

## Medasense List of Publications

### Publications in Peer-Reviewed Journals

- 1. Does nociception monitor-guided anesthesia affect opioid consumption? A systematic review of randomized controlled trials**  
Fleur S. Meijer, Marieke Niesters, Monique van Velzen, Chris H. Martini, Erik Olofsen, Ruth Edry, Daniel I. Sessler, Eveline L. A. van Dorp, Albert Dahan, Martijn Boon  
[Journal of Clinical Monitoring and Computing 2019 July](#)
- 2. Guiding Opioid Administration by 3 Different Analgesia Nociception Monitoring Indices During General Anesthesia Alters Intraoperative Sufentanil Consumption and Stress Hormone Release**  
Sandra Funcke, Hans Pinnschmidt, Stefan Wesseler, Charlotte Brinkmann, Burkhard Beyer, Virginija Jazbutyte, Christoph Behem, Constantin Trepte, Rainer Nitzschke  
[Anesthesia & Analgesia 2019 Sept.](#)
- 3. Correlation between incremental remifentanil doses and the Nociception Level (NOL) index response after intraoperative noxious stimuli**  
Etienne Renaud-Roy, Pierre-André Stöckle, Sarah Maximos, Véronique Brulotte, Lucas Sideris, MD, Pierre Dubé, Pierre Drolet, MD, Issam Tanoubi, Rami Issa, Olivier Verdonck, Louis-Philippe Fortier, Philippe Richebé  
[Can J Anesth. 2019 April](#)
- 4. Nociception-guided versus Standard Care during Remifentanil–Propofol Anesthesia: A Randomized Controlled Trial**  
Fleur S. Meijer, Chris H. Martini, Suzanne Broens, Martijn Boon, Marieke Niesters, Leon Aarts, Erik Olofsen, Monique van Velzen, Albert Dahan  
[Anesthesiology 2019 Feb.](#)
- 5. The nociception level index (NOL) response to intubation and incision in patients undergoing video-assisted thoracoscopic surgery (VATS) with and without thoracic epidural analgesia. A pilot study**  
Laurent Bollag, Srdjan Jelacic, Carlos Delgado Upegui, Cynthia Wu, Philippe Richebé  
[F1000Research 2018, 7:875](#)
- 6. Validation of the PMD100 and its NOL Index to detect nociception at different infusion regimen of remifentanil in patients under general anaesthesia**  
Pierre-André Stöckle, Marco Julien, Rami Issa, Elizabeth Décary, Véronique Brulotte, Pierre Drolet, Margaret Henri, Madeleine Poirier, Jean-François Latulippe, Marc Dorais, Olivier Verdonck, Louis-Philippe Fortier, Philippe Richebé  
[Minerva Anesthesiol. 2018 Oct; 84\(10\):1160-1168](#)

7. **Monitoring the Nociception Level Intraoperatively - An Initial Experiences**  
Pether Jildenstål, Katarina Hallén, Katarina Almskog, Johan Sand and Margareta Warren Stomberg  
[J Anest & Inten Care Med. 2018 June; 7\(2\):1-5](#)
8. **Preliminary intraoperative validation of the nociception level index: a noninvasive nociception monitor**  
Ruth Edry, Vasile Recea, Yuri Dikust, Daniel I. Sessler  
[Anesthesiology 2016 July; 125:193-203](#)
9. **Ability of the Nociception Level (NOL), a multiparameter composite of autonomic signals, to detect noxious stimuli during propofol-remifentanil anesthesia**  
Chris H. Martini, Martijn Boon, Suzanne J. L. Broens, Evelien F. Hekkelman, Lisanne A. Oudhoff, Anna Willemijn Buddeke, Albert Dahan  
[Anesthesiology 2015 Sept.; 123:524-534](#)
10. **Monitoring the Nociception Level – A multi-parameter approach**  
Nir Ben-Israel, Mark Kliger, Galit Zuckerman, Yeshayahu Katz, Ruth Edry.  
[Journal of Clinical Monitoring and Computing 2013 Dec.; 27\(6\):659-668](#)
11. **Differentiating between heat pain intensities: the combined effect of multiple autonomic parameters**  
Treister Roi, Kliger Mark, Zuckerman Galit, Itay Goor Aryeh, Eisenberg Elon  
[PAIN®. 2012 Sept.; 153\(9\):1807-14](#)

### Posters, Abstracts and Presentations

1. **Performance assessment of the NOL Index during general anesthesia**  
Shingo Ito, Hiroyuki Seki, Yoshihiko Deguchi, Junko Nakayama, Junko Sannohe, Toshiya Koitabashi  
[ASA, Orlando, FL, USA, October 2019](#)
2. **Quel monitoring de la balance nociception-antinociception peut-on utiliser en OFA (Opioid Free Anesthesia)?**  
Lewandowski M., Charier D., Meffre S., Zantour D., Toscano R., Bertheaux C., Molliex S.  
*SFAR, Paris, September 2019*
3. **Balance nociception-antinociception sous anesthésie générale: quel paramètre d'évaluation?**  
Meffre S., Charier D., Lewandowski M., Zantour D., Toscano R., Bertheaux C., Molliex S.  
*SFAR, Paris, September 2019*

4. **NOL index shows high sensitivity to detect nociception induced by intubation under different remifentanil dosages**  
Richebé P., McDevitt J., Boselli E., Sbeghen V., Topouzian G.S., Zaphirato V., Fortier L.P., Verdonck O.  
[CAS, Calgary, June 2019](#)
5. **Can NOL index calibration help to individualize remifentanil TCI before skin incision?**  
Max Bisdorff, Laurent Perrin, Ionut Tabolcea, Edgard Engelman, Luc Barvais  
[ESA, Vienna, June 2019](#)
6. **ED50 and ED95 of remifentanil for tracheal intubation as determined by a monitor of nociception (NOL index)**  
McDevitt J., Boselli E., Sbeghen V., Topouzian G. S., Verdonck O., Richebé P.  
[ESA, Vienna, June 2019](#)
7. **Anesthesia's ultimate challenge: monitor intraoperative analgesia**  
Marta Vidal Seoane, Marta Pérez-De-Lis-Novo, C. Bonome González  
[ESA, Vienna, June 2019](#)
8. **Nociception Level (NOL)-guided Analgesia: Influence on Opioid Consumption and Hypotensive Events During Propofol/Remifentanil Anesthesia**  
Albert Dahan. Fleur S. Meijer, Suzanne Broens, Monique van Velzen, Christian Martini  
*Awarded as one of "10 Best of Abstracts: Clinical Science",* [ASA, San Francisco, USA, October 2018](#)
9. **Combined Intraoperative Anesthesia & Analgesia Monitoring Impact on Safety & Recovery: CINAAMON Interim Analysis**  
Etienne Renaud-Roy, Philippe Richebé, Olivier Verdonck, Manon Choinière, Véronique Brulotte, Louis-Philippe Fortier  
[ASA, San Francisco, USA, October 2018](#)  
[CAS Annual Meeting, Montreal, Quebec, Canada, June 2018](#)
10. **Impact of Intravenous Phenylephrine Bolus on Intraoperative Nol Index Values**  
Philippe G.M. Richebé, Véronique Brulotte, Marie-Andree Coulombe, Etienne Renaud-Roy, Omar Elsemin, Manon Choiniere, Pierre Drolet, Louis-Philippe Fortier, Olivier Verdonck  
[ASA, San Francisco, USA, October 2018](#)
11. **Performance Assessment of the PMD-200 in Subjects Requiring Surgery Under General Anesthesia**  
Virginia Horne, Borzoo Farhang, Alexander Friend, Max Breidstein  
[ASA, San Francisco, USA, October 2018](#)

12. **Nol Index Response After Laryngoscopy Performed with Macintosh Blade Versus Glidescope™ Videolaryngoscope**  
Virginie Sbeghen, Jason McDevitt, Olivier Verdonck, Valerie Zaphiratos, Veronique Brulotte, Christian Loubert, Pierre A. Drolet, Louis-Philippe Fortier, Marie-Claude Guertin, Philippe Richebé  
[ASA, San Francisco, USA, October 2018](#)  
*2018 CAS Annual Meeting, Montreal, Quebec, Canada, June 2018*
13. **Douleur Périopératoire et Délirium. Monitoring de La Nociception : Un nouveau paradigme multiparamétrique (NOL)**  
Dr Pierre-André Stöckle  
*NOL technology symposia during SFAR, Paris, France, September 2018*
14. **Intraoperative nociception monitoring and postoperative recovery after knee arthroplasty**  
Patricia Lavand'homme, Emmanuel Thienpont  
[IASP, Boston, USA, September 2018](#)
15. **Detection of Pain under General Anesthesia: Performance Assessment of the PMD-200**  
Virginia Horne, Alex Friend, Max Breidstein, Borzoo Farhang  
[12<sup>th</sup> Annual New England Anesthesia Residents Conference \(NEARC\), Boston, MA, USA, May 2018](#)
16. **O noua tehnica non-invaziva pentru monitorizarea durerii si optimizarea analgeziei intraoperatorii: indexul NOL**  
Serban Bubenek, Ruth Edry  
*NOL technology symposia during SRATI congress, Sinaia, Romania, May 2018*
17. **Nociceptive monitoring during surgery during Mini-symposium: "Monitoring is our future"**  
Albert Dahan  
*Leiden, The Netherlands, March, 2018*
18. **Missing a Piece? NOL™ (Nociception Level) Technology: Intraoperative Pain Monitoring for Optimizing Analgesia**  
Ruth Edry, Daniel I. Sessler  
*ICISA 2017, Tel Aviv, Israel, Nov. 2017*
19. **Tailoring analgesia to patients' needs. The Nociception Level Index (NOL)**  
Albert Dahan  
*3<sup>rd</sup> Symposium on Anesthesia, Organized by Hospital Da Luz, Lisbon, Portugal, Sept. 2017*
20. **Comment j'individualise l'analgésie périopératoire**  
Philippe G. Richebé  
*SFAR Congress, Paris, France, Sept. 2017*

21. **Impact of different remifentanil doses on the nociception level index response to intra- operative noxious stimuli**  
Etienne Renaud-Roy, Pierre-André Stöckle, Olivier Verdonck, Louis-Philippe Fortier, Philippe Richebé  
[2017 CAS, Niagara Falls, ON, Canada, June 2017](#) (pages 6-7)  
[Euroanaesthesia, Geneva, Switzerland, June 2017](#) (page 33, abstract no. 01AP09-6)
22. **NOL Index performance in patients with beta-blockers**  
Ruth Edry, Vasile Recea, Yuri Dikust  
[Euroanaesthesia, Geneva, Switzerland, June 2017](#) (page 226, abstract no. 08AP05-12)
23. **Physiologic Indicators for the assessment of acute pain: Recent evidence and new trends**  
Céline Gélinas  
[Canadian Pain Society, May 2017](#) (pages A36-A37)
24. **Quantified Analgesic Effect of Intraoperative 50% N<sub>2</sub>O Inhalation by the NOL and ANI Nociception Indices**  
Philippe G. Richebé, Elizabeth Decary, Rami Issa, Sarah Maximos, Louis-Philippe Fortier, Olivier Verdonck  
[ASA, Chicago, IL, USA, Oct. 2016](#)
25. **Nociception Level (NOL) index alteration after standardized nociceptive stimulus decreases with higher doses of remifentanil**  
Marco Julien, Elizabeth Décary, Rami Issa, Olivier Verdonck, Louis-Philippe Fortier, Philippe Richebé  
[ESA, London, UK, May 2016](#)
26. **Ability of the nociception level, a Multiparameter Composite of Autonomic Signals, to detect noxious stimuli during propofol-remifentanil anesthesia**  
Chris Martini, Martijn Boon, Albert Dahan  
[ASA conference, San Diego, USA, Oct. 2015](#)
27. **The level of nociception (NOL) in thoracotomy patients with and without epidural analgesia**  
Laurent Bollag, Srdjan Jelacic, Cynthia Wu, Philippe Richebé  
[EFIC Pain Congress, Vienna, Austria, Sept. 2015](#)
28. **Validation of nociception monitor – The NOL Index**  
Ruth Edry, Vasile Recea, Yuri Dikust, Daniel I. Sessler  
[EuroAnesthesia, Germany, June 2015](#) (page 45, abstract no. 1AP12-6)
29. **Objective assessment of spinal cord stimulation effectiveness on chronic radicular pain**  
Nir Ben-Israel, Yariv Amos, Noam Racheli, Mark Kliger, Galit Zuckerman, Roi Treister, Elon Eisenberg  
[International Association for the Study of Pain Annual Meeting, Argentina, Oct. 2014](#)

30. **Objective measurement of pain levels in patients with radicular pain treated by spinal cord stimulation**  
Nir Ben-Israel, Yariv Amos, Mark Kliger, Galit Zuckerman, Erica Suzan, Elon Eisenberg [American Academy of Pain Medicine Annual Meeting, AZ, US, Mar. 2014](#)
31. **Detection of noxious stimuli during general anesthesia using the NOL index for nociception level**  
Edry Ruth, Kliger Mark, Zuckerman Galit, Racheli Noam, Katz Yeshayahu, Ben-Israel Nir  
[EuroAnesthesia, Barcelona, Spain, June 2013](#)
32. **Non-linear Multi-Parameter Approach for Evaluation of Nociception Level During General Anesthesia**  
Ben-Israel Nir, Zuckerman Galit, Kliger Mark, Katz Yeshayahu, Edry Ruth  
[STA, Phoenix, AZ, Jan. 2013; ASA Conference, Washington DC, Oct. 2012](#)
33. **A combination of multiple autonomic parameters, rather than each parameter alone, yields significant differentiation between heat pain intensities**  
Roi Treister, Mark Kliger, Galit Zuckerman, Itay Goor Aryeh, Elon Eisenberg  
[EFIC Conference, Germany, 2011](#)
34. **Toward automatic pain monitoring: Method for classification of pain level based on statistical processing of multiple non-invasive physiological measures**  
Roi Treister, Mark Kliger, Galit Zuckerman, Itay Goor Aryeh, Elon Eisenberg  
[IPA Conference, Israel, 2010](#)

#### **Key Citations and Reviews**

1. **Pain monitor: reality or fantasy in ambulatory patients**  
Borzoo Farhang, Donald Mathews  
[Current Opinion in Anesthesiology 2019 Dec.; 32\(6\):727-734 doi: 10.1097/ACO.0000000000000797](#)
2. **Assessing nociception: steps towards intraoperative “full monitoring” – Editorial Review**  
Manuel Á. Gómez-Ríos, Alfredo Abad-Gurumeta, José M. Calvo-Vecino  
[Minerva Anestesiologica 2018 Oct.; 84\(10\):1123-5](#)
3. **Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU**  
John W Devlin, Yoanna Skrobik, Céline Gélinas, John Needham et al.  
[Crit Care Med. 2018 Sep;46\(9\):e825-e873](#)

4. **Le monitoring de la douleur peropératoire : actualités et perspectives (Intraoperative pain monitoring: Update and future directions)**  
Pierre-André Stöckle, Philippe Richebé  
[Anesthésie & Réanimation 2018 May; 4\(3\):204-214](#)
5. **Next steps in ICU pain research**  
Kathleen Puntillo , Céline Gélinas and Gerald Chanques  
[Intensive Care Med. 2017 Sep; 43\(9\):1386-1388](#)
6. **Digital innovations and emerging technologies for enhanced recovery programmes**  
Frederic Michard, Tong Joo (TJ) Gan, Henrik Kehlet  
[Br J Anaesth 2017; 119\(1\):31-39](#)
7. **Objective Assessment of Acute Pain**  
Helen Laycock, Carsten Bantel  
[J Anesth Clin Res 2016; 7:6](#)
8. **Physiological Signal Processing for Individualized Anti-nociception Management During General Anesthesia: a Review**  
Julien De Jonckheere, Vincent Bonhomme, Mathieu Jeanne, Emmanuel Boselli, Matthias Gruenewald, Regis Logier, Philippe Richebé  
[Yearb Med Inform. 2015 Aug; 10\(1\):95-101](#)
9. **Assessing pain objectively: the use of physiological markers**  
Rachel Cowen, Maria Stasiowska, Helen Laycock, Carsten Bantel.  
[Anaesthesia. 2015 July; 70\(7\):828-47](#)
10. **Acute psychosocial stress reduces pain modulation capabilities in healthy men**  
Geva Nirit, Pruessner Jens, Defrin Ruth  
[PAIN® 2014 Nov.; 155\(11\):2418-25](#)
11. **Multi-parameter autonomic-based pain assessment: More is more?**  
Marco L. Loggia, Vitaly Napadow  
[PAIN® 2012; 153:1779–1780](#)