of Warwick, Coventry CV4 7AL, UK; Critical Care Unit, Birmingham Heartlands Hospital, Birmingham B9 5SS, UK.
- [9]Department of Surgery, Transplant and Anaesthetics, Royal Papworth Hospital NHS Foudnation Trust, Cambridge, UK.
- [10]Department of Emergency Medicine, Royal London Hospital, Barts Health NHS Trust, London, UK; Department of Emergency Medicine, Whipps Cross Hospital, Barts Health NHS Trust, London, UK; Department of Emergency Medicine, Newham Hospital, Barts Health NHS Trust, London, UK.
- [11]Emergency Department, St George's University Hospitals NHS Foundation Trust, London SW17 0QT, UK.
- [12]Queen Elizabeth Hospital King's Lynn NHS Foundation Trust, King's Lynn, UK.
- [13]Department of Emergency Medicine and Department of Intensive Care, Hampshire Hospitals NHS Foundation Trust, Hampshire, UK.
- [14]Department of Anesthesiology, Ohio State University Wexner Medical Center, Columbus, OH, USA.
- [15]Department of Critical Care Medicine, University Hospitals Bristol and Weston NHS Foundation Trust, Bristol, UK.
- [16]Department of Anesthesiology and Intensive Care, St. Anna University Hospital, Sofia, Bulgaria.
- [17]Department of Medicine and Emergency Medicine, Drexel University College of Medicine, Philadelphia, PA, USA.
- [18]Department of Emergency Medicine, Weill Cornell Medicine, New York, NY, USA.
- [19]Department of Emergency Medicine, UT Southwestern Medical Center, Dallas, TX, USA.
- [20]Division of Trauma and Emergency Surgery, Department of Surgery, UT Health San Antonio, San Antonio, TX, USA.
- [21]Division of Trauma/Surgical Critical Care/General Surgery, Department of Surgery, Augusta University Medical Center, Augusta, GA, USA.
- [22]Pulmonary, Critical Care Medicine and Sleep Medicine Section, Department of Medicine, Virginia Tech Carilion School of Medicine, Roanoke, VA, USA.
- [23]Division of Critical Care Medicine, NewYork-Presbyterian Queens Hospital, New York, NY, USA.
- [24]Department of Emergency Medicine, Hackensack Meridian School of Medicine, Nutley, NJ, USA.
- [25]Department of Anesthetics and Acute Pain, Kingston Hospital NHS Foundation Trust, Surrey, UK.

- [26]University Hospital Southampton NHS Foundation Trust, Southampton SO16 6YD, UK.

Abstract

Introduction: Cognitive activity and awareness during cardiac arrest (CA) are reported but ill understood. This first of a kind study examined consciousness and its underlying electrocortical biomarkers during cardiopulmonary resuscitation (CPR).

Methods: In a prospective 25-site in-hospital study, we incorporated a) independent audiovisual testing of awareness, including explicit and implicit learning using a computer and headphones, with b) continuous real-time electroencephalography(EEG) and cerebral oxygenation(rSO_2) monitoring into CPR during in-hospital CA (IHCA). Survivors underwent interviews to examine for recall of awareness and cognitive experiences. A complementary cross-sectional community CA study provided added insights regarding survivors' experiences.

Results: Of 567 IHCA, 53(9.3%) survived, 28 of these (52.8%) completed interviews, and 11(39.3%) reported CA memories/perceptions suggestive of consciousness. Four categories of experiences emerged: 1) emergence from coma during CPR (CPR-induced consciousness [CPRIC]) 2/28(7.1%), or 2) in the post-resuscitation period 2/28(7.1%), 3) dream-like experiences 3/28(10.7%), 4) transcendent recalled experience of death (RED) 6/28(21.4%). In the cross-sectional arm, 126 community CA survivors' experiences reinforced these categories and identified another: delusions (misattribution of medical events). Low survival limited the ability to examine for implicit learning. Nobody identified the visual image, 1/28(3.5%) identified the auditory stimulus. Despite marked cerebral ischemia (Mean rSO_2 = 43%) normal EEG activity (delta, theta and alpha) consistent with consciousness emerged as long as 35-60 minutes into CPR.

Conclusions: Consciousness. awareness and cognitive processes may occur during CA. The emergence of normal EEG may reflect a resumption of a network-level of cognitive activity, and a biomarker of consciousness, lucidity and RED (authentic "near-death" experiences)

介紹： 心臟驟停 （CA） 期間的認知活動和意識有報導，但知之甚少。這項首創的研究檢查了心肺復甦 （CPR） 期間的意識及其潛在的皮層電生物標誌物。

方法： 在一項前瞻性 25 個地點的院內研究中，我們結合了 a） 獨立的意識視聽測試，包括使用計算機和耳機的顯性和隱性學習，以及 b） 連續即時腦電圖（EEG） 和腦氧合 （rSO_2） 在院內 CA （IHCA） 期間監測 CPR。倖存者接受了訪談，以檢查對意識和認知體驗的回憶。一項互補的橫斷面社區 CA 研究提供了有關倖存者經歷的更多見解。

結果： 在 567 例 IHCA 中，53 例 （9.3%） 存活，其中 28 例 （52.8%） 完成了訪談，

11 例 （39.3%） 報告了提示意識的 CA 記憶/感知。出現了四類經歷：

1） 在 CPR 期間從昏迷中醒來（CPR 誘導意識 [CPRIC]）2/28 （7.1%），或 2） 復甦後 2/28 （7.1%），

3） 夢境般的經歷 3/28 （10.7%），

4） 超然的死亡回憶經歷 （RED） 6/28 （21.4%）。

在橫斷面組中，126 名社區 CA 倖存者的經歷強化了這些類別並確定了另一個類別：妄想（醫療事件的錯誤歸因）。低生存率限制了檢查內隱學習的能力。沒有人識別視覺圖像，1/28 （3.5%） 識別了聽覺刺激。儘管有明顯的腦缺血（平均 rSO_2= 43%），在 CPR 開始 35-60 分鐘後，與意識一致的正常腦電圖活動（delta、theta 和 alpha）出現。

結論： 意識。意識和認知過程可能發生在 CA 期間。正常腦電圖的出現可能反映了網路水平認知活動的恢復，以及意識、清醒和 RED（真實的"瀕死"體驗）的生物標誌物。

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