Onco-Anesthésie, Quoi de neuf?

Karoune. A
Service Anesthésie Réanimation EH Didouche Mourad Constantine
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Nothing to declare related with the topic

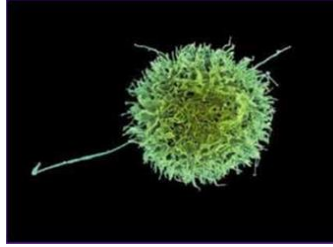
BIOGEN
LABORATOIRE DE RECHERCHE

Anesthésie & Réanimation

Volume 8, Issue 4, July 2022, Pages 315-330

Onco-anaesthesia: From theory to practice

INTRODUCTION

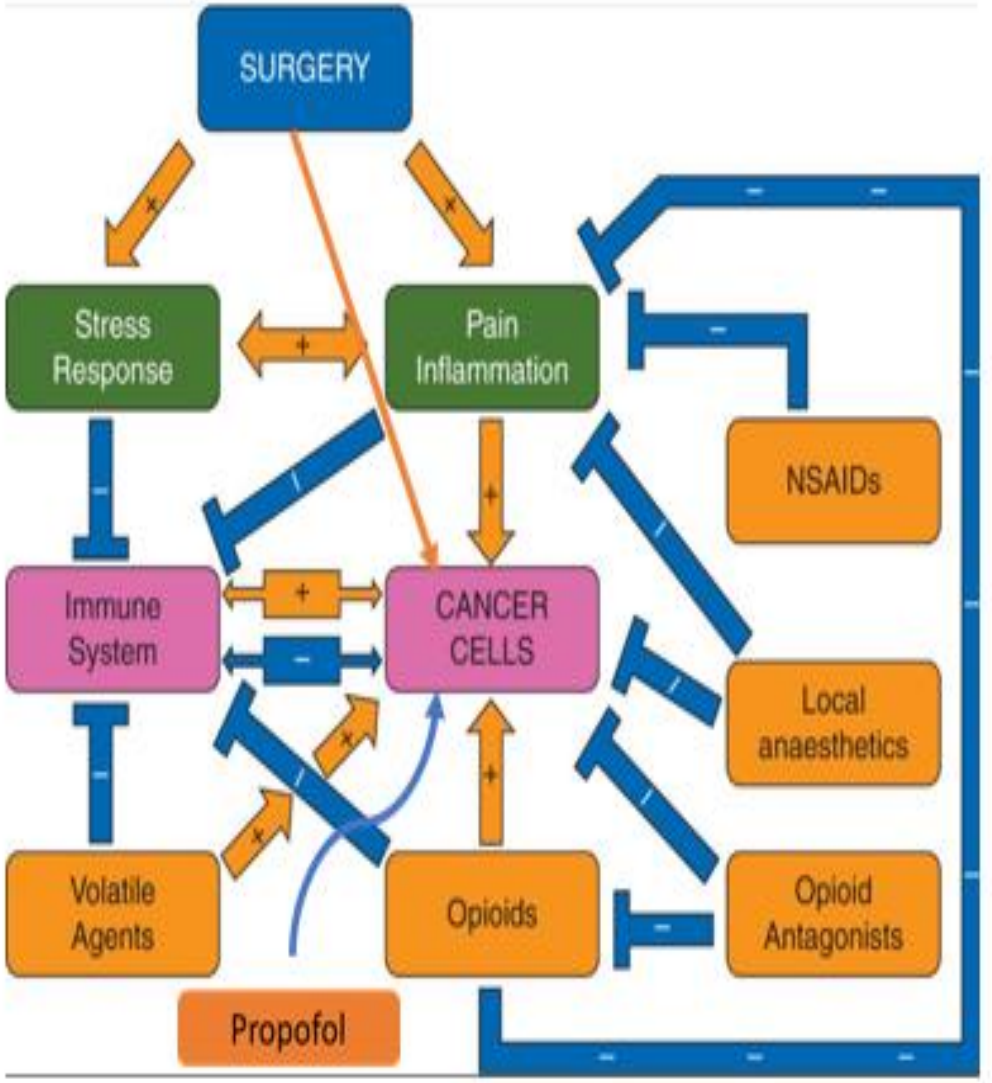


La période périopératore de chirurgie carcinologique : une période à haut risque de récidive des tumeurs.

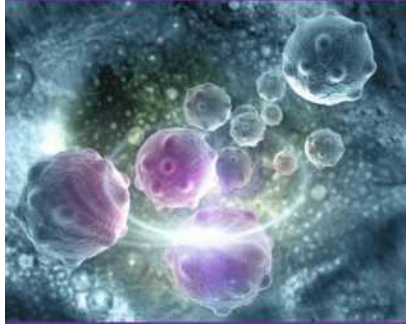
L'inflammation, la douleur et le stress peropératoire affectent la réponse immune antitumorale:
la chirurgie est paradoxalement immunodépressive.

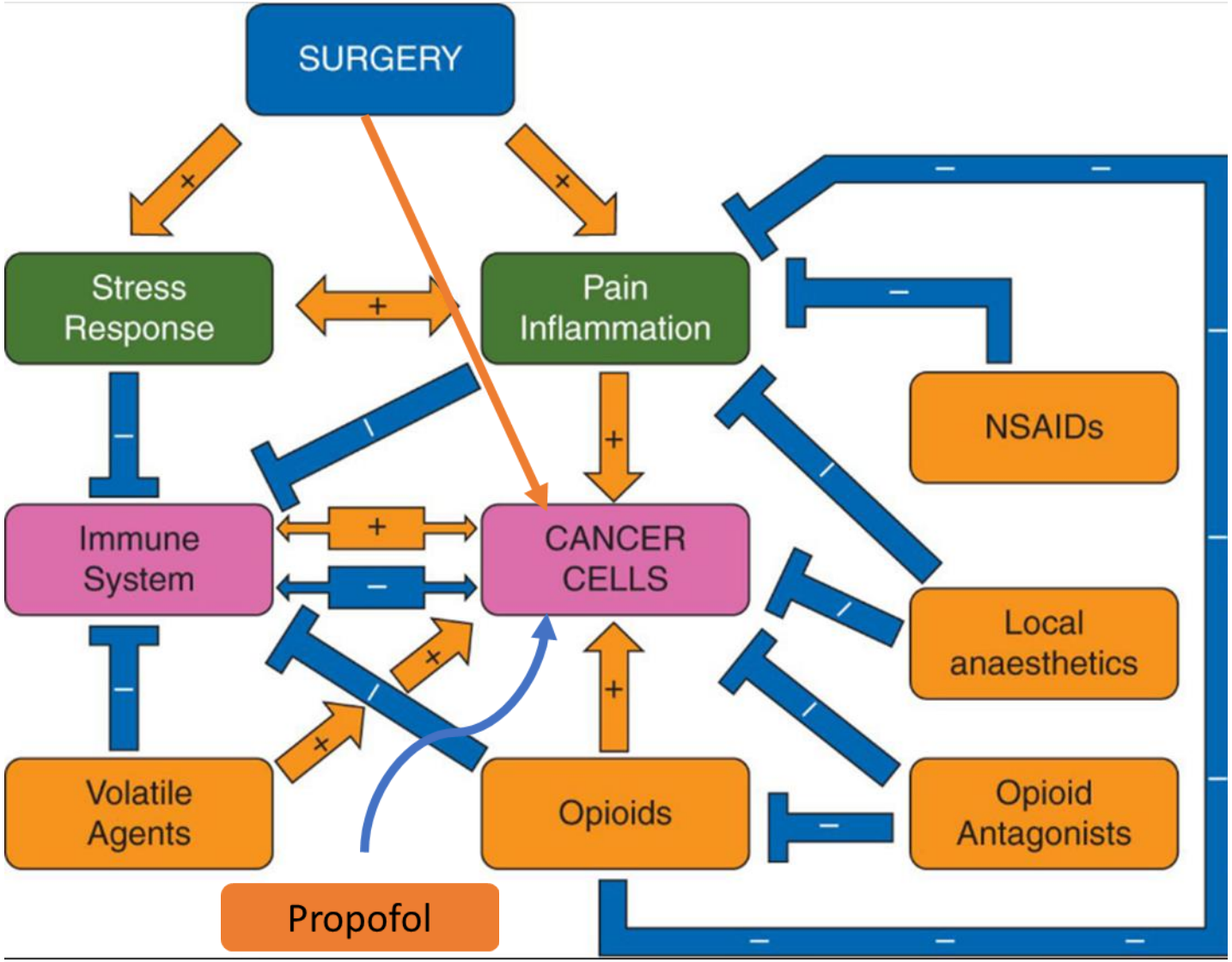
La manipulation directe de la tumeur favorise la dissémination des cellules cancéreuses.

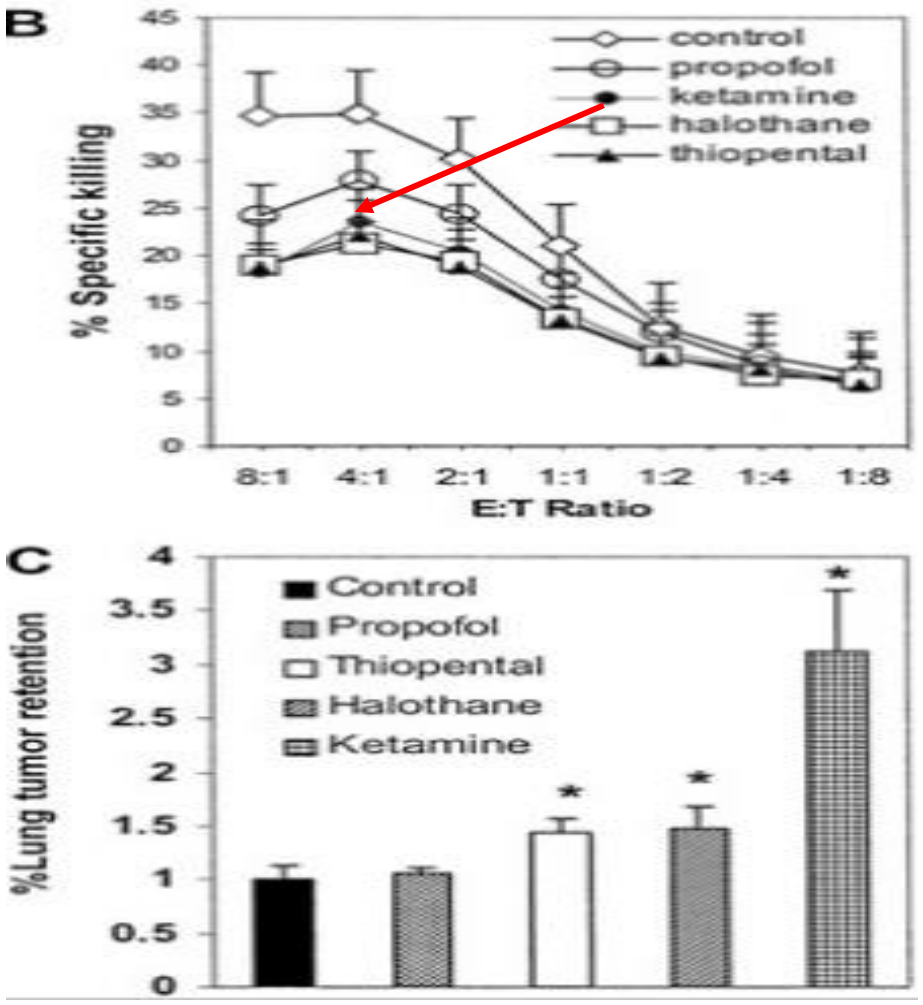
Le but de cette mise au point est de donner un aperçu de ces particularités qui pourraient faire l'objet d'une recherche spécifique en onco-anesthésie inexistante à ce jour.



1ère hypothèse: Les Drogues anesthésiques peuvent-ils influencer la biologie du cancer ??







Anesthesia & Analgesia 97(5):p 1331-1339, November 2003. | **DOI:** 10.1213/01.ANE.0000082995.44040.07

ANESTHETIC PHARMACOLOGY: RESEARCH REPORT

Suppression of Natural Killer Cell Activity and Promotion of Tumor Metastasis by Ketamine, Thiopental, and Halothane, but Not by Propofol: Mediating Mechanisms and Prophylactic Measures

Melamed, Rivka MSc*; Bar-Yosef, Shahar MD†; Shakhar, Guy PhD*; Shakhar, Keren MA*; Ben-Eliyahu, Shamgar PhD*

Les anesthésiques augmentent la susceptibilité aux métastases tumorales, en supprimant l'activité des cellules tueuses naturelles. La kétamine s'est révélée la plus délétère.

Propofol et immunité. Quelles sont les constatations ?

Ishikawa et al. BMC Anesthesiology (2021) 21:71
https://doi.org/10.1186/s12871-021-01294-w

BMC Anesthesiology

REVIEW Open Access

Anesthetics may modulate cancer surgical outcome: a possible role of miRNAs regulation

Masashi Ishikawa[1,2*†], Masae Iwasaki[1,2†], Atsuhiro Sakamoto[1] and Daqing Ma[2]

- Effets sur la réponse immunitaire

Cellules NK, lymphocytes

Production d'interleukines/réponse inflammatoire

Phagocytose

Pièges extracellulaires des neutrophiles.

- Effets sur les cellules cancéreuses

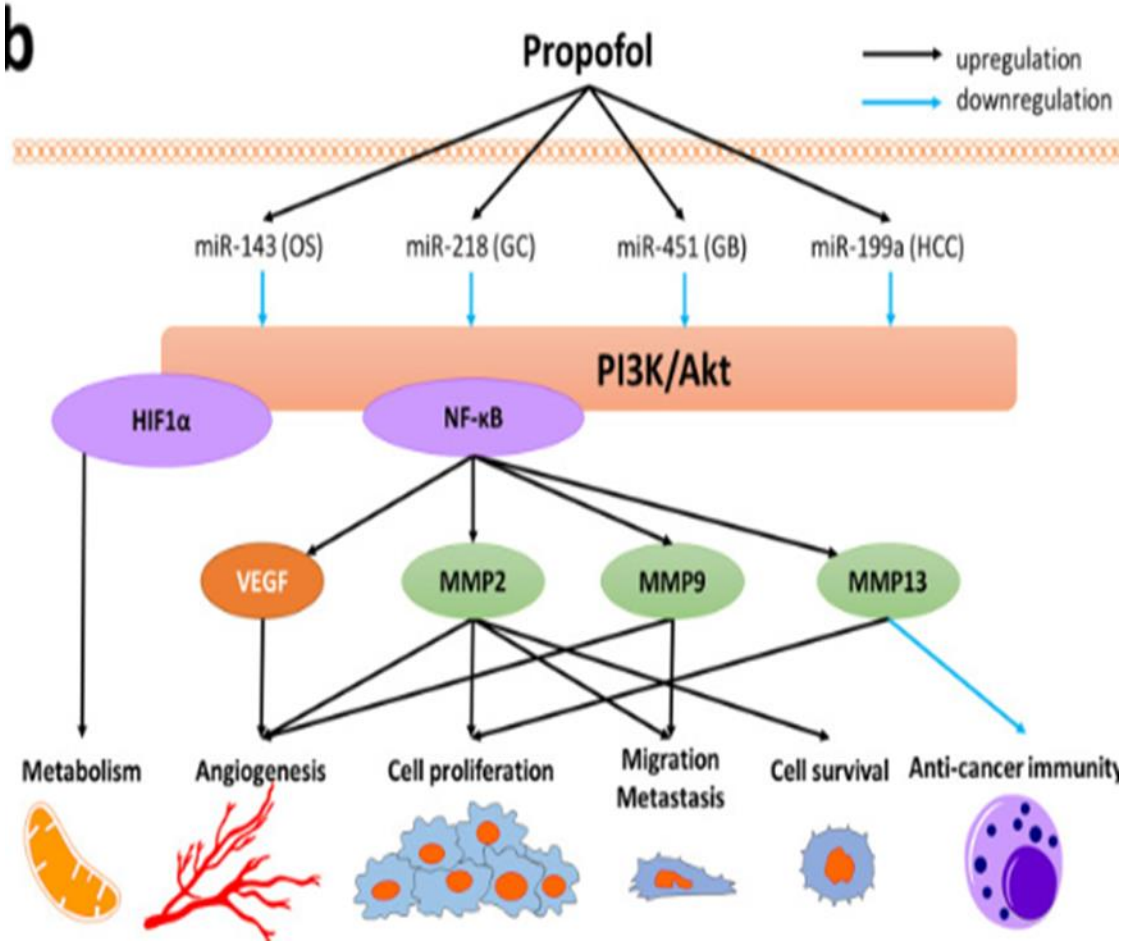
Apoptose (HIF)

Prolifération (VEGF)

Cytotoxicité

Migration/invasion, microenvironnement

Effets génétiques : ARNm, altération de l'ADN

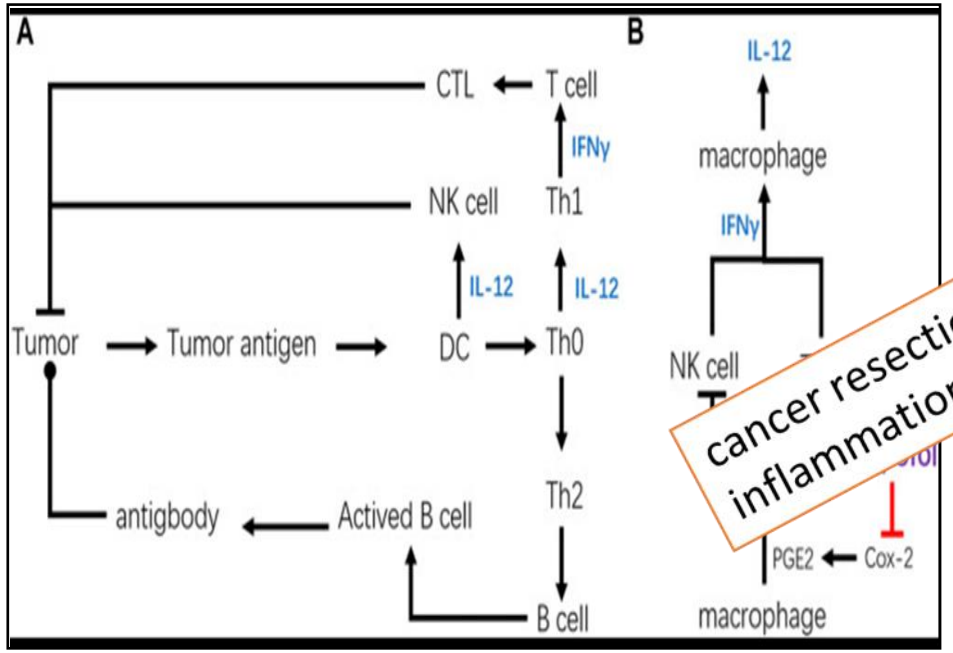


frontiers | Frontiers in Pharmacology

TYPE Review
PUBLISHED 04 November 2022
DOI 10.3389/fphar.2022.919636

The benefits of propofol on cancer treatment: Decipher its modulation code to immunocytes

Long Gu[1], Xueqi Pan[2], Chongcheng Wang[3]* and Lei Wang[4]*



cancer resection; immunocytes; immunomodulation; inflammation; propofol.

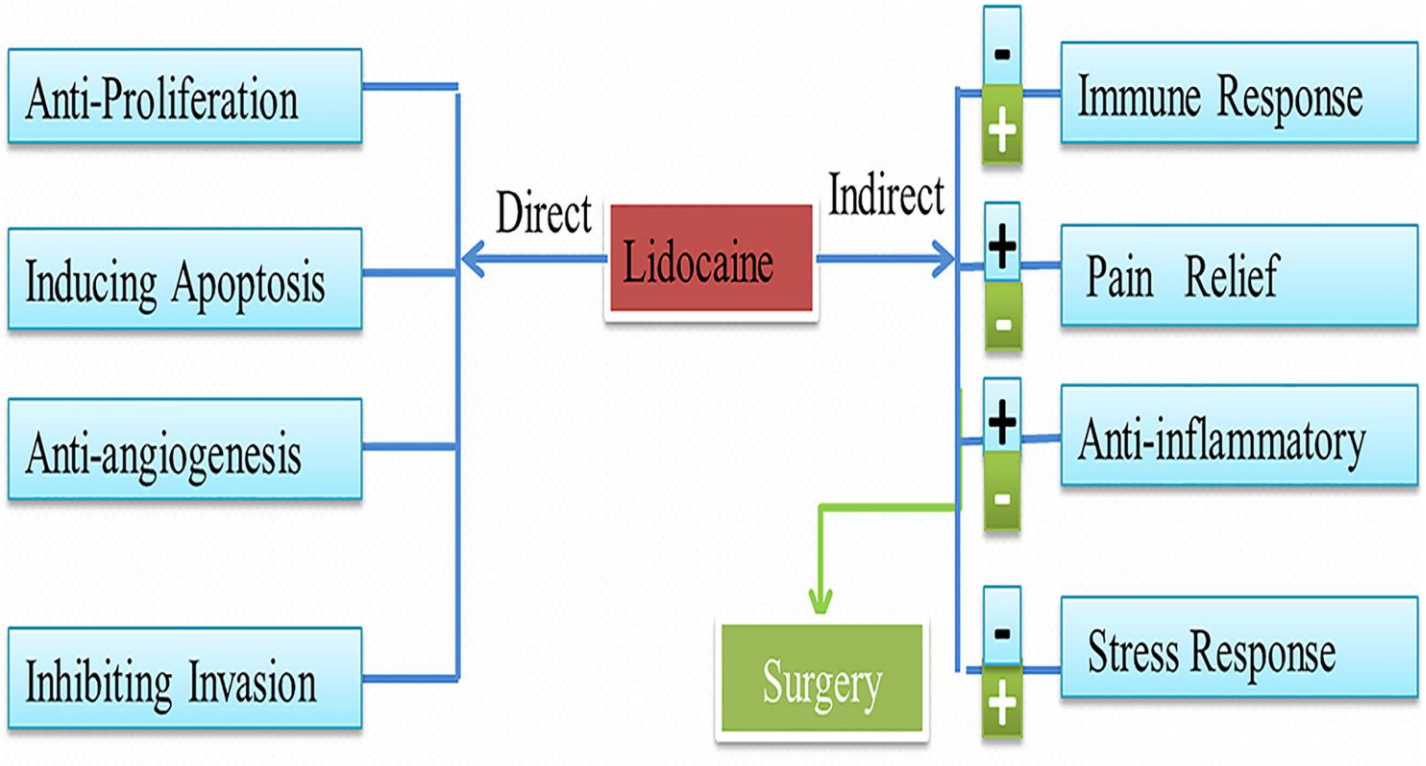
TABLE 2 Comparison of immunomodulation between propofol and volatile anesthetics in cancer resection.

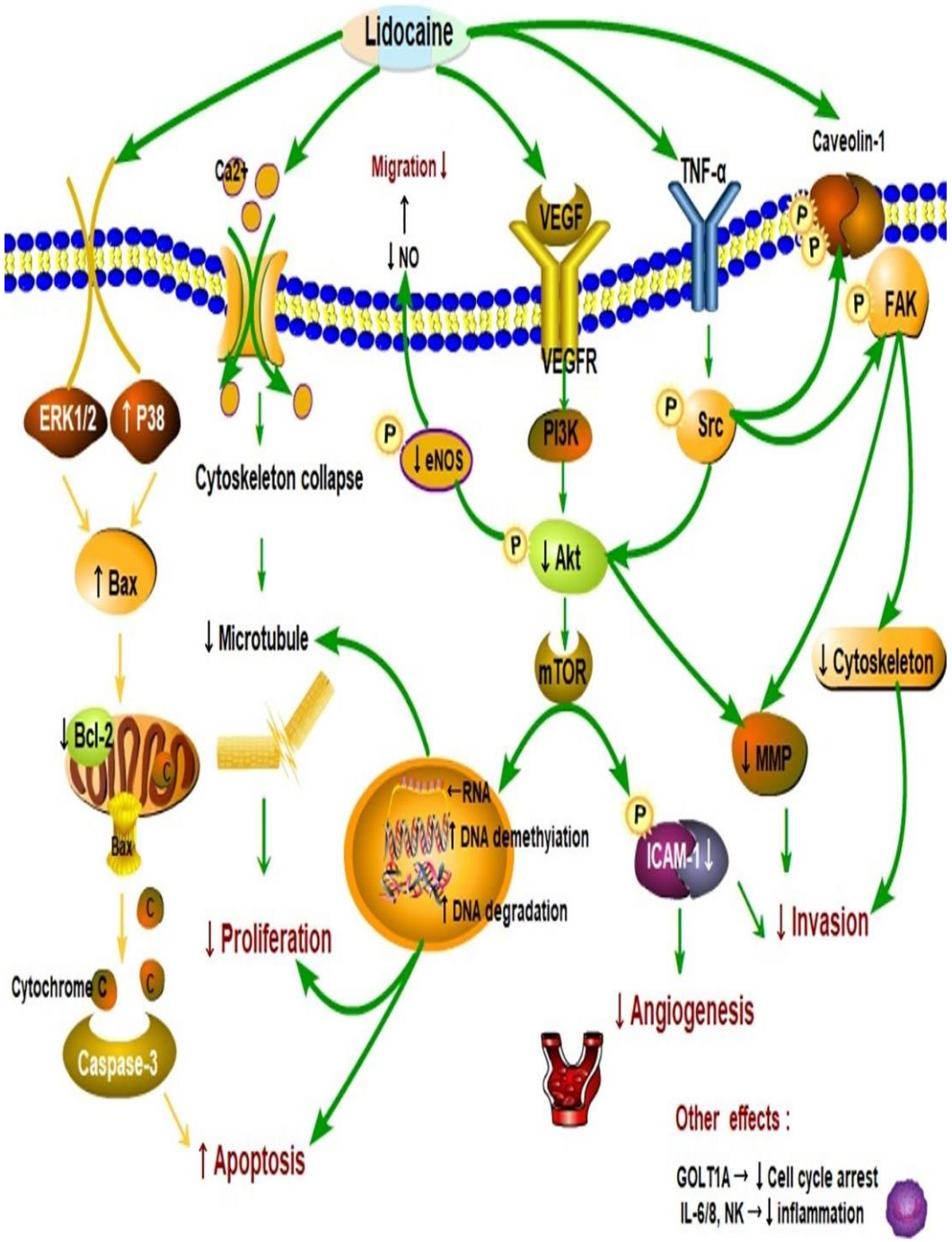
Type of cancer resection	Anesthetics species	Comparing object	Consequence	Sample collecting time	Reference
Breast cancer surgery	Propofol and sevoflurane	Natural killer (NK) cell, cytotoxic T lymphocyte (CTL) counts, and apoptosis rate	No difference	After inducing anesthesia and at 1 and 24 h postoperatively	Lim et al. (2018)
	Propofol–ketorolac and sevoflurane–fentanyl	NK cell cytotoxicity	Propofol–ketorolac demonstrated a favorable … n immune function	Before and 24 h after surgery	Oh et al. (2018)
	Propofol/paravertebral and sevoflurane/opioid	Concentrations of 11 cytokines and …	… ravertebral alters a … ytokines	Before and after surgery	Deegan et al. (2010)
	Propofol *versus* sevoflurane	B… … cells	… o differences	Immediately before anesthesia induction and at 24 h postoperatively	Cho et al. (2017)
	Propofol	… subpopulations, … ntrations of IL-2 and IL-4	Desflurane anesthesia is associated with less adverse immune responses	Before and 1 h after anesthesia induction and at 24 h postoperatively	Woo et al. (2015)
Radical … col…	… urane	T lymphocyte subsets	Propofol has better impact on T lymphocyte function	Before anesthesia , 90 min after induction, 150 min after induction, and 30 min after entering post-anesthesia care unit	Chen et al. (2015)
	Propofol and sevoflurane	Lymphocyte subtype	Propofol may have less or shorter impact on immunity	Before induction, on finishing the surgery and 24 h after surgery	Yu et al. (2019)
Tongue cancer	Propofol and sevoflurane	T lymphocyte subsets, natural killer cells, and B lymphocytes	Propofol has slightly less effect on cellular immune responses	30 min before induction, 1 h, 3 h, and 5 h after induction, at the end of the operation, and 24, 48, and 72 h after operation	Zhang et al. (2014)
Pulmonary lobectomy for non–small-cell lung cancer	Propofol or isoflurane	CD4(+)CD28(+) percentage and the ratio of interferon-gamma:interleukin-4	Propofol promotes activation and differentiation of peripheral T helper cells	Before induction, 10 min after induction, immediately after stopping of anesthetics , 1 and 24 h post-operation	Ren et al. (2010)
Kidney cancer surgery	Propofol and sevoflurane	Amount of NK cells, T lymphocytes, regulatory T cells, and T-helper cells, CTL	No significant differences	Before surgery, at the end of the surgery and postoperative days 1, 3 and 7	Liu et al. (2016)
Radical hysterectomy for cervical cancer	Propofol and sevoflurane	T lymphocyte subsets and CD4+/CD8+ ratio, NK cells, and B lymphocytes	Propofol is superior in the protection of circulating lymphocytes	At 30 min before induction, the end of the operation, and 24, 48, and 72 h after operation	Efremov et al. (2020)

Front Oncol. 2021 Jun 24;11:669746. doi: 10.3389/fonc.2021.669746

Local Anesthetic Lidocaine and Cancer: Insight Into Tumor Progression and Recurrence

Caihui Zhang [1], Cuiyu Xie [1], Yao Lu [1 2]



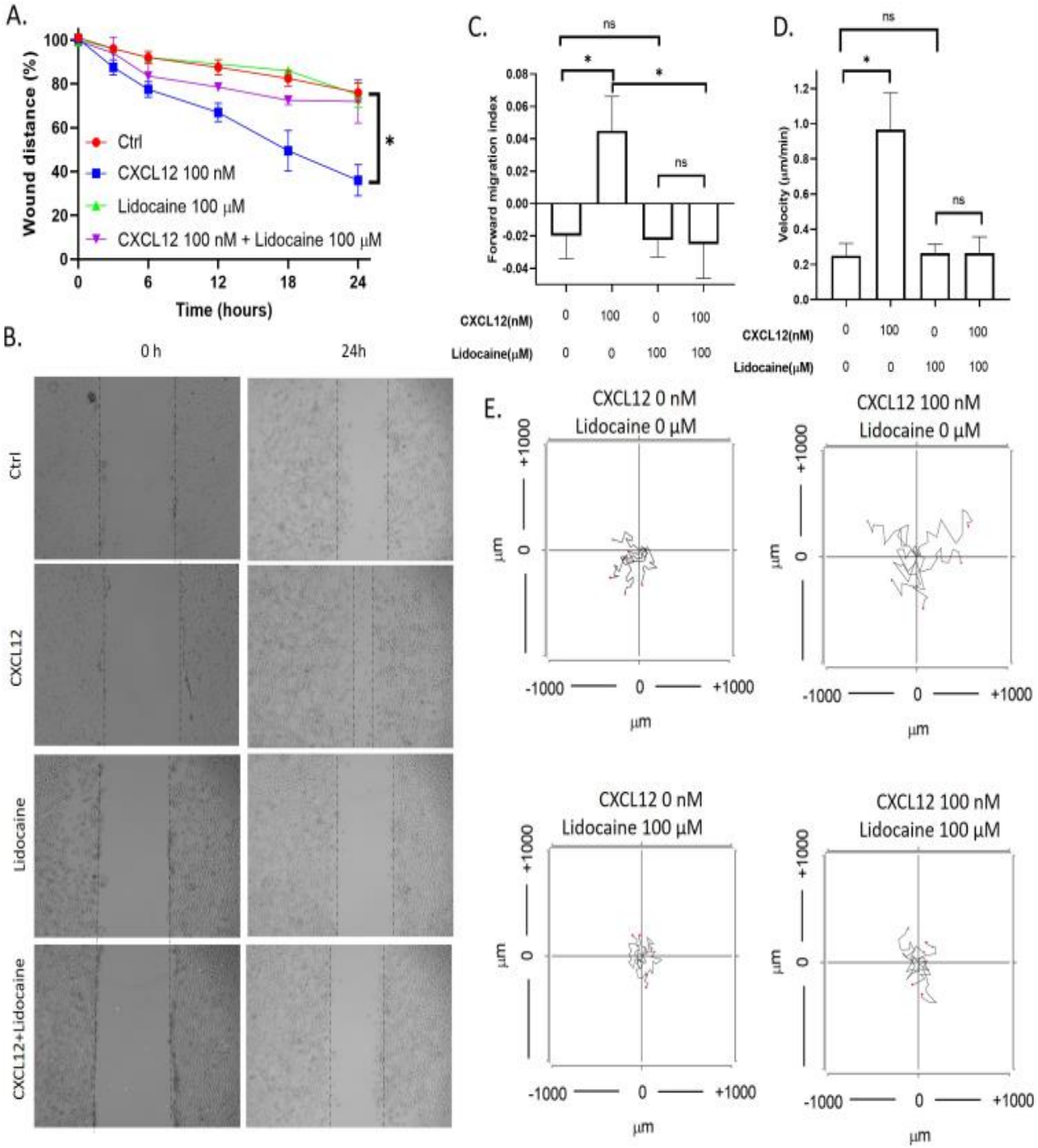


Cancer Biomark. 2022 Apr 6;33(3):317-330. doi: 10.3233/CBM-210249

Lidocaine inhibited migration of NSCLCA549 cells via the CXCR4 regulation

Baichun Xing, Linlin Yang and Yanan Cui*

Lidocaine at clinical plasma concentrations inhibited CXCL12-induced CXCR4 activation, thereby reduced the intracellular Ca^{2+}-dependent cytoskeleton remodeling, resulting in slower migration of A549 cells.



ONCOIMMUNOLOGY
2024, VOL. 13, NO. 1, 2308940
https://doi.org/10.1080/2162402X.2024.2308940

Anesthésiques locaux

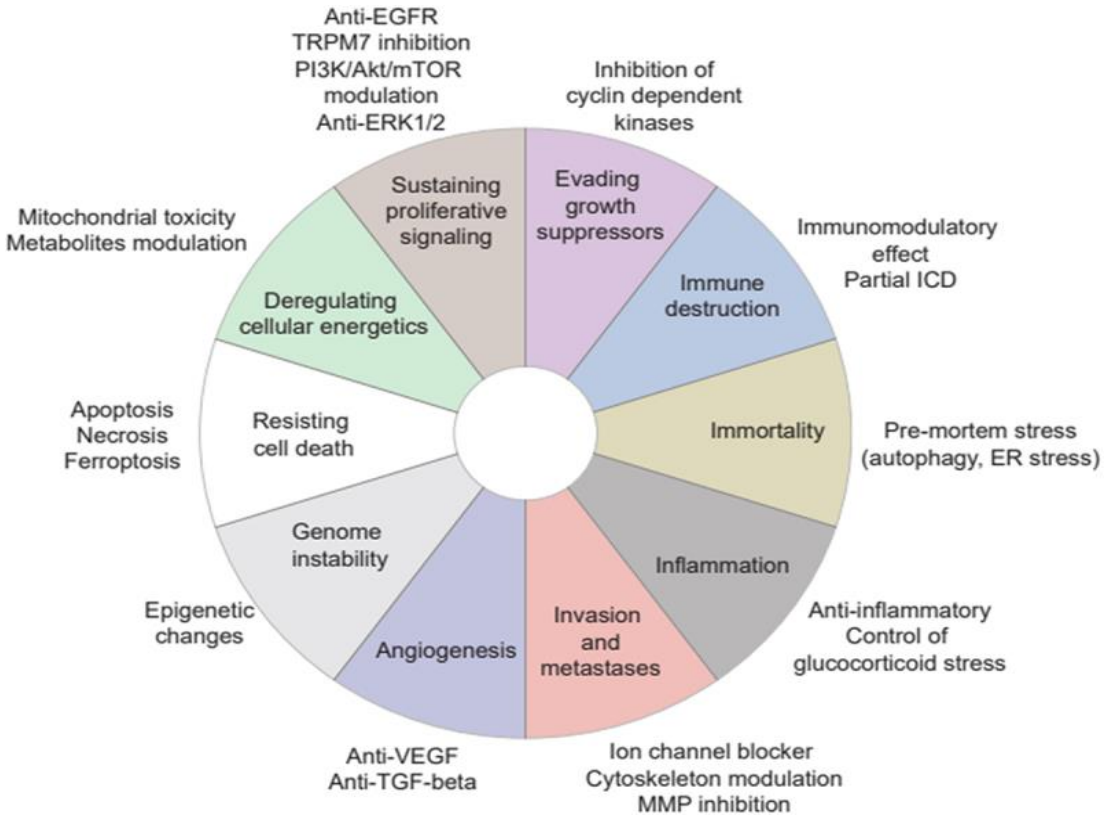
Trial watch: local anesthetics in cancer therapy

Killian Carnet Le Provost[a,b], Oliver Kepp[a,b], Guido Kroemer[a,b,c], and Lucillia Bezu[a,b,d]

[a]Equipe Labellisée Par La Ligue Contre Le Cancer, Université de Paris, Sorbonne Université, Centre de Recherche des Cordeliers, Institut Universitaire de France, Paris, France; [b]Metabolomics and Cell Biology Platforms, Gustave Roussy, Université Paris Saclay, Villejuif, France; [c]Pôle de Biologie, Hôpital européen Georges Pompidou, AP-HP, Paris, France; [d]Gustave Roussy, Département Anesthésie, Chirurgie et Interventionnel, Villejuif, France

Les propriétés antitumorales et immunomodulatrices potentielles

Effets antimigratoires
Effet antimitotiques
Effets immunitaires
Effet épigénétique
Effet neuroendocrinien
Effets synergétiques

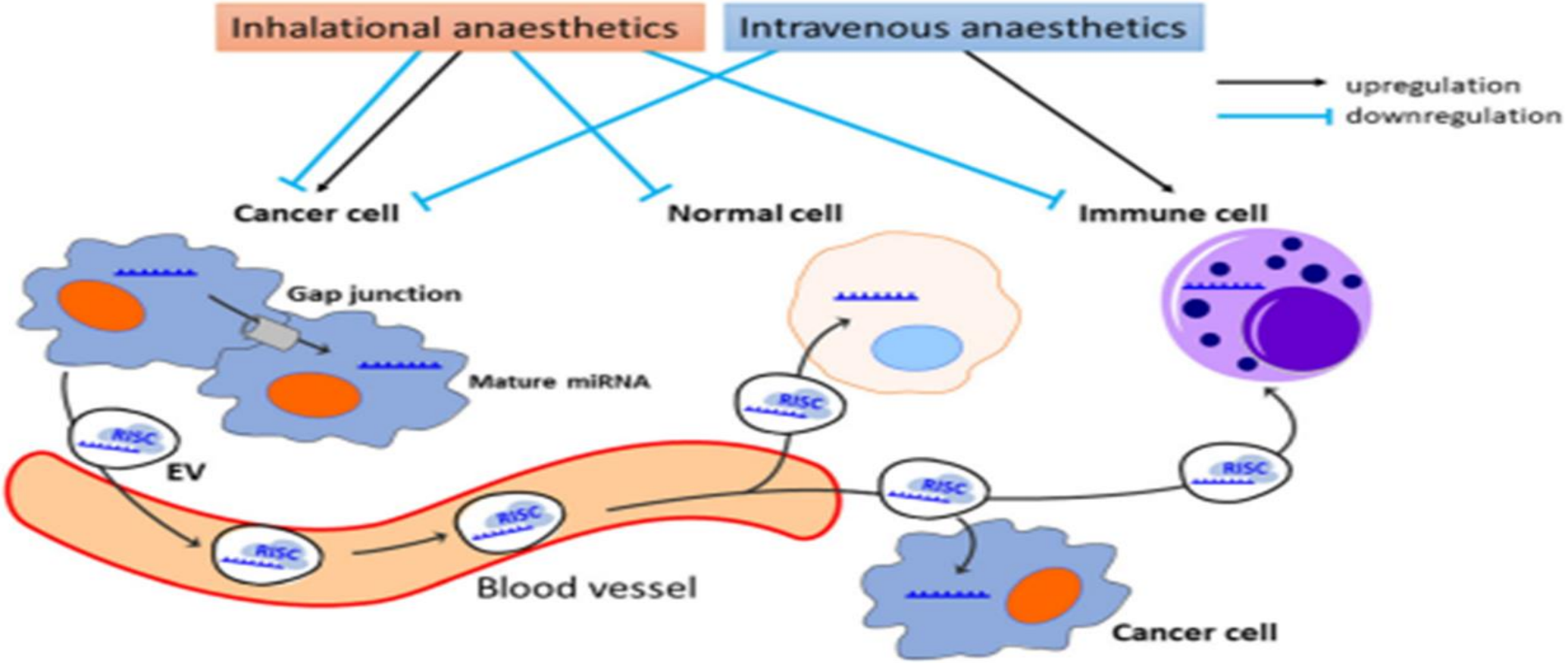


2ème hypothèse: AG ou ALR? Type de Cancer?

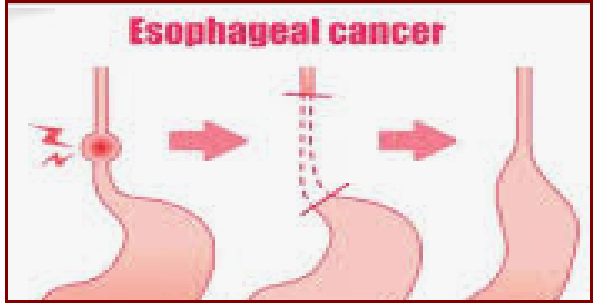
Regional anaesthesia and **analgesia**: **relationship** to cancer recurrence and survival.

Tedore T.

Br J Anaesth. 2015 Dec;115 Suppl 2:ii34-45. doi: 10.1093/bja/aev375.



▸ Sci Rep. 2017 Oct 25;7:14020. doi: 10.1038/s41598-017-14147-9

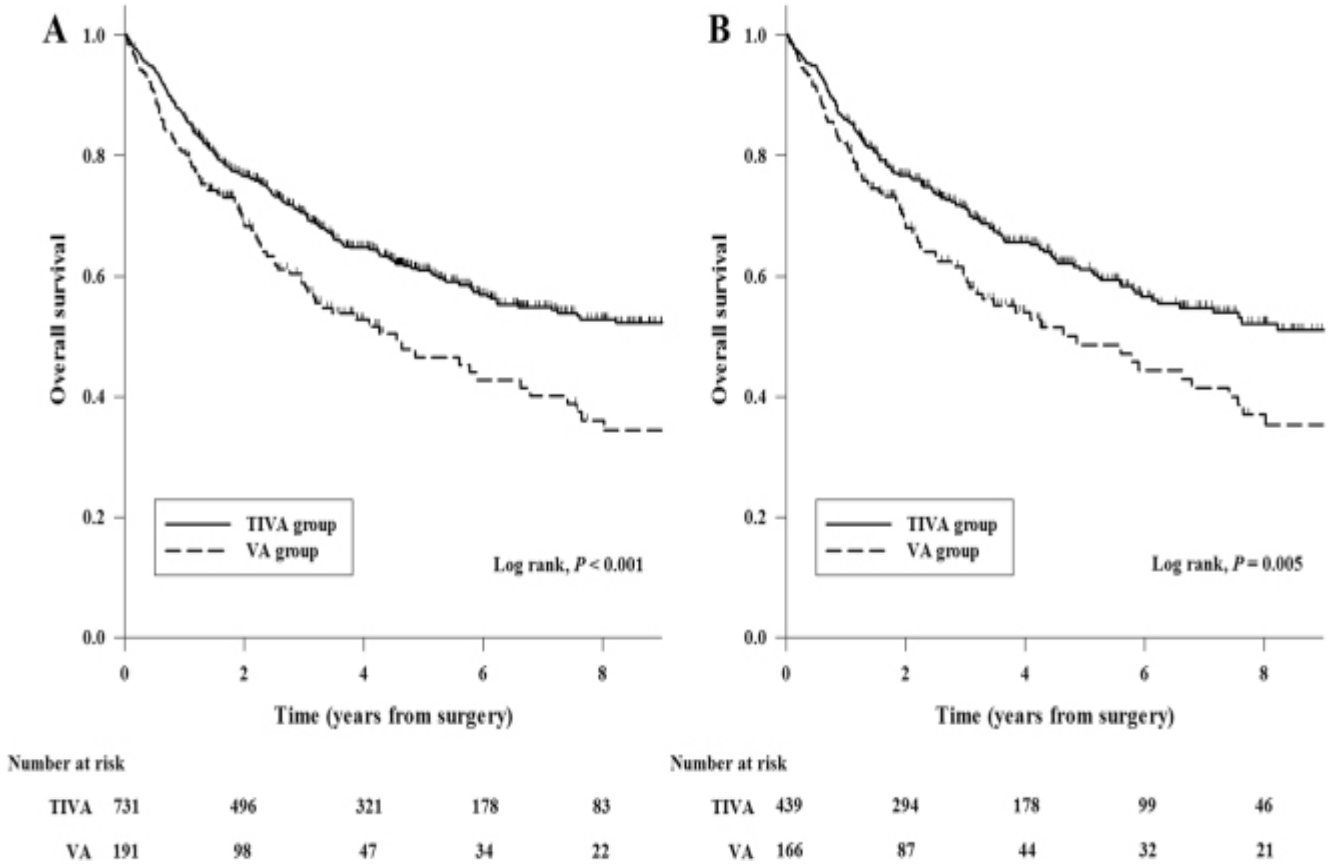


Impact of anesthetic agents on overall and recurrence-free survival in patients undergoing esophageal cancer surgery: A retrospective observational study

In-Jung Jun [1], Jun-Young Jo [1], Jong-Il Kim [1], Ji-Hyun Chin [1], Wook-Jong Kim [1], Hyeong Ryul Kim [2,#], Eun-Ho Lee [1,✉,#], In-Cheol Choi [1]

Conclusion

This retrospective observational study of 922 patients who underwent elective esophageal cancer surgery found that intravenous anesthesia with propofol during surgery was related to better postoperative survival rates compared with volatile anesthesia. Further prospective randomized studies are warranted to support our findings.

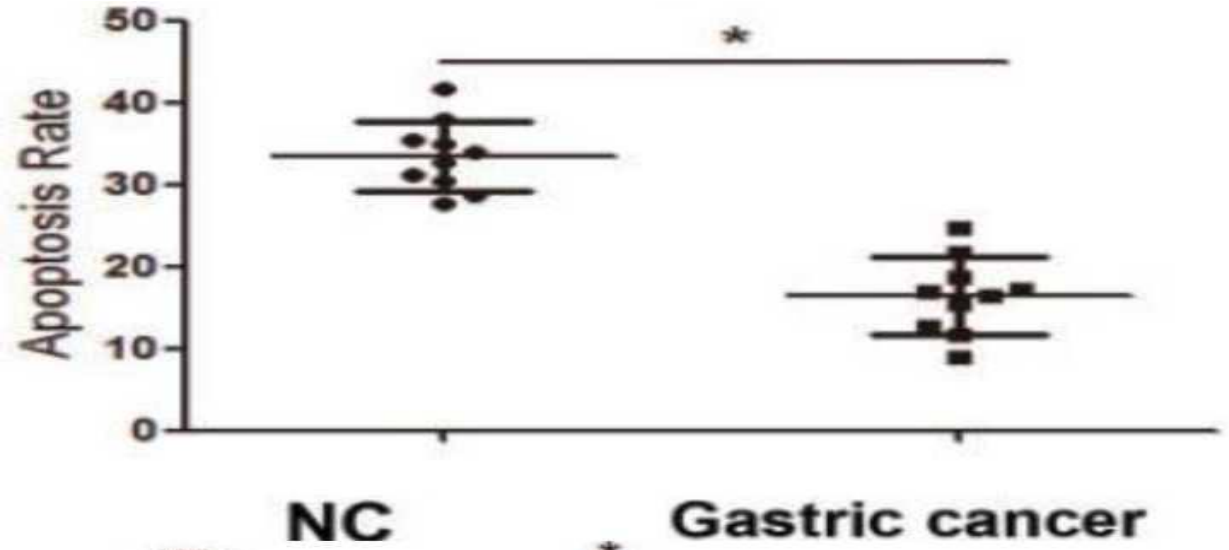


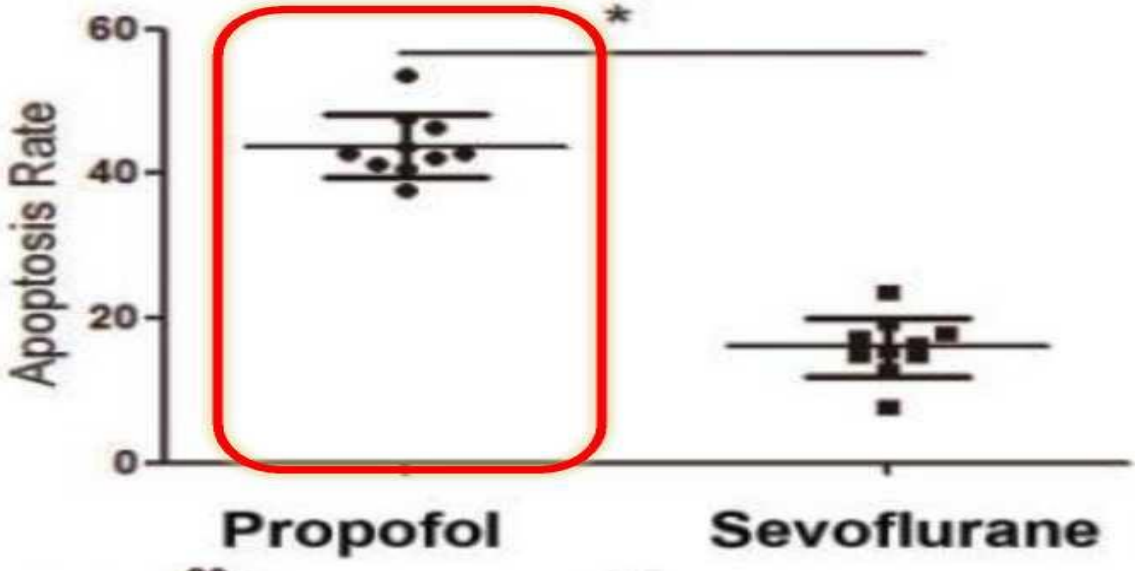
▸ J Int Med Res. 2020 Mar 27;48(3):0300060520904861. doi: 10.1177/0300060520904861

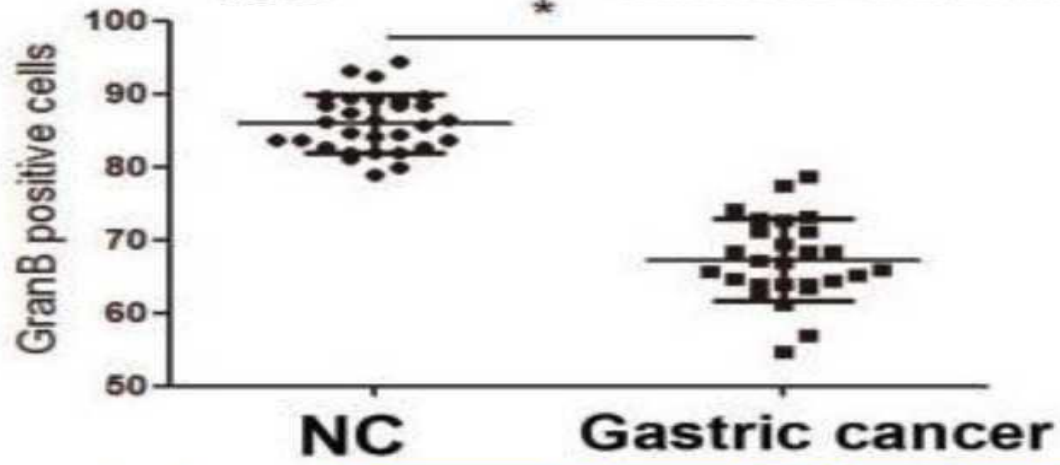
Effects of propofol and sevoflurane on tumor killing activity of peripheral blood natural killer cells in patients with gastric cancer

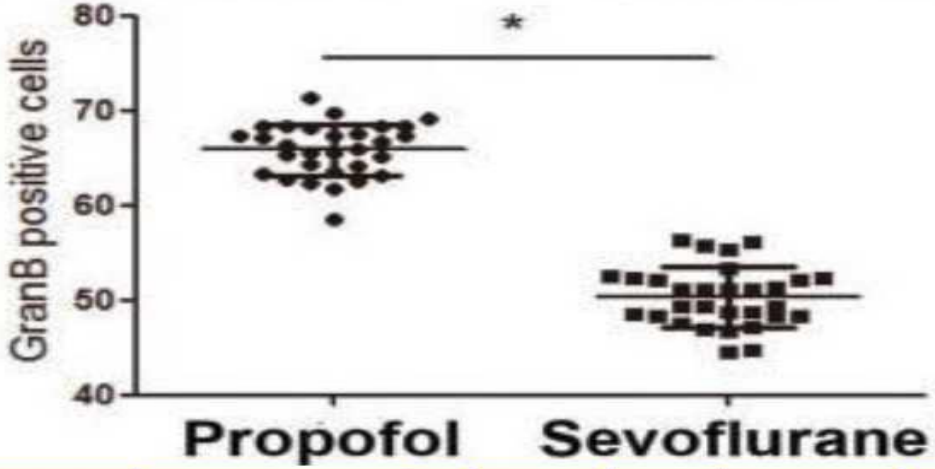
Lili Ai [1,2], Hao Wang [1,✉]

Journal of International Medical Research









Conclusions: Cytotoxicity of NK cells in patients with gastric cancer is low, but it can be promoted by propofol. Propofol regulates cytotoxicity in NK cells by promoting SMAD4, thereby affecting cellular function.

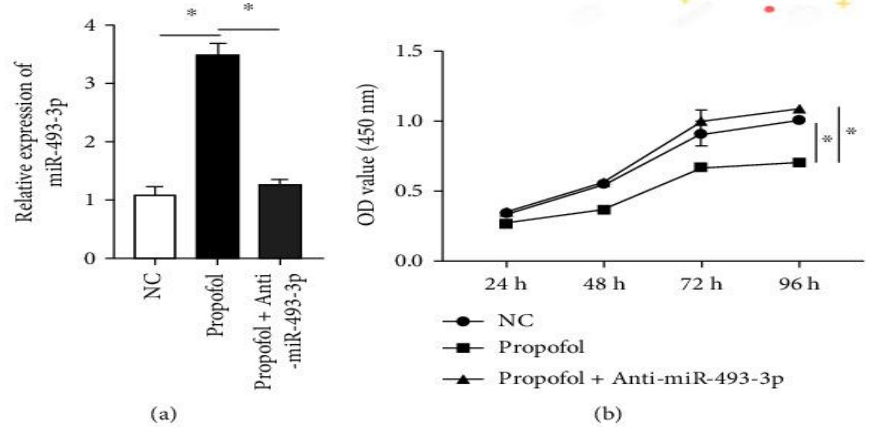
Volume 2023, Article ID 7698706, 8 pages
https://doi.org/10.1155/2023/7698706

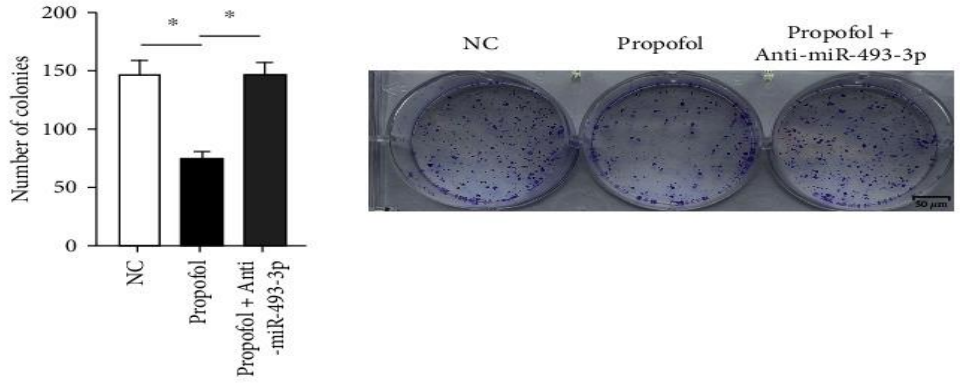
Research Article

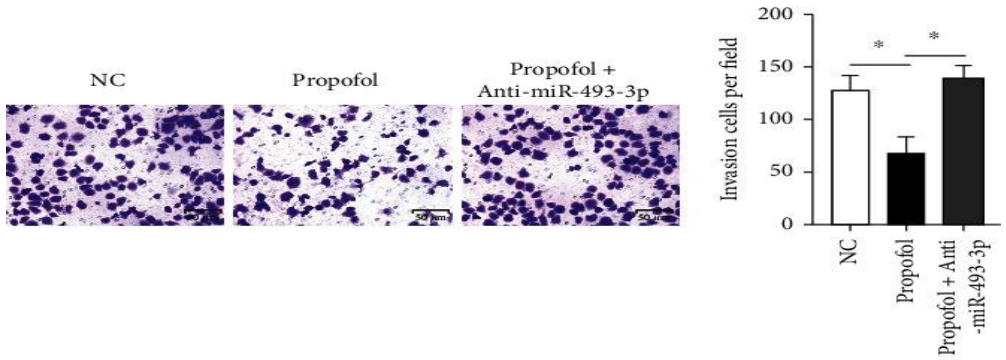
Propofol-Induced miR-493-3p Inhibits Growth and Invasion of Gastric Cancer through Suppression of DKK1-Mediated Wnt/β-Catenin Signaling Activation

Kaishuai Zhan,[1] Xiaodan Song,[1] Qian Zhang,[1] Jianshu Yang,[2] and Shoutang Lu

Conclusion: Propofol-induced miR-493-3p decreased GC cell development via targeting DKK1 and hence inhibited Wnt/β-catenin signaling, according to these findings.







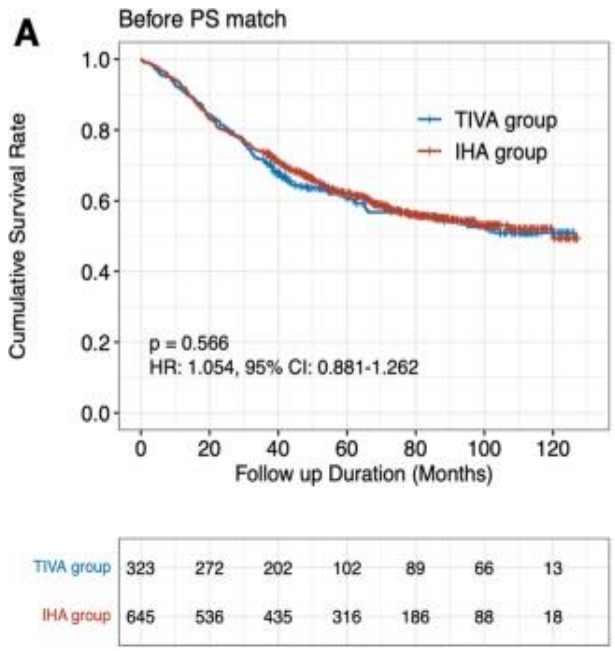
BMC Cancer

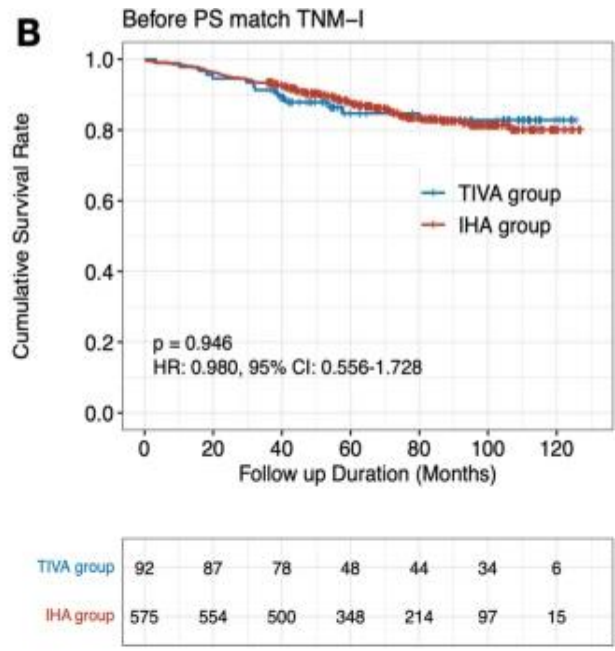
Research | Open access | Published: 10 November 2021

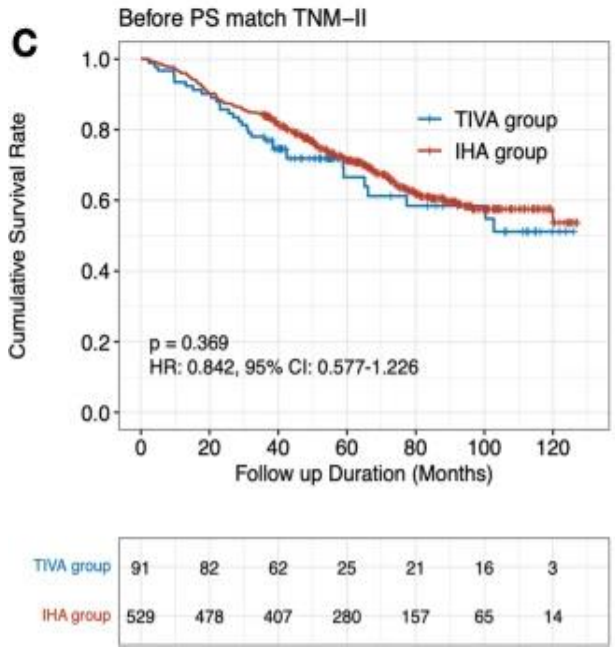
The long-term survival outcomes of gastric cancer patients with total intravenous anesthesia or inhalation anesthesia: a single-center retrospective cohort study

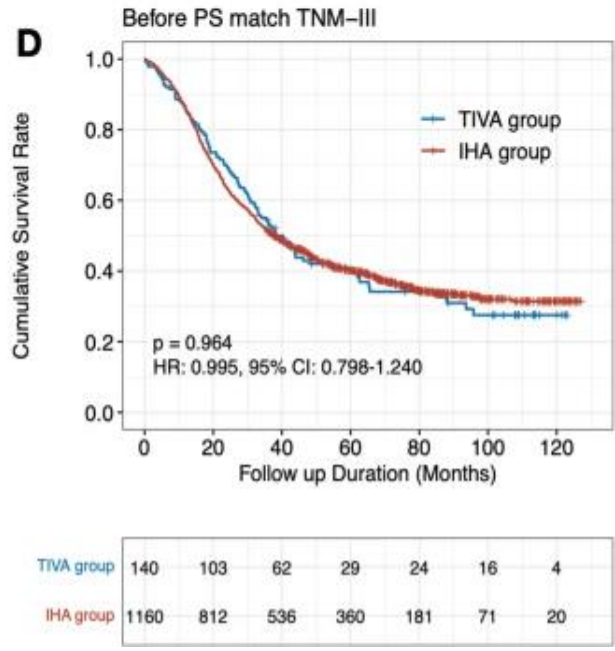
Wei-Wei Wu, Wei-Han Zhang, Wei-Yi Zhang, Kai Liu, Xin-Zu Chen, Zong-Guang Zhou, Jin Liu, Tao Zhu

L'anesthésie intraveineuse totale s'est avérée supérieure à l'anesthésie par inhalation en termes de survie globale.









Observational Study > J Anesth. 2024 Feb;38(1):92-97. doi: 10.1007/s00540-023-03288-z.

The association between intraoperative anesthesia methods used during gastric cancer surgery and long-term mortality: A retrospective observational study using a Japanese claims database

Tomoko Kagawa [1 2], Kiyoyasu Kurahashi [3], Tomotsugu Seki [1 4], Yohei Kawasaki [5], Isao Nahara [1], Chikashi Takeda [1 6], Hiroshi Yonekura [1], Shiro Tanaka [7], Koji Kawakami [1]

Conclusions

We found no significant difference in the postoperative risks of overall survival between inhaled and intravenous anesthesia in patients with gastric cancer undergoing gastrectomy.

EJA

Eur J Anaesthesiol 2014; **31**:678–684

ORIGINAL ARTICLE

The influence of total intravenous anaesthesia and isoflurane anaesthesia on plasma interleukin-6 and interleukin-10 concentrations after colorectal surgery for cancer

A randomised controlled trial

Simona C. Margarit, Horatiu N. Vasian, Erika Balla, Stefan Vesa and Daniela C. Ionescu

Interleukin IL-6 and IL-10 measurement

Blood samples (7 ml) were taken after venous cannula insertion before starting intravenous fluids and induction of anaesthesia (T0), after intubation but before skin incision (T1), and 2 h (T2) and 24 h (T3) after extubation.

	TIVA ($n = 30$)	Isoflurane ($n = 30$)
IL-6		
T0	3.2 (1.6 to 21)	3.1 (1.1 to 14)
T1	3.2 (1.1 to 23)	3.2 (1.1 to 21)
T2	302 (47 to 357)[a]	328 (43 to 356)[a]
T3	88 (5.8 to 349)[a]	101 (23 to 328)[a]
IL-10		
T0	4.6 (1.8 to 9.9)	4.6 (1 to 43)
T1	5.2 (2.4 to 9.4)	7.2 (2 to 44)
T2	77 (10 to 396)	82 (25 to 436)
T3	14 (4.5 to 37)	22 (9.1 to 223)

Ionescu *et al. Perioperative Medicine* 2013, **2**:8
http://www.perioperativemedicinejournal.com/content/2/1/8

Perioperative Medicine

RESEARCH Open Access

Choice of anesthetic technique on plasma concentrations of interleukins and cell adhesion molecules

Daniela C Ionescu[1,2*], Simona Claudia D Margarit[1], Adina Norica I Hadade[3], Teodora N Mocan[4], Nicolae A Miron[5] and Daniel I Sessler[6]

Table 3 Area under the curve between-group comparisons

	Total intravenous anesthesia ($n = 44$)	Isoflurane ($n = 44$)	*P* value
IL-1β (pg·hour/ml)	3.4 (3.0 to 4.3)	3.3 (2.9 to 4.0)	0.428
IL-6 (pg·hour/ml)	33.0 (21.6 to 44.9)	78.0 (52.2 to 109.1)	**0.006**
IL-8 (pg·hour/ml)	49.0 (39.6 to 67.0)	54.0(47.2 to 82.6)	0.285
IL-10 (pg·hour/ml)	37.0 (23.8 to 55.4)	26.0 (21.6 to 42.1)	0.151
IL-13 (pg·hour/ml)	93.0 (83.4 to 101.3)	101.0 (89.8 to 112.1)	0.218
Soluble ICAM-1 (ng·hour/ml)	213 (188.0 to 242.3)	197 (178.9 to 220.9)	0.488
Soluble VCAM-1 (ng·hour/ml)	1,139 (1,029 to 1,188)	1,029 (947 to 1,163)	0.226

Data expressed as median (95% confidence interval). Area-under-the-curve based on preoperative values. Mann–Whitney U tests were used for between-group comparisons; because multiple comparisons were made, $P<0.01$ was considered statistically significant. Bold data are significant.

Conclusion: The only biomarker whose postoperative area-under-the-curve concentrations differed significantly as a function of anesthetic management was IL-6. Two hours after surgery, IL-6 concentrations were significantly greater in patients given isoflurane than TIVA. However, the differences were modest and seem unlikely to prove clinically important. Further studies are needed.

Received: 18 July 2019 | Revised: 24 December 2019 | Accepted: 29 December 2019

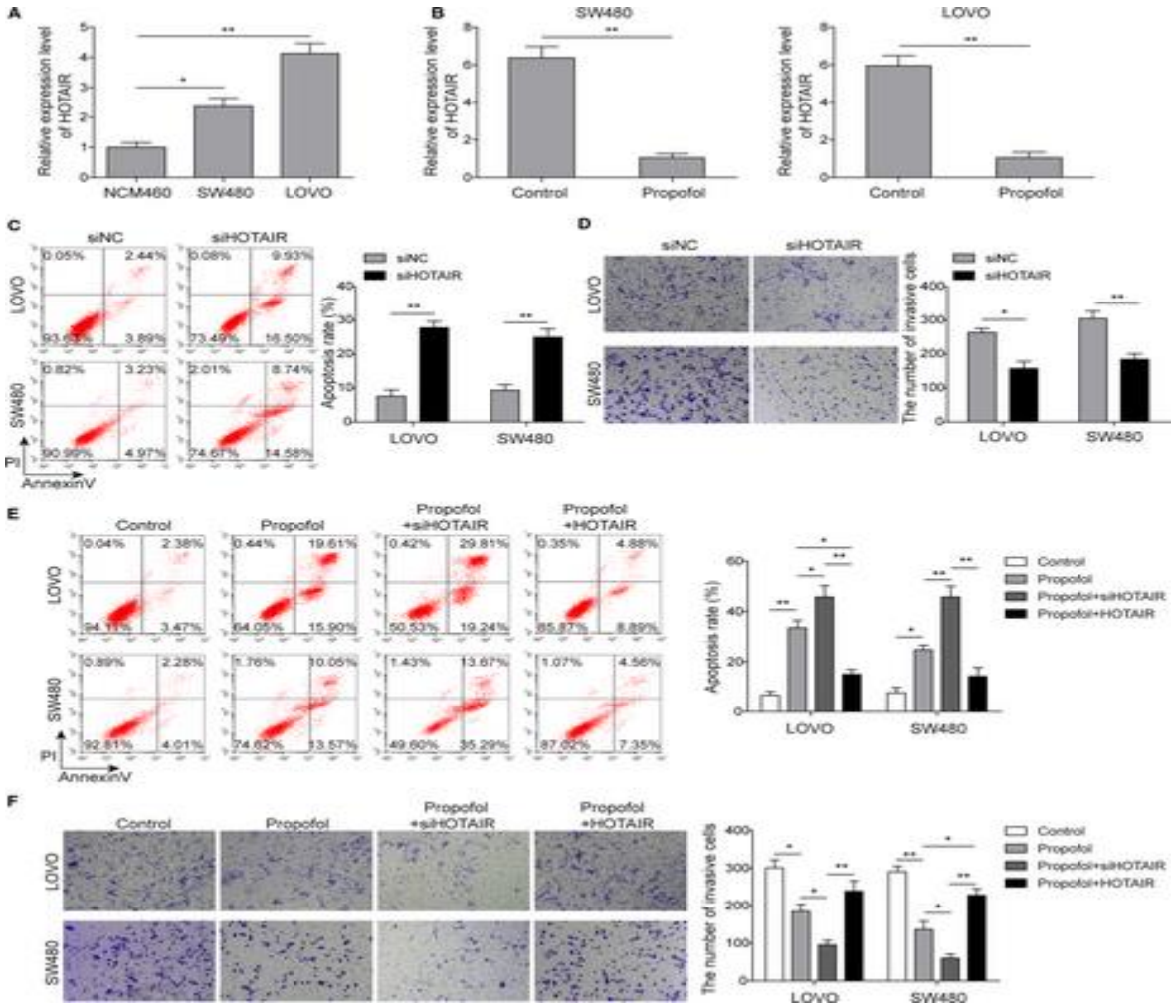
DOI: 10.1002/cam4.2840

ORIGINAL RESEARCH

Cancer Medicine Open Access WILEY

Effects of propofol on colon cancer metastasis through STAT3/HOTAIR axis by activating WIF-1 and suppressing Wnt pathway

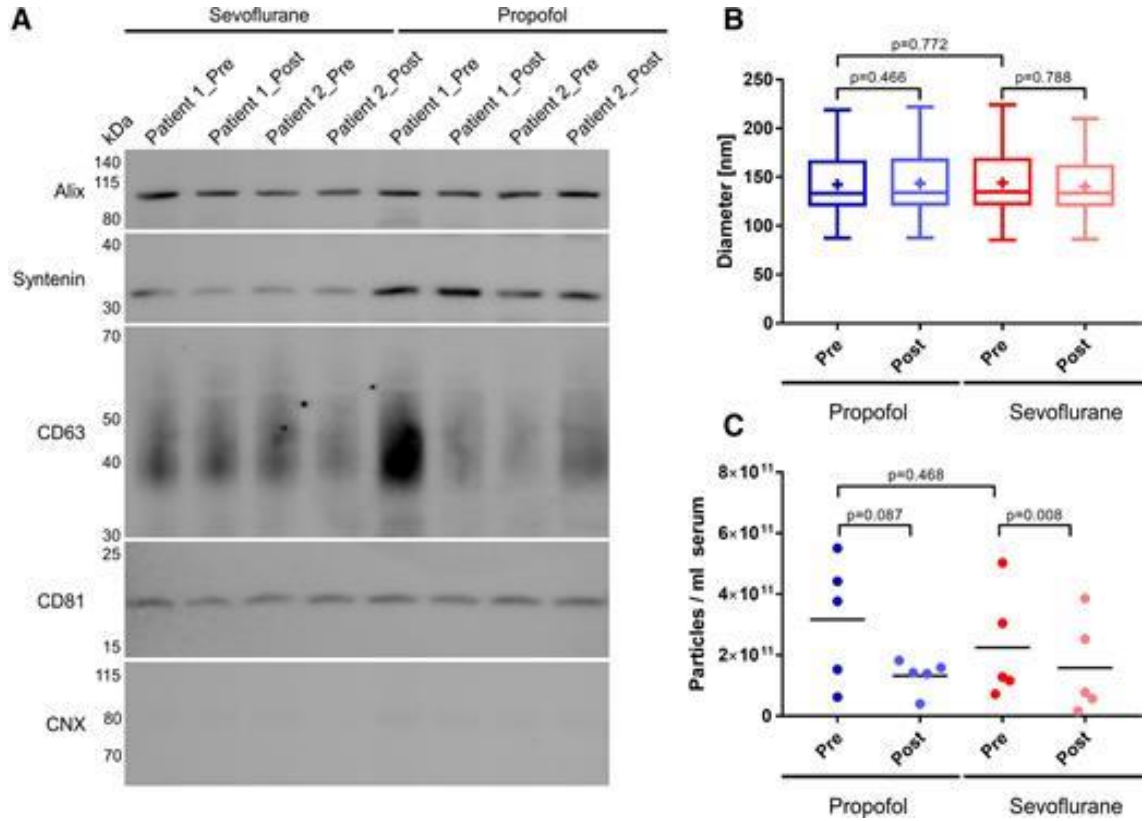
Yun-Fei Zhang | Chang-Sheng Li | Yi Zhou | Xi-Hua Lu



Perioperative Medicine | January 2020

Propofol and Sevoflurane Differentially Impact MicroRNAs in Circulating Extracellular Vesicles during Colorectal Cancer Resection: A Pilot Study FREE

Dominik Buschmann, M.Sc., Ph.D.; Florian Brandes, M.D.; Anja Lindemann, M.Sc., Ph.D.; Melanie Maerte, M.D.; Petra Ganschow, M.D.; Alexander Chouker, M.D.; Gustav Schelling, M.D. ✉; Michael W. Pfaffl, Ph.D.; Marlene Reithmair, M.D., vet.



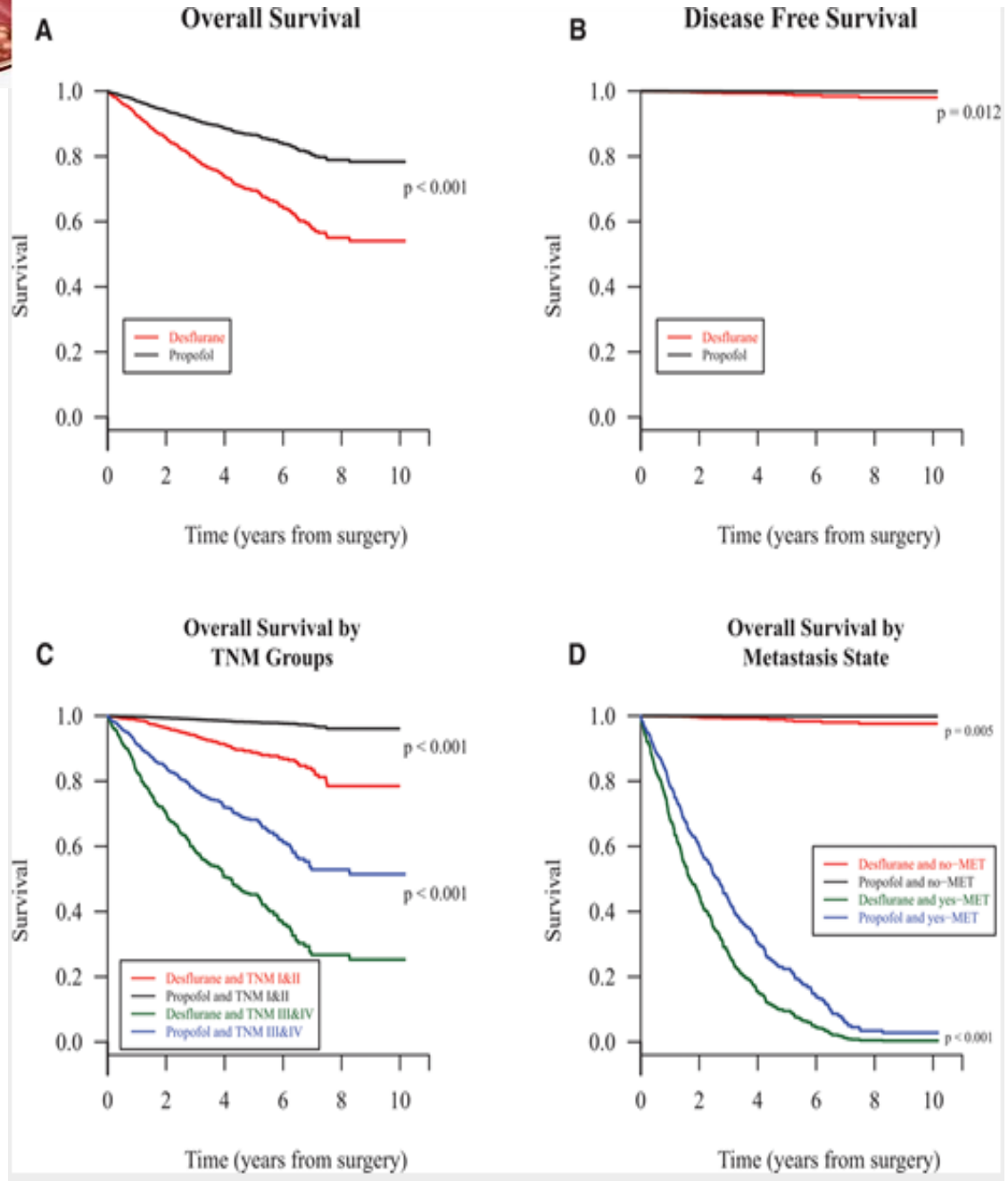
ANESTHESIOLOGY
Trusted Evidence: Discovery to Practice®
Perioperative Medicine | November 2018

Propofol-based Total Intravenous Anesthesia Is Associated with Better Survival Than Desflurane Anesthesia in Colon Cancer Surgery FREE

Zhi-Fu Wu, M.D.; Meei-Shyuan Lee, D.P.H.; Chih-Shung Wong, M.D., Ph.D.; Chueng-He Lu, M.D.; Yuan-Shiou Huang, M.D.; Kuen-Tze Lin, M.D.; Yu-Sheng Lou, M.S.; Chin Lin, Ph.D.; Yue-Cune Chang, Ph.D.; Hou-Chuan Lai, M.D.

In the matched analyses, the propofol-treated group had a better survival, irrespective of lower tumor–node–metastasis stage (hazard ratio, 0.22; 95% CI, 0.11 to 0.42; *P* < 0.001) or higher tumor–node–metastasis stage (hazard ratio, 0.42; 95% CI, 0.32 to 0.55; *P* < 0.001) and presence of metastases (hazard ratio, 0.67; 95% CI, 0.51 to 0.86; *P* = 0.002) or absence of metastases (hazard ratio, 0.08; 95% CI, 0.01 to 0.62; *P* = 0.016).

Conclusions: Propofol anesthesia for colon cancer surgery is associated with better survival irrespective of tumor-node-metastasis stage.

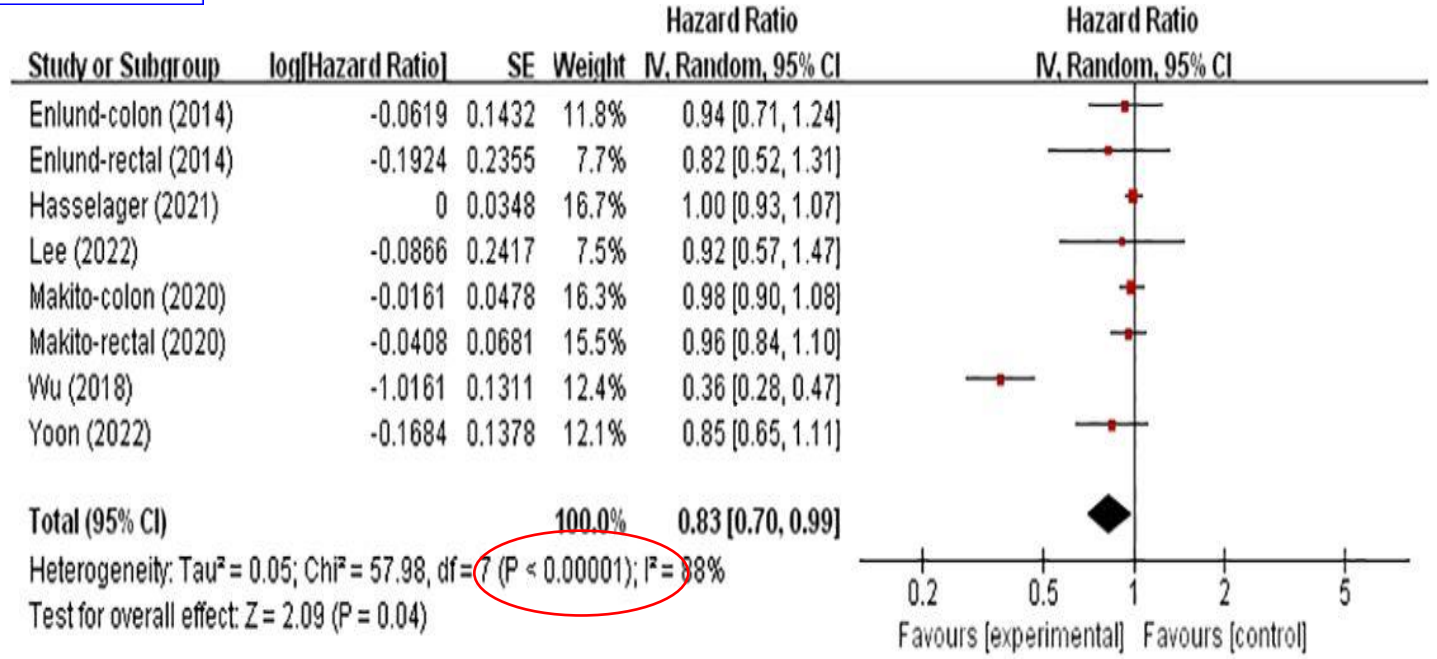


Front Oncol. 2024 Apr 15;14:1397197. doi: 10.3389/fonc.2024.1397197

Effect of different anaesthetic techniques on the prognosis of patients with colorectal cancer after resection: a systematic review and meta-analysis

Shijun Xia [1], Yuwen Zhu [1], Wenjiang Wu [1,*], Yue Li [1], Linchong Yu [1]

Finally, although our meta-analysis established a possible association, it inferred no causal relationship nor explained potential mechanisms. We believe that further prospective clinical trials are required to elucidate the molecular mechanisms underlying the role of anaesthetics in cancer prognosis.



In conclusion, we conducted a meta-analysis using six studies, which included 111043 patients, and the results showed an association between TIVA and postoperative mortality in cancer surgery, but its impact on RFS remains inconclusive.

Alexa et al. Trials (2022) 23:219
https://doi.org/10.1186/s13063-022-06157-4

STUDY PROTOCOL Open Access

The influence of TIVA or inhalation anesthesia with or without intravenous lidocaine on postoperative outcome in colorectal cancer surgery: a study protocol for a prospective clinical study

Alexandru L. Alexa[1,2*], Tiberiu F. Tat[3] and Daniela Ionescu[1,2,4]

400 patients

Cette étude vise à comparer l'influence de la TIVA et de l'anesthésie par inhalation sur les résultats à long terme chez les patients atteints de CCR subissant une intervention chirurgicale.

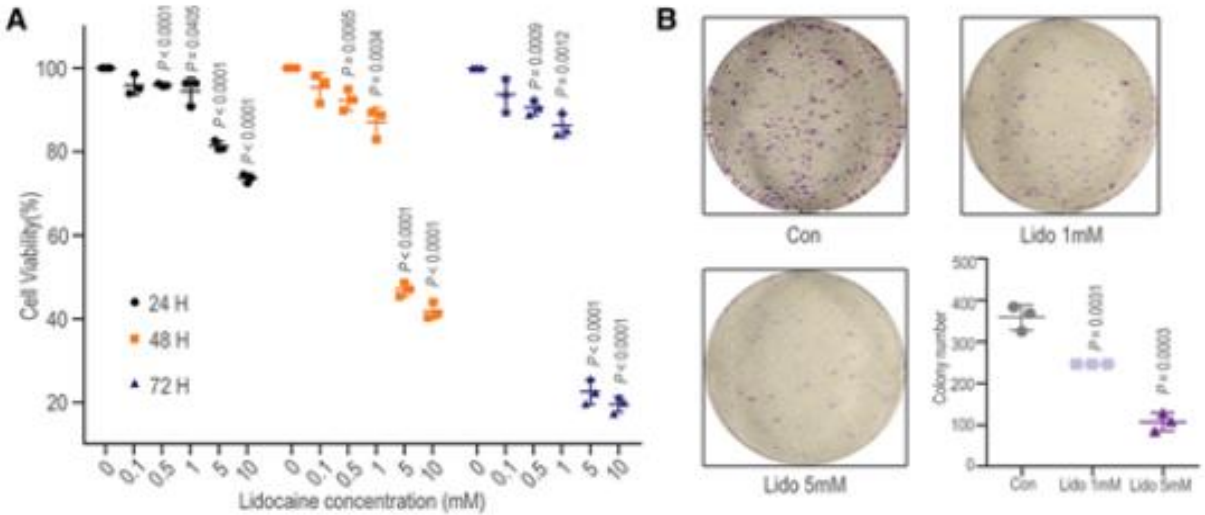
Les résultats à long terme comprennent l'incidence des récidives du cancer et la mortalité.

Survie globale avec la lidocaïne intraveineuse par rapport au placebo

Perioperative Medicine | May 2017

Lidocaine Induces Apoptosis and Suppresses Tumor Growth in Human Hepatocellular Carcinoma Cells *In Vitro* and in a Xenograft Model *In Vivo* FREE

Wei Xing, M.D., Ph.D. ✉; Dong-Tai Chen, M.D.; Jia-Hao Pan, M.D.; Yong-Hua Chen, M.D.; Yan Yan, M.D.; Qiang Li, M.D.; Rui-Feng Xue, M.D.; Yun-Fei Yuan, M.D.; Wei-An Zeng, M.D., Ph.D.



Conclusions: The authors' findings suggest that lidocaine may exert potent antitumor activity in hepatocellular carcinoma. Furthermore, combining lidocaine with cisplatin may be a novel treatment option for hepatocellular carcinoma.

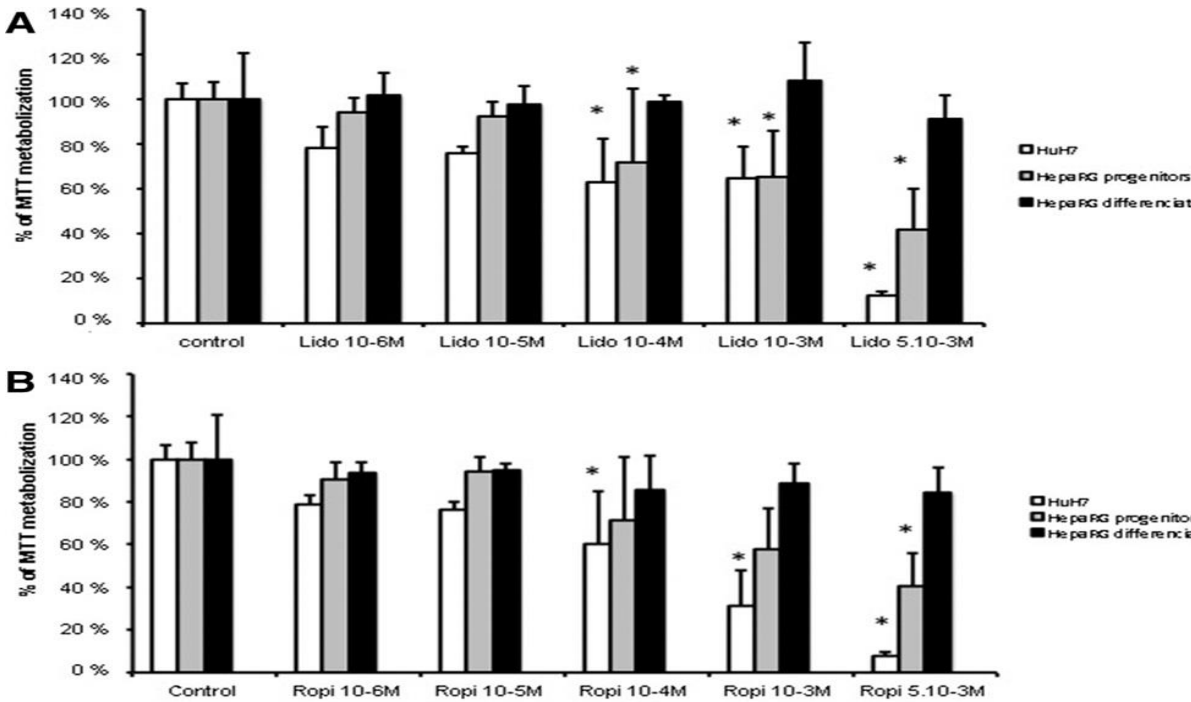
ANESTHESIA & ANALGESIA

LIVER CANCER

CANCER AND SUPPORTIVE CARE: ORIGINAL LABORATORY RESEARCH REPORT

Local Anesthetics Inhibit the Growth of Human Hepatocellular Carcinoma Cells

Le Gac, Grégoire MD*†; Angenard, Gaëlle BS*; Clément, Bruno PhD*; Laviolle, Bruno MD, PhD‡; Coulouarn, Cédric PhD*; Beloeil, Hélène MD, PhD*†



CONCLUSIONS:

The data demonstrate that LAs induced profound modifications in gene expression profiles of tumor cells, including modulations in the expression of cell cycle–related genes that result in a cytostatic effect and induction of apoptosis.

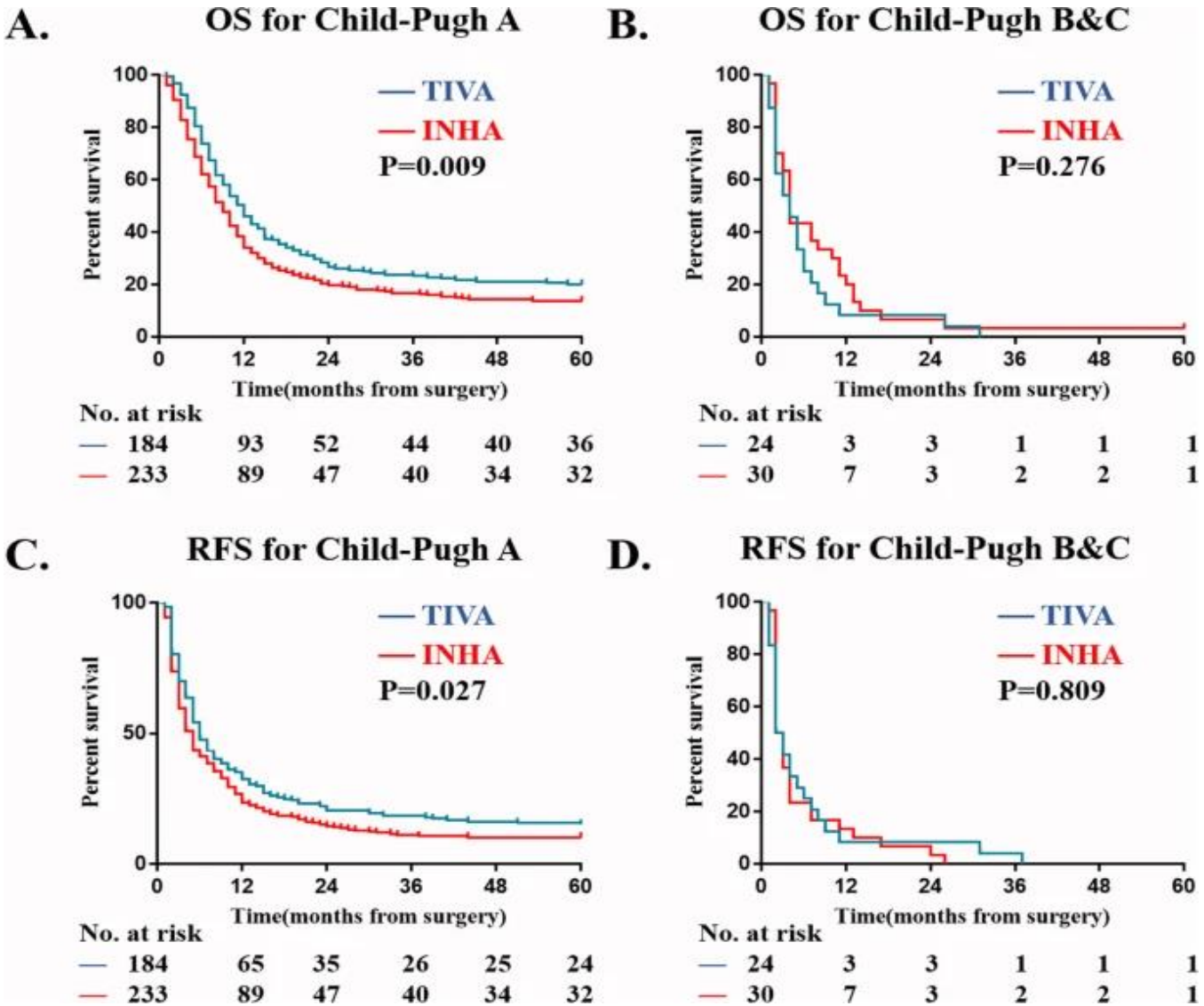
BMC Anesthesiology **20**, Article number: 233 (2020)

Distant survival for patients undergoing surgery using volatile versus IV anesthesia for hepatocellular carcinoma with portal vein tumor thrombus: a retrospective study

Xiao-Yan Meng, Xiu-Ping Zhang, Zhe Sun, Hong-Qian Wang & Wei-Feng Yu

Conclusion

This retrospective analysis identifies that TIVA is associated with better outcomes compared with INHA. Future prospective studies clinical and translational studies are required to verify this difference and investigate underlying pathophysiology.



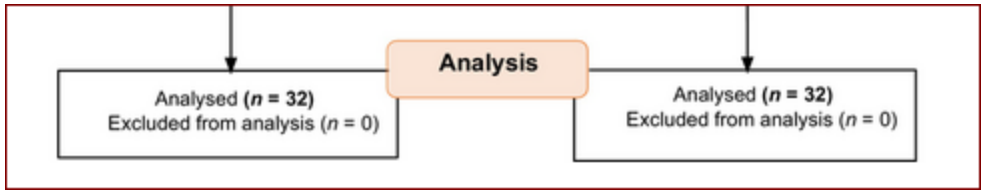
IJC INTERNATIONAL JOURNAL of CANCER

Gallbladder Cancer

Randomized Controlled Trial > Int J Cancer. 2025 Jan 15;156(2):447-455. doi: 10.1002/ijc.35179. Epub 2024 Oct 9.

Effect of anesthetic technique on antitumor immunity in patients undergoing surgery for gall bladder cancer: A prospective randomized comparative study

Ankit Sharma [1], Lata Kumari [1], Brajesh Kumar Ratre [1], Maroof Ahmad Khan [1], Sunil Kumar [1], Rakesh Kumar Deepak [1], Vinod Kumar [1], Nishkarsh Gupta [1], Rakesh Garg [1], Seema Mishra [1], Sushma Bhatnagar [1], Sachidanand Jee Bharati [1]



There was a statistically significant difference in the postoperative value of TGF-β (higher in group T). There was a statistically significant difference in postoperative interleukin-17A value (indicative of TH17 cells), and it was found to be higher in group S. Propofol-based TIVA increases serum TGF-β levels. At the same time, Sevoflurane modulates T-helper cells-based immunity to increase TH17 cells in patients with gall bladder cancer. Multiple larger studies will be required to validate the results and provide useful recommendations.

Basic Clin Pharmacol Toxicol

2019 Sep;125(3):271-278

ORIGINAL ARTICLE

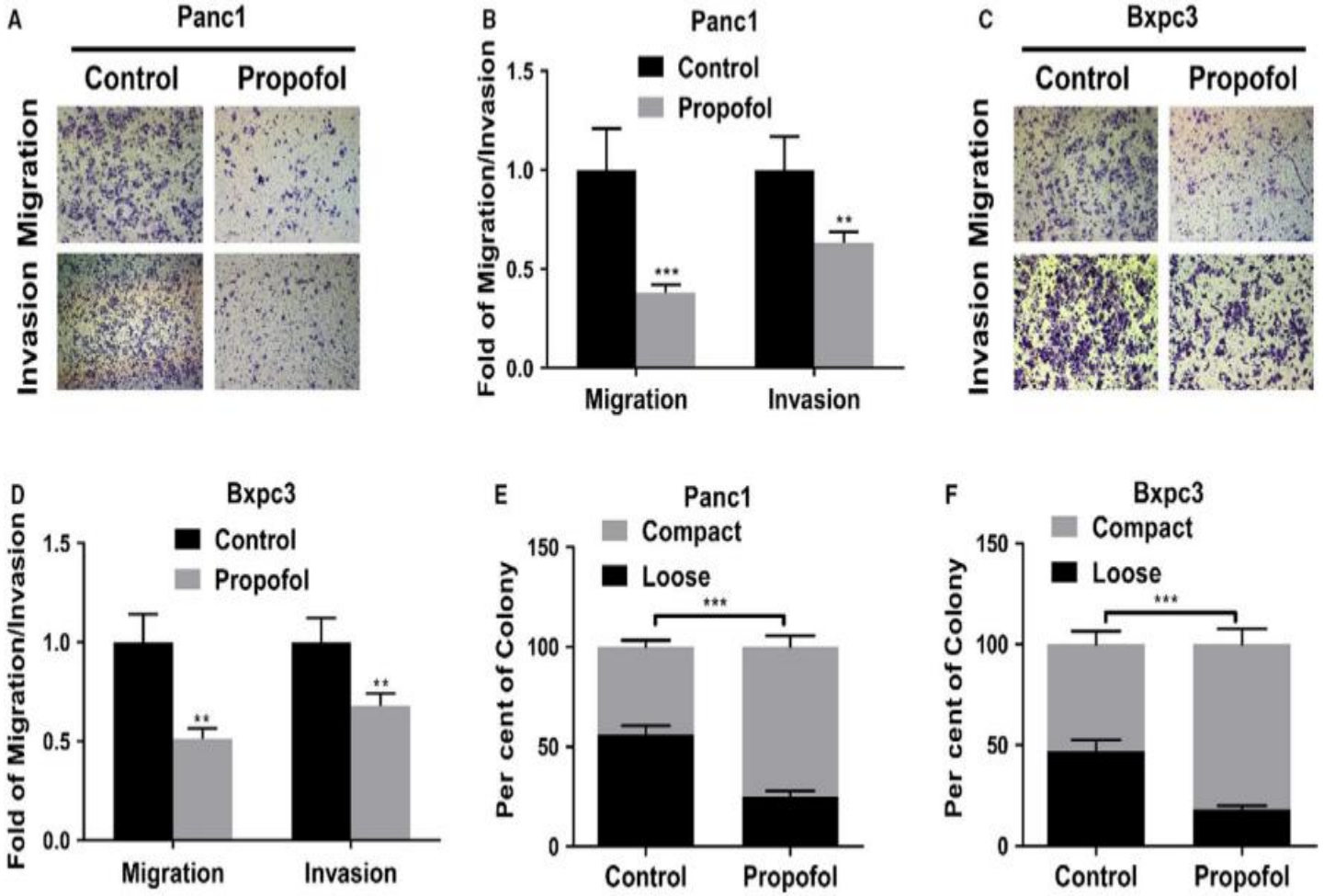
BCPT

PANCREATIC CANCER

Propofol inhibits pancreatic cancer proliferation and metastasis by up-regulating miR-328 and down-regulating ADAM8

Xiangdi Yu[1] | Yutong Gao[1,2] | Fangxiang Zhang[1]

In conclusion, our results suggest that propofol plays critical roles in repressing growth, migration and invasion of pancreatic cancer cells. It up-regulates the expression of miR-328 to inhibit ADAM8. This study may provide direct evidence to support further use of propofol in surgical treatment of pancreatic cancer for the purpose of improving cancer prognosis and survival.



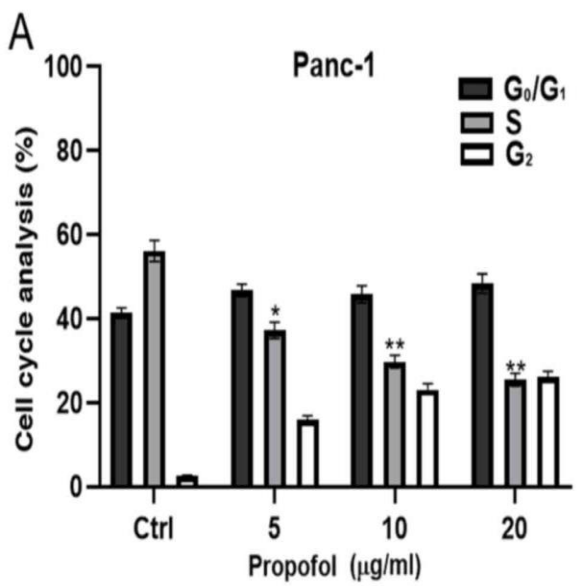
Oncology Reports

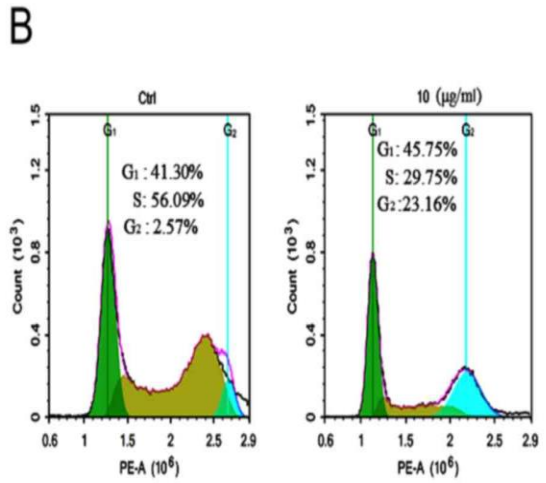
Oncol Rep. 2021 Dec;46(6):249. doi: 10.3892/or.2021.8200.

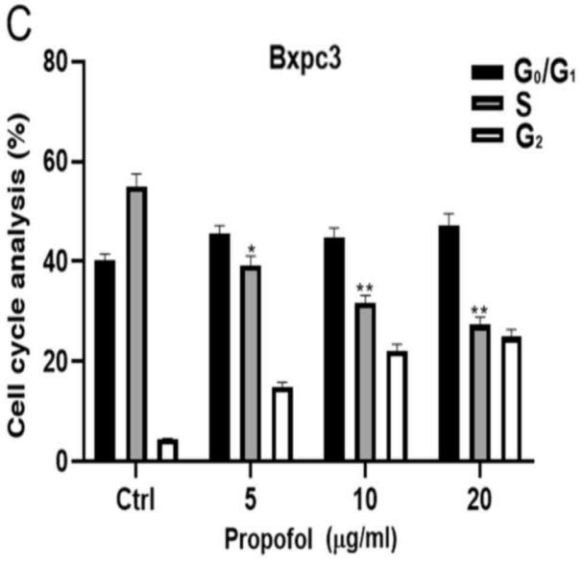
Propofol mediates pancreatic cancer cell activity through the repression of ADAM8 via SP1

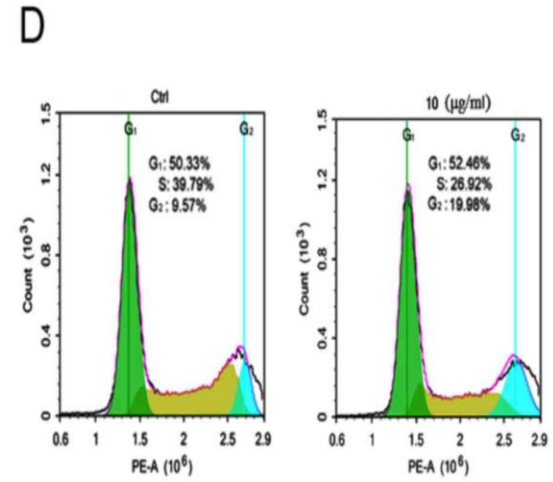
Authors: Yutong Gao, Yu Zhou, Chunlin Wang, Klarke M. Sample, ✉Xiangdi Yu,

Le propofol joue un rôle essentiel dans l'inhibition de la viabilité et de la migration des cellules cancéreuses du pancréas, il bloque également la progression du cycle cellulaire en phase S en ciblant SP1 pour réguler ADAM8.







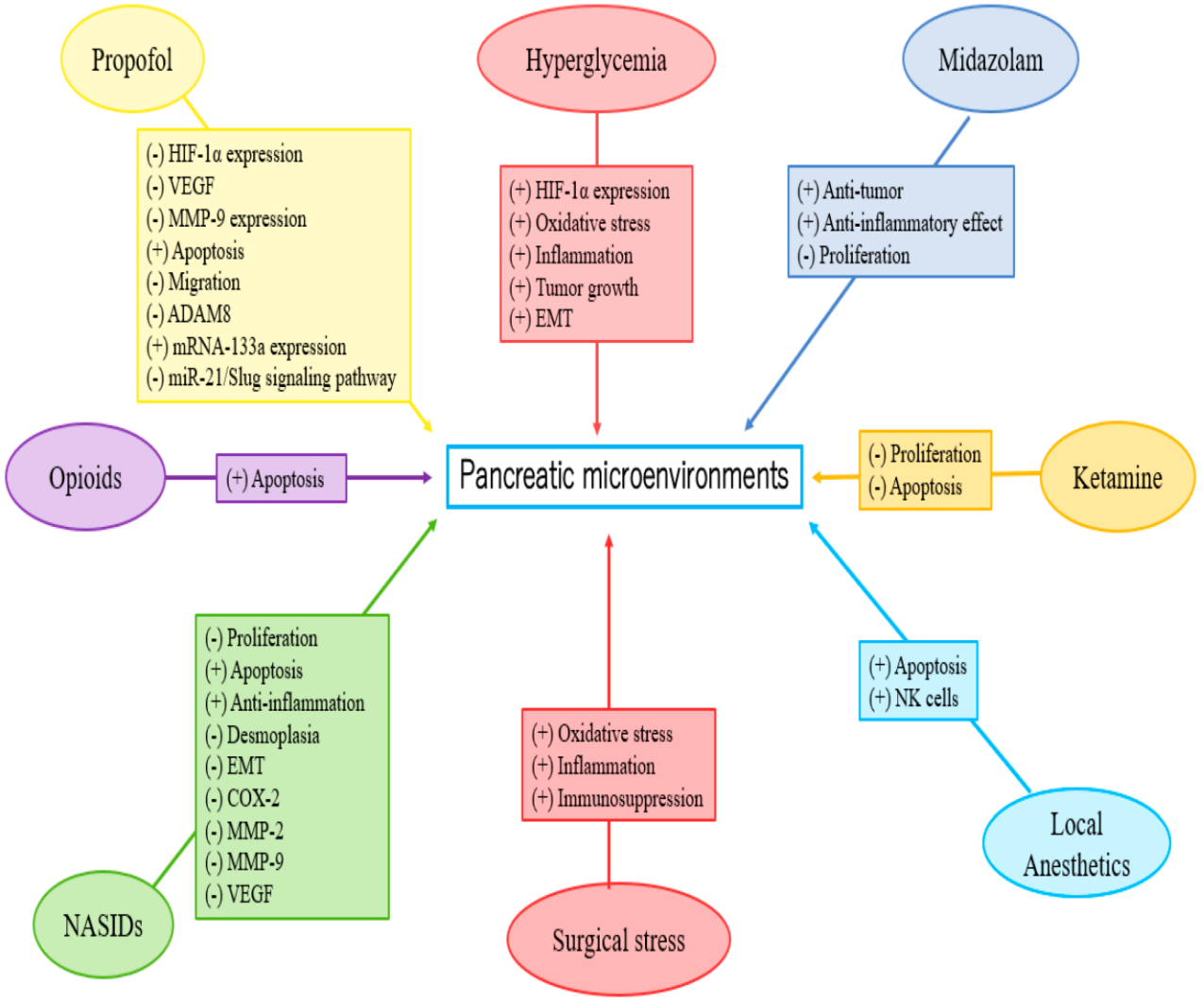


Review > Cancers (Basel). 2022 May 28;14(11):2684. doi: 10.3390/cancers14112684.

Pancreatic Cancer and Microenvironments: Implications of Anesthesia

Hou-Chuan Lai [1], Yi-Wei Kuo [2], Yi-Hsuan Huang [1], Shun-Ming Chan [1], Kuang-I Cheng [2 3], Zhi-Fu Wu [1 2 3 4]

Jusqu'à présent, il existe très peu de preuves permettant de recommander des anesthésiques ou des techniques d'analgésie spécifiques pour la chirurgie du CP.



British Journal of Anaesthesia **113** (S1): i63–i67 (2014)
Advance Access publication 9 July 2014 · doi:10.1093/bja/aet581

BJA

Differential effects of serum from patients administered distinct anaesthetic techniques on apoptosis in breast cancer cells *in vitro*: a pilot study

A. I. Jaura[1,2], G. Flood[1,2], H. C. Gallagher[2] and D. J. Buggy[1,2,3,4*]

Sevoflurane/opioid (*n*=10) Propofol/paravertebral (*n*=10)

Conclusions: Serum from patients given sevoflurane anaesthesia and opioids for primary breast cancer surgery reduces apoptosis in ER-negative breast cancer cells to a greater extent than serum from patients given propofol-paravertebral anaesthesia. Anaesthetic technique might affect the serum milieu in a manner that impacts cancer cell apoptosis, and thereby tumour metastasis.

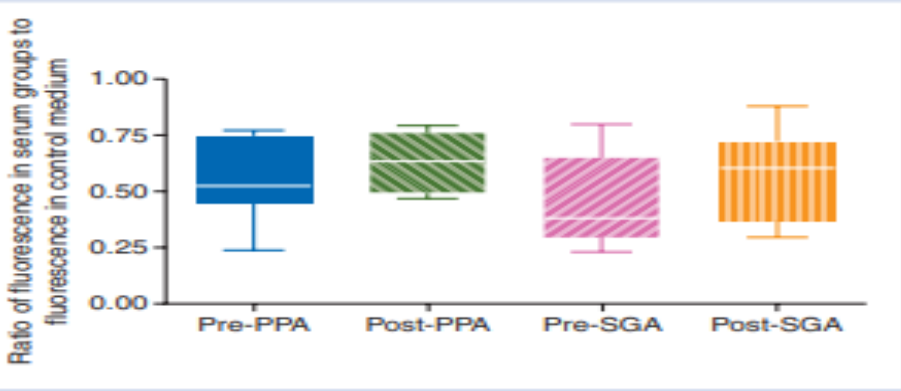


Fig 1 Effects of serum on breast cancer cell viability. No significant difference in the effect of serum from patients receiving the two anaesthetic techniques on cell viability ratio. Cell viability measured as fluorescence emitted relative to control. PPA, propofol/paravertebral anaesthesia group; SGA, sevoflurane general anaesthesia group.

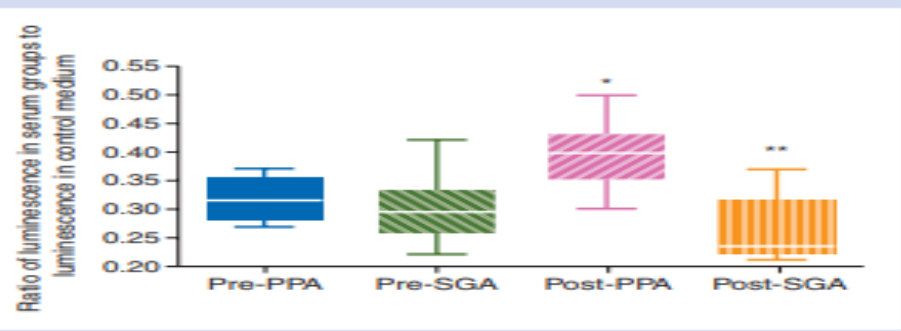


Fig 2 Effects of serum on breast cancer cell apoptosis. Decreased apoptosis in postoperative serum from the SGA group compared with the postoperative PPA group ($P=0.001$) compared with the preoperative SGA group ($P=0.04$). Apoptosis measured as luminescence relative to control.

Submitted: 28-May-2023; Revised: 20-Aug-2023; Accepted: 09-Oct-2023; Published: 23-Feb-2024

REVIEW ARTICLE

Effects of propofol intravenous general anesthesia and inhalational anesthesia on T-lymphocyte activity after breast cancer surgery: A meta-analysis

Daqi Sun, Kunyue Li, Ziqi Chai, Lijuan Wang, Shimin Gu, Na Sun, Yu Zhang, Yuxia Wang, Tao Wang
Department of Anesthesiology, The Third Affiliated Hospital of Zhengzhou University, Zhengzhou, China

Background: Breast cancer is one of the most common cancers in women. General anesthesia is a commonly used anesthesia method for breast cancer surgery, and studies have confirmed that general anesthesia can induce immunosuppression in breast cancer patients and increase the metastasis rate of tumors. However, the difference between the effects of intravenous general anesthesia and inhalation anesthesia on the function of T-lymphocytes is still controversial, and it is necessary to explore reasonable anesthesia methods to reduce immunosuppression caused by surgery and anesthesia. **Materials and Methods:** Databases (Embase, PubMed, Cochrane Library, CBM, CNKI, and Wanfang) were searched (up to October 2022) for randomized controlled trials (RCTs) comparing intraoperative inhalation anesthesia and propofol intravenous anesthesia in breast cancer patients, with the outcome of T-lymphocyte subsets. The meta-analysis was performed by STATA 14.0. **Results:** Six RCTs with 352 patients were included in the study. Compared with inhalation anesthesia, there was no difference in T-lymphocyte subsets between the two groups immediately after surgery, but the activities of $CD4^+$ T cells in patients with propofol anesthesia were higher (standard mean difference [SMD] = 0.234, 95% confidence interval [CI]: 0.003–0.466, $P = 0.047$, $I^2 = 44.1\%$) than those under inhalation anesthesia 1 day after surgery, and $CD4^+/CD8^+$ activities in patients with propofol anesthesia were higher (SMD = 304, 95% CI: 0.072–0.537, $P = 0.010$, $I^2 = 48.0\%$) than those under inhalation anesthesia 1 day after surgery. **Conclusion:** There were no differences in the effects of propofol and inhalation anesthetics on T-lymphocytes immediately after surgery, but the inhibitory effects of inhalation anesthetics on $CD4^+$ and $CD4^+/CD8^+$ cells were stronger 1 day after surgery.

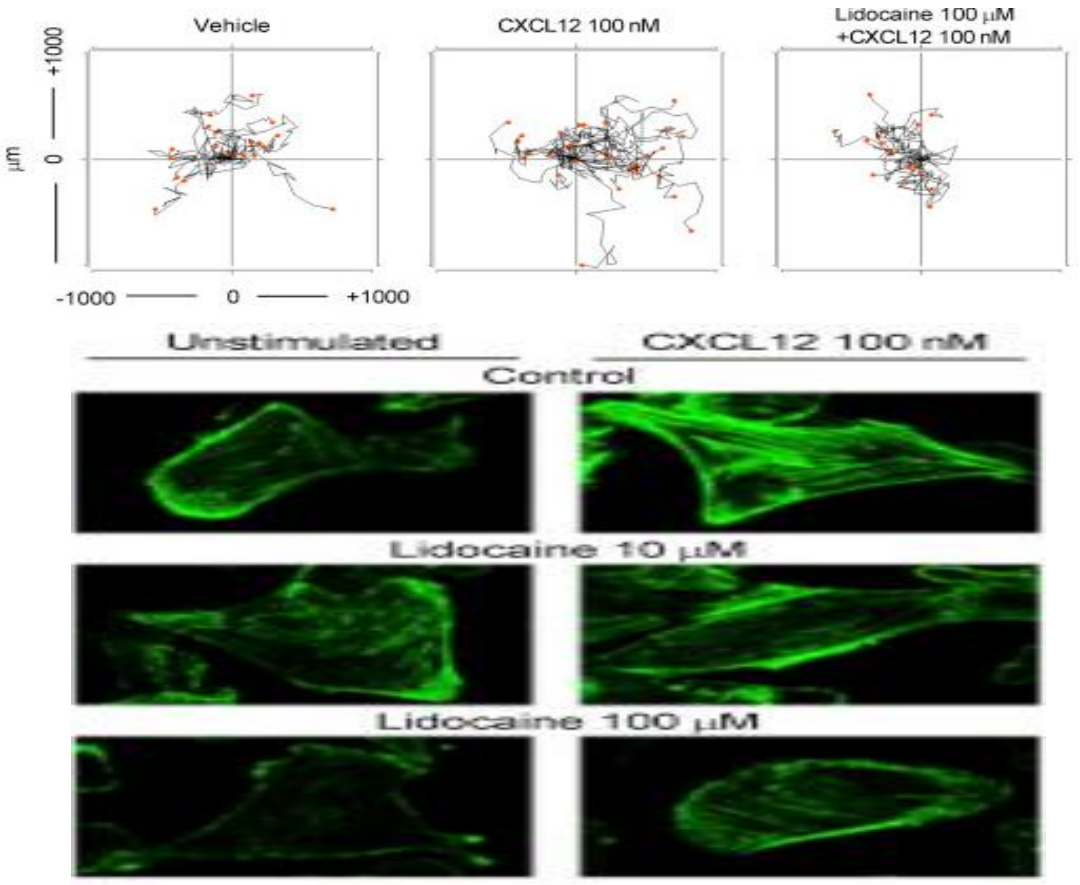
Indicators of immune function	Number of studies included	Number of examples/*n*	SMD (95% CI)		*P*	
			T_1	T_2	T_1	T_2
$CD3^+$	5	312	0.202 (−0.303~0.707)	0.243 (−0.148~0.635)	>0.05	>0.05
$CD4^+$	6	352	0.157 (−0.404~0.718)	0.234 (0.003~0.466)	>0.05	<0.05
$CD8^+$	6	352	−0.079 (−0.440~0.283)	0.167 (−0.064~0.397)	>0.05	>0.05
$CD4^+/CD8^+$	6	352	0.389 (−0.176~0.954)	0.304 (0.072~0.537)	>0.05	<0.05

BJA British Journal of Anaesthesia

> Br J Anaesth. 2018 Oct;121(4):962-968. doi: 10.1016/j.bja.2018.07.015. Epub 2018 Aug 16.

Lidocaine inhibits cytoskeletal remodelling and human breast cancer cell migration

G D'Agostino [1], A Saporito [2], V Cecchinato [3], Y Silvestri [3], A Borgeat [4], L Anselmi [5], M Uguccioni [6]

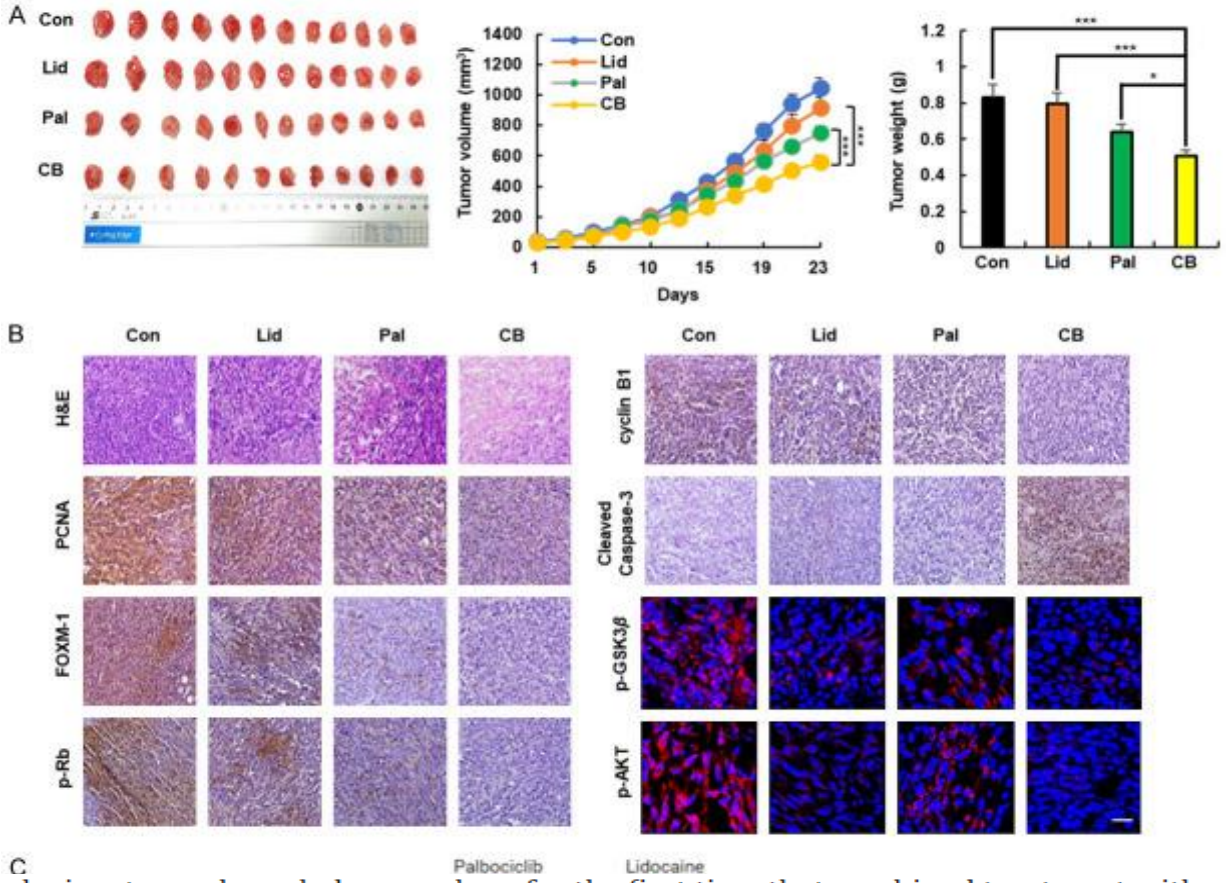


Conclusions: At clinical concentrations, lidocaine significantly inhibits CXCR4 signalling. The results presented shed new insights on the molecular mechanisms governing the inhibitory effect of lidocaine on cell migration.

American Journal of Cancer Research
ISSN: 2156-6976

Am J Cancer Res. 2022 Jul 15;12(7):3083–3098.

Lidocaine enhances the efficacy of palbociclib in triple-negative breast cancer



In conclusion, to our knowledge, we show for the first time that combined treatment with palbociclib and lidocaine significantly inhibited the growth of TNBC cells, and showed synergistic anticancer activities by inhibiting cell proliferation and inducing apoptosis *in vitro and in vivo*. In addition, this combination may augment the therapeutic effect by inhibiting the PI3K/AKT/GSK3β and EMT pathways. Furthermore, these results suggest that the use of lidocaine during surgery or perioperative conditions may be beneficial to the treatment efficiency of cancer patients receiving palbociclib in TNBC (Figure 6C).

RESEARCH Open Access

Lidocaine effects on neutrophil extracellular trapping and angiogenesis biomarkers in postoperative breast cancer patients with different anesthesia methods: a prospective, randomized trial

Wenjuan Zhang[1†], Jiao Liu[1†], Xiaohui Li[2], Zhixia Bai[2], Yan Sun[2] and Xuexin Chen[2*]

Zhang et al. BMC Anesthesiology (2024) 24:162
https://doi.org/10.1186/s12871-024-02540-7

BMC Anesthesiology

This trial found that the addition of lidocaine to either volatile sevoflurane or propofol i.v. anaesthesia reduced expression of NETosis (H3Cit and MPO) and MMP3, as markers of metastatic risk, comared with not adding lidocaine.

Table 3 Serum biomarkers

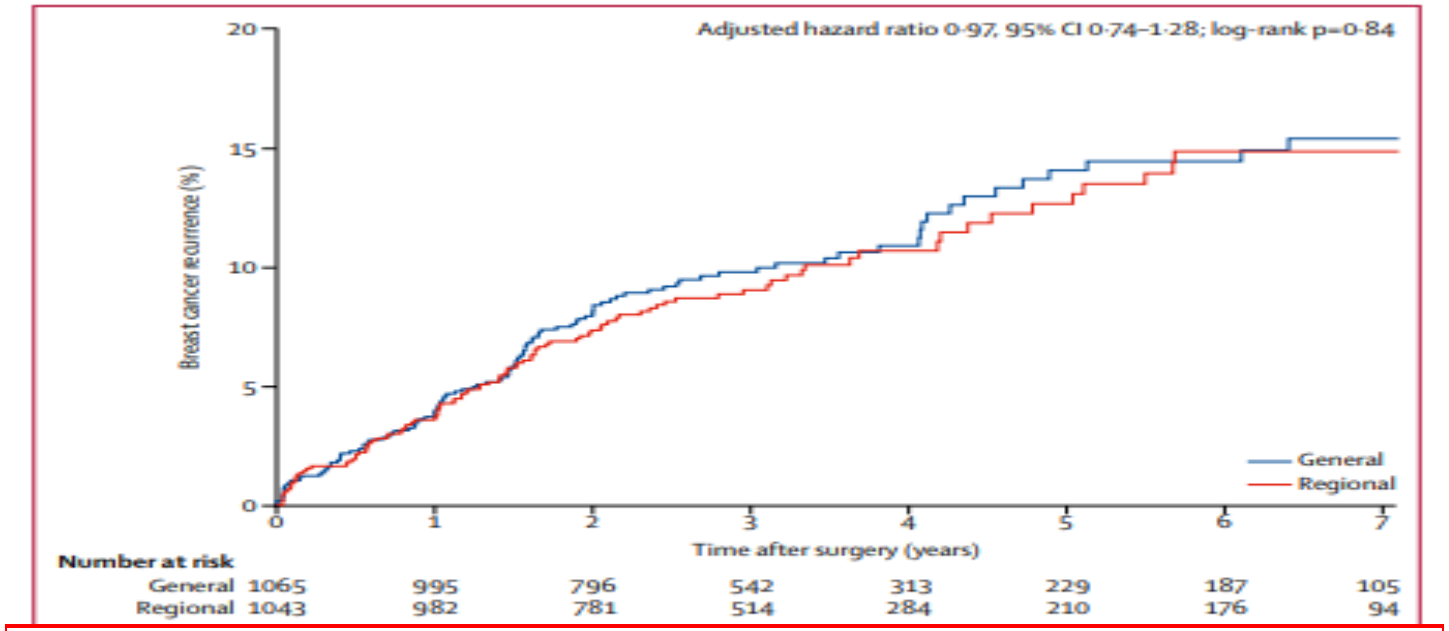
Trial groups		Group S Sevoflurane (*n* = 29)	Group SL Sevoflurane + lidocaine (*n* = 30)	Group P Propofol-TIVA (*n* = 30)	Group PL Propofol-TIVA + lidocaine (*n* = 30)	*P*
H3Cit (ng ml^{-1})	Preoperative	4.17(3.58–4.67)	3.98(3.34–4.62)	4.05(3.44–4.52)	4.01(3.56–4.42)	0.877
	Postoperative	3.61(3.10–3.94)*	3.21(2.77–3.91)†	3.21(2.92–3.57)‡	3.08(2.66–3.65)$^{¥}$	0.0003 <0.0001† <0.0001‡ <0.0001¥
MPO (ng ml^{-1})	Preoperative	10.39(6.89–17.22)	8.62(6.13–16.90)	9.45(6.73–17.37)	8.69(6.72–18.80)	0.928
	Postoperative	14.31(8.55–20.87)§	13.44(9.42–16.16)	14.34(9.87–19.75)**	12.08(6.37–20.23)	0.032§ 0.035**
NE (ng ml^{-1})	Preopera					0.999
	Postoper					0.045¶ 0.037##
MMP-9 (ng ml^{-1})	Preoperative	735.82(538.11-1036.80)	739.80(486.81-1037.14)	647.91(472.22-1268.65)	719.35(513.42-973.21)	0.999
	Postoperative	1622.04(1073.59–1945.00)***	1564.15(972.44-2138.75)¶	1364.97(868.04-1902.74)$^{£}$	1509.65(1121.78-1946.54)$^{#}$	<0.0001*** <0.0001¶ 0.013£ <0.0001#
VEGF-A (pg ml^{-1})	Preoperative	103.90(40.49-192.93)	90.36(34.53-170.03)	100.59(62.12–136.80)	123.03(82.09–189.20)	0.243
	Postoperative	114.29(55.04-170.85)	95.78(50.61-202.51)	96.86(52.85-129.77)	117.35(89.77-190.17)	0.234

Conclusions Regardless of the specific technique employed for general anesthesia, there was no increase in the postoperative serum concentrations of MPO and NE after perioperative lidocaine infusion compared to preoperative serum concentrations. This supports the hypothesis that intravenous lidocaine during cancer surgery aimed

Randomized Controlled Trial > Lancet. 2019 Nov 16;394(10211):1807-1815.
doi: 10.1016/S0140-6736(19)32313-X. Epub 2019 Oct 20.

Recurrence of breast cancer after regional or general anaesthesia: a randomised controlled trial

Daniel I Sessler [1], Lijian Pei [2], Yuguang Huang [3], Edith Fleischmann [4], Peter Marhofer [4], Andrea Kurz [5], Douglas B Mayers [6], Tanja A Meyer-Treschan [7], Martin Grady [6], Ern Yu Tan [8], Sabry Ayad [6], Edward J Mascha [9], Donal J Buggy [10]; Breast Cancer Recurrence Collaboration



Interpretation In our study population, regional anaesthesia-analgesia (paravertebral block and propofol) did not reduce breast cancer recurrence after potentially curative surgery compared with volatile anaesthesia (sevoflurane) and opioids. The frequency and severity of persistent incisional breast pain was unaffected by anaesthetic technique. Clinicians can use regional or general anaesthesia with respect to breast cancer recurrence and persistent incisional pain.

	Regional (n=1043)	General (n=1065)	ASD*
(Continued from previous column)			
Intraoperative variables			
Crystalloid (L)	1 (1–1·5)†	1 (1–1·5)†	0·13
Colloid (L)	0 (0–0)†	0 (0–0)†	0·019
Blood loss (mL)**	100 (10–250)†	50 (10–200)†	0·12
Allogeneic blood (mL)	0 (0–0)	0 (0–0)†	0·03
MAP (mm Hg)	77 (9·9)†	75 (9·2)‡	0·20
Heart rate	73 (11)†	69 (9)‡	0·35
Bispectral index	51 (13)¶	55 (13)¶	0·32
Core temperature (°C)	36·1 (35·9–36·5)†	36·2 (36·0–36·5)†	0·17
Sevoflurane (MAC h)	0 (0–0)†	0·9 (0·7–1·5)†	1·95
Sevoflurane (any)	176 (17%)†	1027 (97%)†	2·71
Sevoflurane amount, if received (MAC h)	1·3 (0·8)	1·1 (0·7)	0·21
Ondansetron (mg)	4 (0–4)	4 (4–4)	0·10
Propofol (mg)	525 (377–809)	120 (100–150)	2·13
Midazolam (mg)	1 (1–2)	1 (1–2)	0·15
Lidocaine (mg)	0 (0–0)	0 (0–30)	0·11
Neostigmine (mg)	0 (0–1)	1 (0–1)	0·09
Rocuronium (mg)	20 (0–30)	20 (0–30)	0·05
Ephedrine (mg)	0 (0–10)	0·0 (0–12)	0·08
Atropine (mg)	0 (0–0·5)	0·5 (0–0·5)	0·09
Fentanyl (µg)	100 (50–100)	200 (100–250)	1·4
Intraoperative morphine equivalents (mg)	10 (5–10)	20 (15–25)	1·8
Postoperative treatment			
Radiation	437 (42%)†	428 (40%)†	0·032
Chemotherapy	582 (56%)†	567 (54%)†	0·05

frontiers in Oncology

REVIEW
published: 09 February 2022
doi: 10.3389/fonc.2022.795864

Current Status and Prospects of Anesthesia and Breast Cancer: Does Anesthetic Technique Affect Recurrence and Survival Rates in Breast Cancer Surgery?

Ryungsa Kim[1], Ami Kawai[1], Megumi Wakisaka[1] and Takanori Kin[2]*

Ref. (year)	Cancer type (patient *n*)	Surgery type	Anesthetic technique	Outcomes	Benefit/ remarks
111 (2017)	Gastrointestinal, breast, prostate, ovarian (*n* = 67,577)	Cancer surgery	RA/inhalation anesthesia vs. inhalation anesthesia	No difference in OS, RFS, or BRFS Some benefit of OS in RCT on colorectal cancer	Negative
112 (2019)	Breast, esophageal, NSLC (*n* = 7866) Breast, colorectal, gastric, esophageal, NSLC, mixed (*n* = 18,778)	Radical cancer surgery	Propofol TIVA vs. inhalation anesthesia	Improved RFS with TIVA Improved OS with TIVA	Positive

RCT, randomized controlled trial; NSLC, non-small cell lung cancer; BRFS, biochemical recurrence-free survival.

- At this time, RCTs have not provided sufficient evidence that the anesthetic technique is associated with the recurrence rate or long-term outcomes in patients undergoing breast cancer surgery. Further such trials are needed for the development of systemic breast cancer therapies.

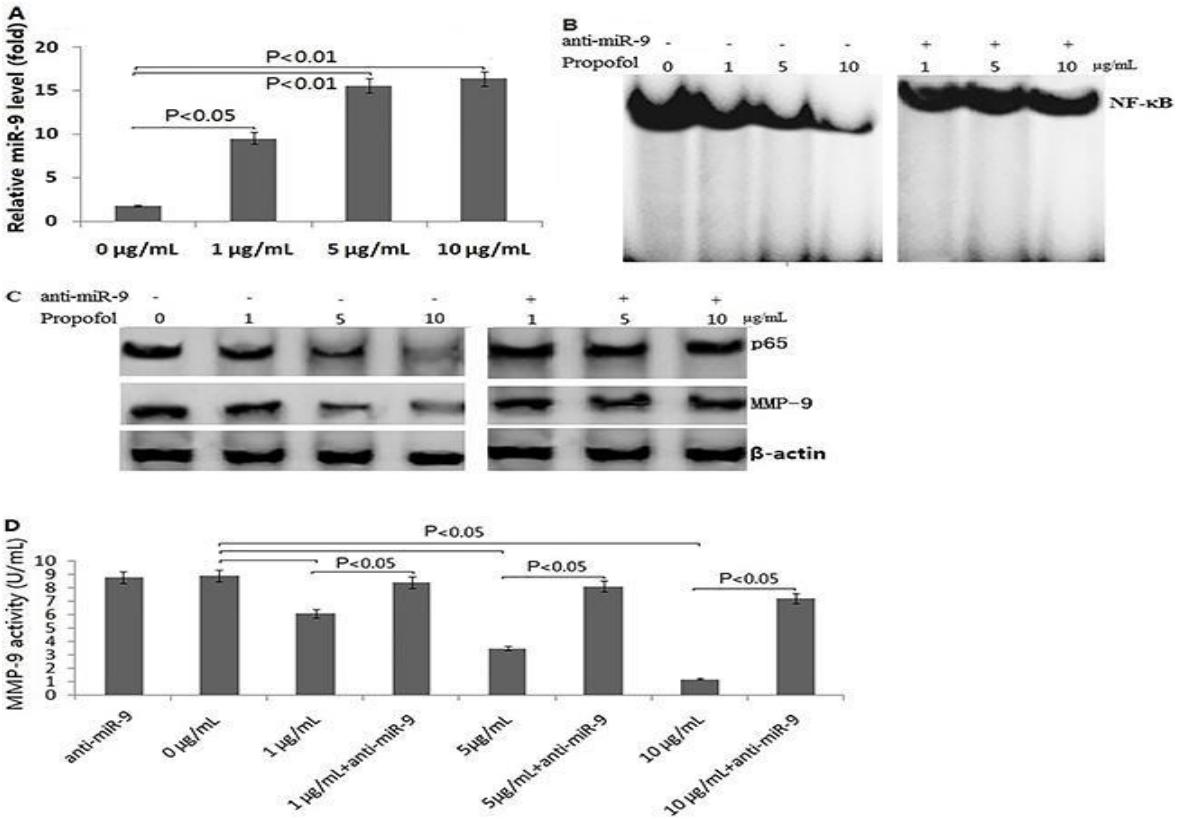
Ref. (year)	Cancer type (patient *n*)	Surgery type	Anesthetic technique	Outcomes	Benefit/ remarks
98 (2006)	Stage I–III breast (*n* = 129)	Mastectomy and axillary clearance	GA/PVA (*n* = 50) *vs.* GA/opioid anesthesia (*n* = 79)	4-fold reduced recurrence or metastasis risk during 2.5 to 4-year follow-up period with GA/PVA Increased RFS at 3 years with GA/PVA (94% vs. 77%)	Positive
99 (2014)	Stage 0–III breast (*n* = 619)	Breast-conserving surgery or total mastectomy	RA (*n* = 123) *vs.* RA/GA (*n* = 90) *vs.* GA (*n* = 406)	Trend of reduced recurrence with RA, with or without GA	Potential benefit
100 (2014)	Breast, colon, rectal (*n* = 2838)	Radical cancer surgery	Propofol (*n* = 902) *vs.* sevoflurane (*n* = 1935)	Favorable 1- and 5-year OS rates with propofol	Potential benefit
101 (2015)	Stage 0–III breast (*n* = 358)	Partial or total mastectomy without axillary node dissection	GA/PVA (*n* = 193) *vs.* GA (*n* = 165)	No difference in recurrence	Negative
102 (2016)	Stage 0–III breast (*n* = 1107)	Mastectomy or breast-conserving surgery	LRA (*n* = 646) *vs.* GA (*n* = 461); PSM (*n* = 375 each)	No difference in OS, DFS, or LRR	Negative/PSM
103 (2016)	Stage I–III breast (*n* = 792)	Mastectomy with or without axillary node dissection	PVB (*n* = 198) *vs.* opioid-based analgesia (*n* = 594); PSM (*n* = 197 each)	No difference in RFS or OS	Negative/PSM
104 (2016)	Stage I–III breast (*n* = 325)	Modified radical mastectomy	Propofol TIVA (*n* = 173) *vs.* sevoflurane (*n* = 152)	Less recurrence over 5 years with propofol	Positive
105 (2017)	Stage I–III breast (*n* = 2645)	Breast-conserving surgery or mastectomy	Propofol TIVA (*n* = 56) *vs.* inhalation anesthesia (*n* = 2589): PSM (1:5 matching for each inhalation agent)	No difference in RFS or OS	Negative/PSM
106 (2017)	Stage I–II breast (*n* = 91, elderly)	Breast-conserving surgery with SLNB or axillary dissection	LA/midazolam/remifentanil/propofol (*n* = 37) *vs.* GA (*n* = 54)	No difference in locoregional RFS or OS	Negative
107 (2019)	Stage 0–III breast (*n* = 976)	Breast cancer surgery	Propofol (*n* = 344) *vs.* desflurane (*n* = 632); PSM (*n* = 296, 592)	No difference in LRR or 5-year OS	Negative/PSM
108 (2019)	Stage 0–III breast (*n* = 5331)	Breast-conserving surgery or total mastectomy	Propofol TIVA (*n* = 3085) *vs.* inhalation anesthesia (*n* = 2246); PSM (*n* = 1766 each)	No difference in 5-year RFS or OS	Negative/PSM
109 (2020)	Stage 0–III breast (*n* = 1026)	Mastectomy	Propofol TIVA (*n* = 814) *vs.* sevoflurane (*n* = 212); PSM (*n* = 159 each)	No difference in 1-year RFS HR for recurrence or metastasis after sevoflurane vs. propofol was significantly higher for luminal B HER-2 (+) subtype than for other subtypes	Negative/PSM
110 (2020)	Stage 0–IV breast (*n* = 6305)	Total or partial mastectomy, with or without axillary clearance	Propofol (*n* = 3296) *vs.* sevoflurane (*n* = 3209)	Trend toward better 5-year OS with propofol	Potential benefit/PSM

Braz J Med Biol Res. 2016 Dec 12;49(12):e5717. doi: 10.1590/1414-431X20165717.

Propofol inhibits invasion and growth of ovarian cancer cells via regulating miR-9/NF-κB signal

X Huang [1], Y Teng [2], H Yang [3], J Ma [4]

In our study, we found that propofol upregulated miR-9 expression in ovarian cancer ES-2 cells, by which it inhibited NF-κB activation and its downstream MMP-9 expression, leading to the inhibition of cell growth and invasion of ES-2 cells.



TCR TRANSLATIONAL CANCER RESEARCH
ADVANCES CLINICAL MEDICINE TOWARD THE GOAL OF IMPROVING PATIENTS' QUALITY OF LIFE

Original Article

Vol 10, No 7 (July 31, 2021)

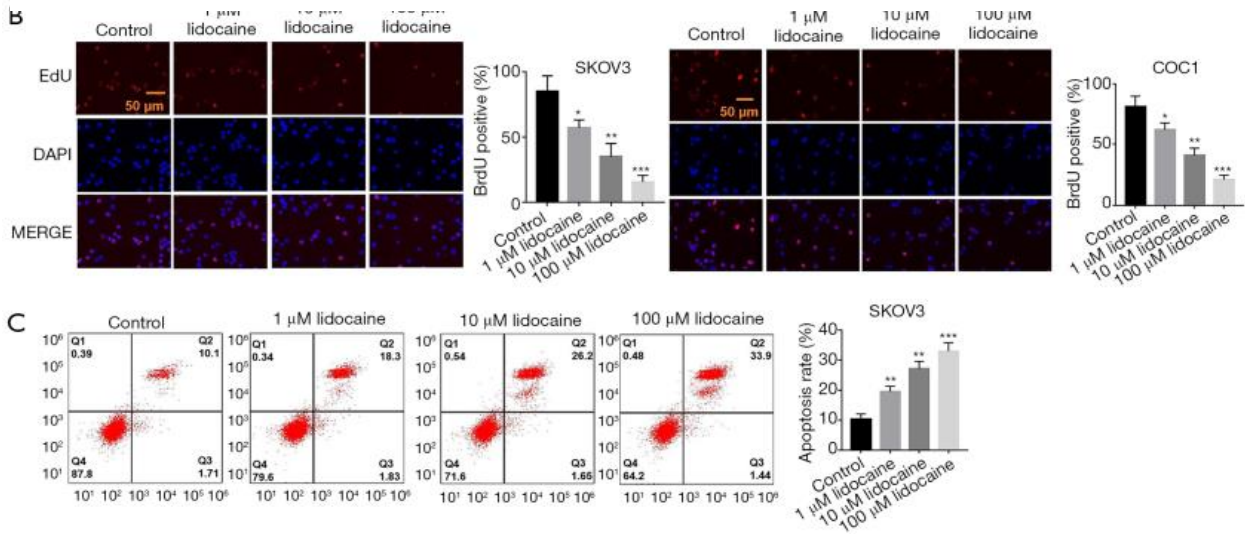
Check for updates

Lidocaine inhibits the proliferation and metastasis of epithelial ovarian cancer through the Wnt/β-catenin pathway

Mei Sun[1#], Saisai Huang[2#], Yongtao Gao[2]

Conclusions Other Section

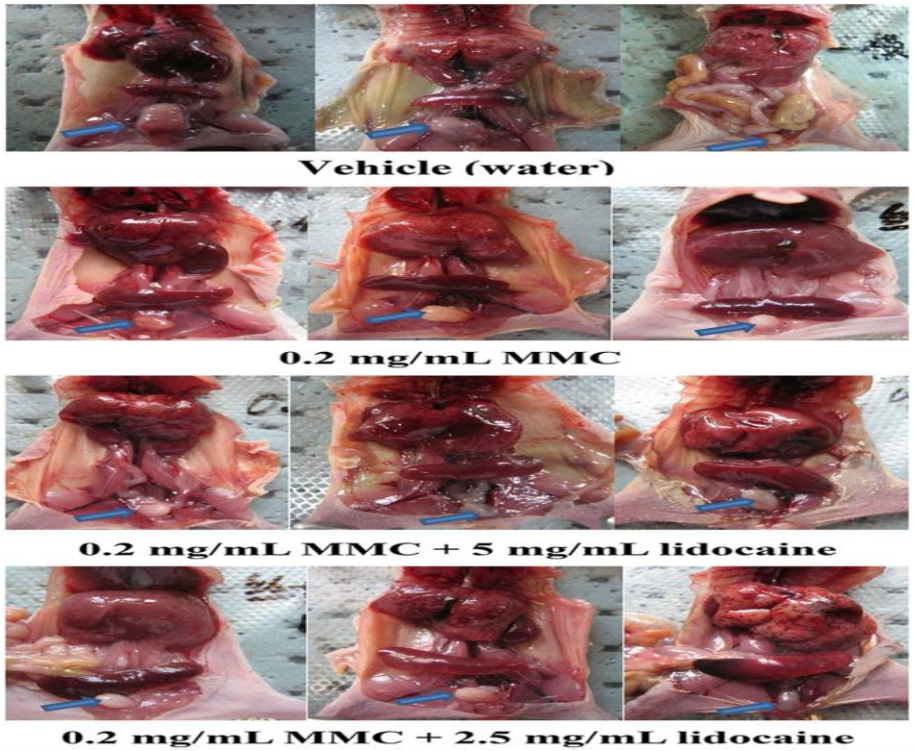
We demonstrated that lidocaine could inhibit proliferation, migration, and invasion, and induce apoptosis in ovarian cancer cells in a dose-dependent manner to regulate the progression of ovarian cancer. It also could suppress the EMT progression of ovarian cancer through the Wnt/β-catenin pathway. Wnt inhibitor XAV-939 further enhanced the antitumor effect of lidocaine.



Sci Rep. 2018 Jan 12;8(1):598. doi: 10.1038/s41598-017-19026-

Lidocaine enhances the effects of chemotherapeutic drugs against bladder cancer

Xihua Yang[1], Lili Zhao[1], Meiping Li[2], Lei Yan[1], Shengwan Zhang[2], Zhenguo Mi[1], Liansheng Ren[1] & Jun Xu[1]



Group	Survived 60 days(n/N)	Mean survival time(days)	Mean bladder wet weight(mg)	Tumor inhibition rate (%)	Life extension rate (%)
Vehicle	0/8	34.62±6.49	68.94±53.61	–	–
MMC	1/8	40.86±9.15	36.15±19.83	47.56	18.78
MMC/high lidocaine	0/8	49.30±6.72*	20.26±6.07*	70.61	42.40
MMC/low lidocaine	1/8	41.25±12.92	19.80±6.17*	71.28	19.15

The combination of 0.66 mg/mL MMC and 5 mg/mL lidocaine prolonged survival (from 34.62 ± 6.49 to 49.30 ± 6.72 days; n = 8, $P < 0.05$) and reduced bladder wet weight (from 68.94 ± 53.61 to 20.26 ± 6.07; n = 8, $P < 0.05$). Intravesical instillation of lidocaine combined with other chemotherapeutic agents potentially could be an effective therapy for bladder cancer.

FULL PAPER

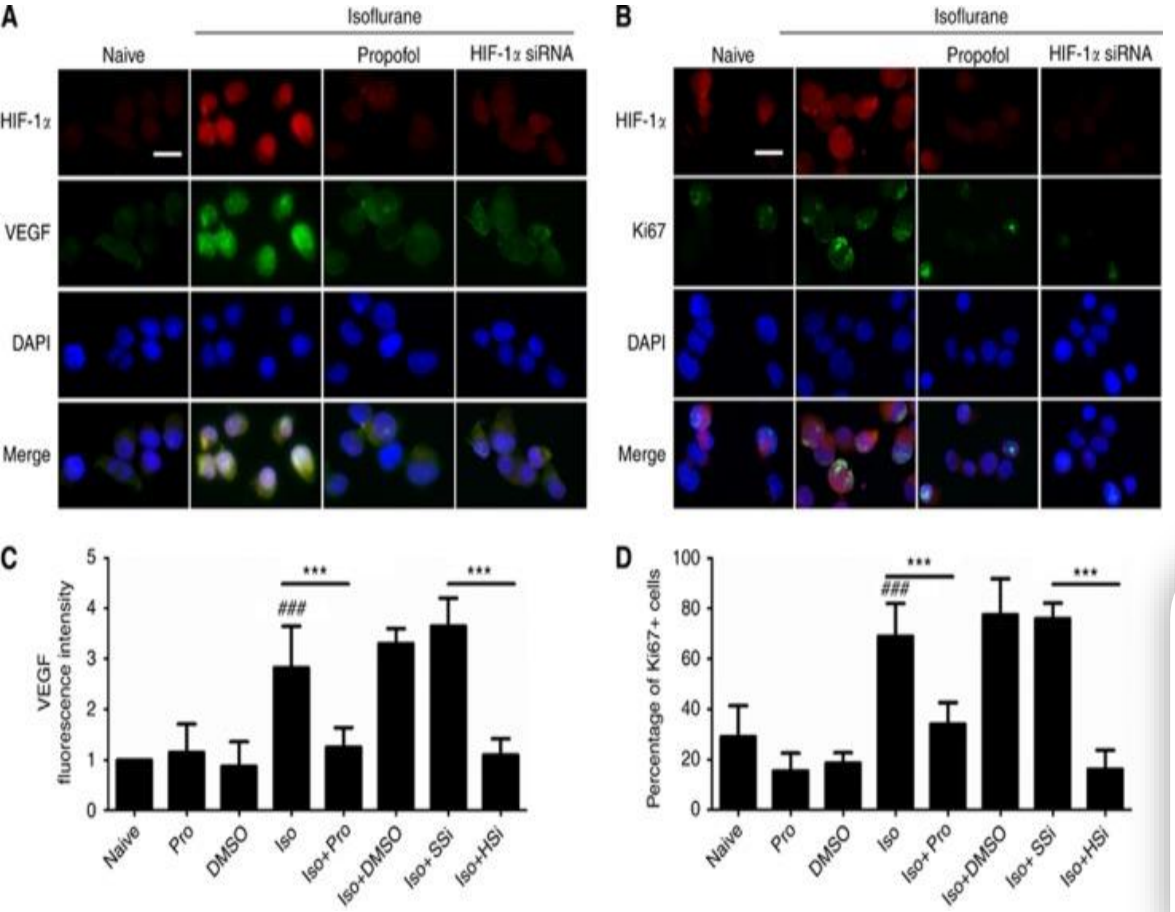
BJC

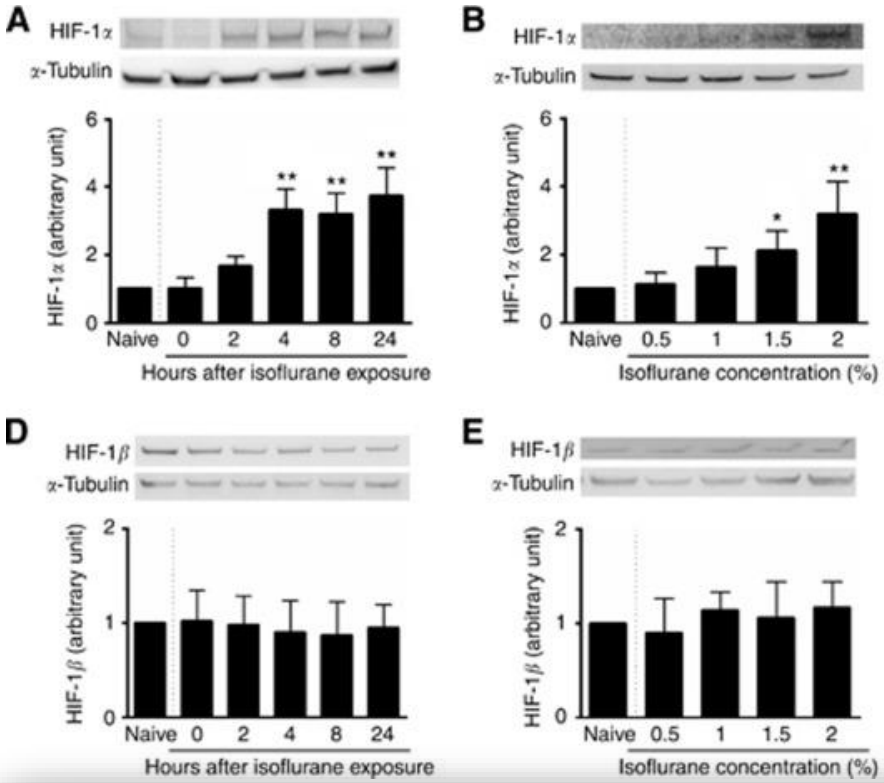
British Journal of Cancer (2014) 111, 1338–1349 | doi: 10.1038/bjc.2014.426

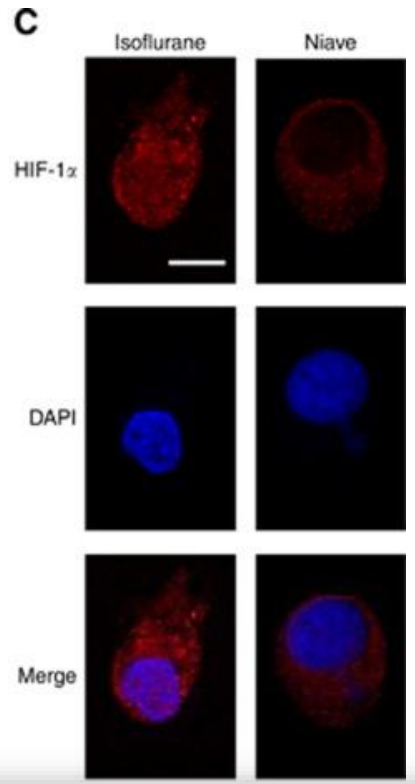
Keywords: prostate cancer; isoflurane; propofol; cancer cell malignancy

Prostate cancer cell malignancy via modulation of HIF-1α pathway with isoflurane and propofol alone and in combination

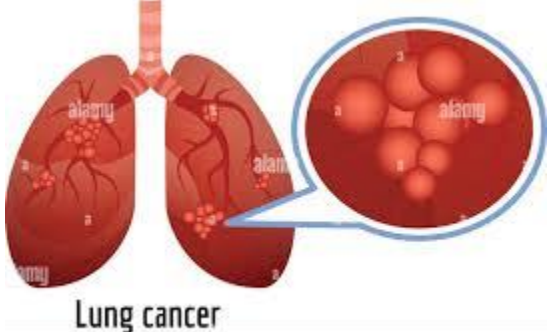
H Huang[1,2,4], L L Benzonana[1,4], H Zhao[1,4], H R Watts[1], N J S Perry[1], C Bevan[3], R Brown[3] and D Ma*[,1]







Conclusions: Our findings suggest that modulation of HIF-1α activity by anaesthetics may affect cancer recurrence following surgery. If our data were to be extrapolated to the clinical setting, isoflurane but not propofol should be avoided for use in cancer surgery. Further work involving in vivo models and clinical trials is urgently needed to determine the optimal anaesthetic regimen for cancer patients.



Research Article

Cancer Control
Volume 25: 1-7
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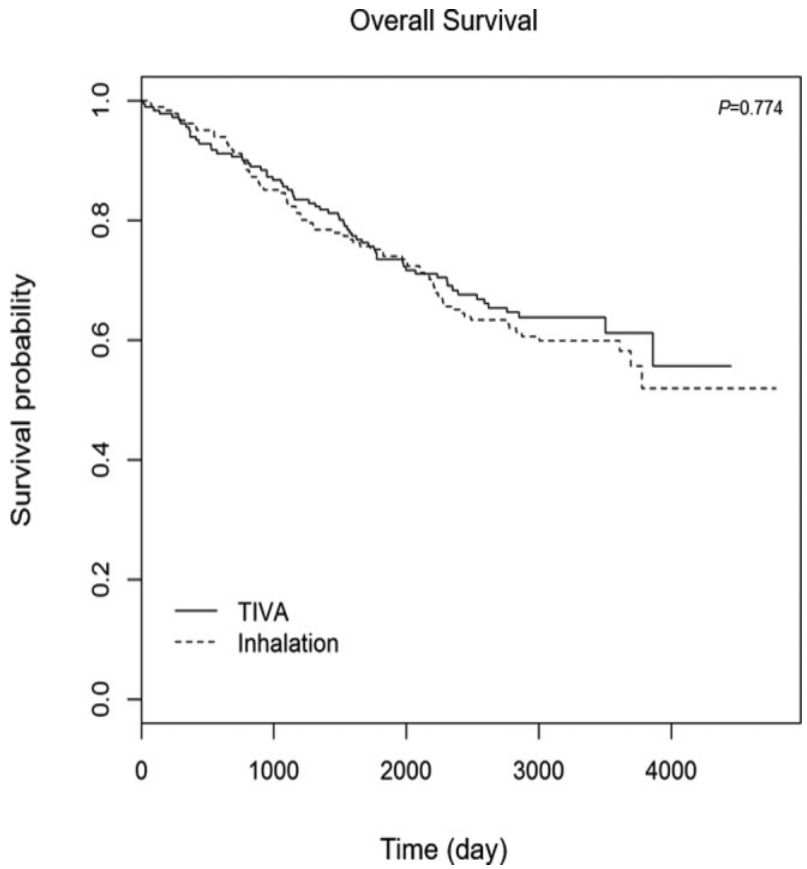
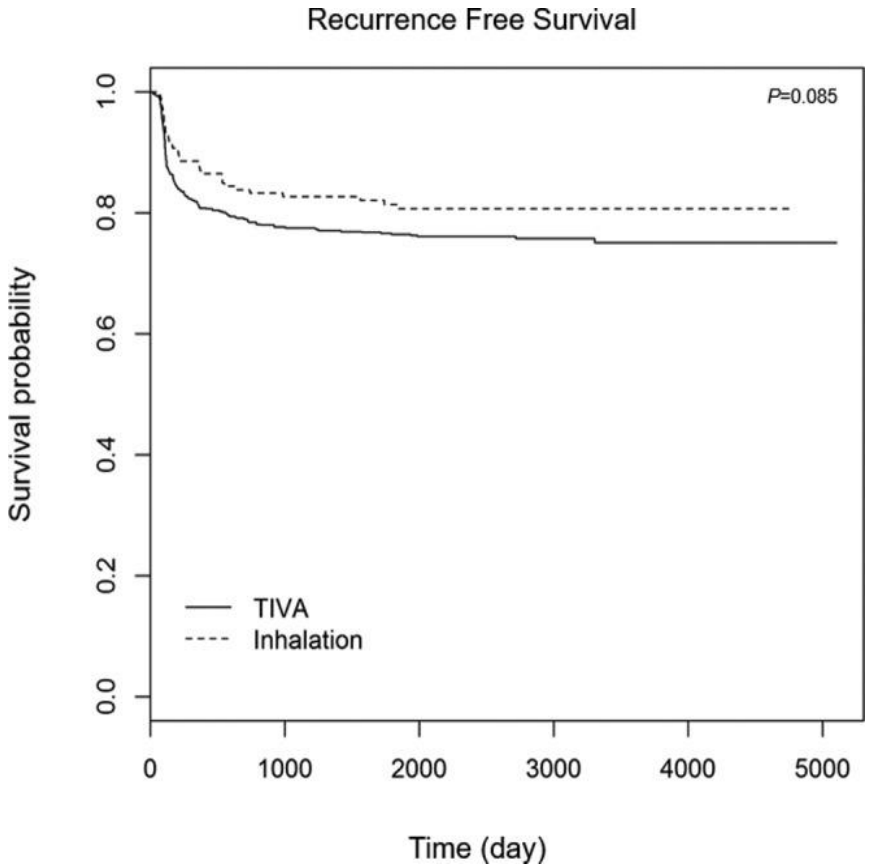
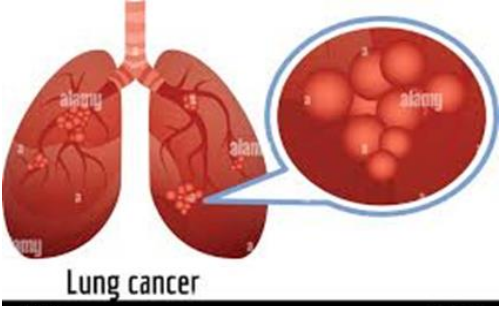
SAGE

Long-Term Oncologic Outcomes for Patients Undergoing Volatile Versus Intravenous Anesthesia for Non-Small Cell Lung Cancer Surgery: A Retrospective Propensity Matching Analysis

Tak Kyu Oh, MD[1], Kwhanmien Kim, MD, PhD[2], Sanghoon Jheon, MD, PhD[2], Jaebong Lee, MS[3], Sang-Hwan Do, MD, PhD[1], Jung-Won Hwang, MD, PhD[1], and In-Ae Song, MD, PhD[1]







KJA
Korean Journal of Anesthesiology

Clinical Research Article

Korean J Anesthesiol 2023;76(4):336-347
https://doi.org/10.4097/kja.22584
pISSN 2005-6419 • eISSN 2005-7563

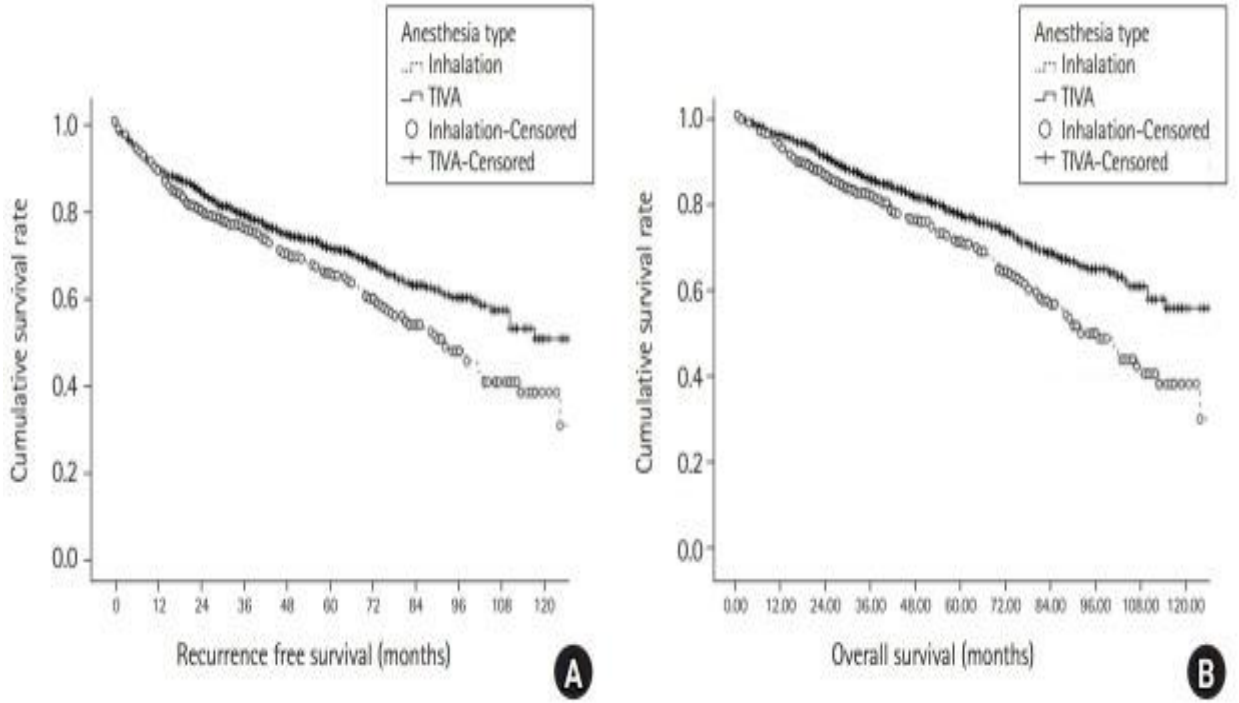
> Korean J Anesthesiol. 2023 Aug;76(4):336-347. doi: 10.4097/kja.22584. Epub 2022 Dec 28.

Effect of total intravenous versus inhalation anesthesia on long-term oncological outcomes in patients undergoing curative resection for early-stage non-small cell lung cancer: a retrospective cohort study

Kwon Hui Seo [1], Ji Hyung Hong [2], Mi Hyoung Moon [3], Wonjung Hwang [4], Sea-Won Lee [5], Jin Young Chon [1], Hyejin Kwon [1], Sook Hee Hong [6], Sukil Kim [7]

Results: We included 1,508 patients with stage I/II NSCLC. The patients were divided into the TIVA (n = 980) and Inhalation (n = 528) groups. The two groups were well-balanced in terms of baseline clinical characteristics. The TIVA group demonstrated significantly improved RFS (7.7 years, 95% CI [7.37, 8.02]) compared with the Inhalation group (6.8 years, 95% CI [6.30, 7.22], P = 0.003). Similarly, TIVA was superior to inhalation agents with respect to OS (median OS; 8.4 years, 95% CI [8.08, 8.69] vs. 7.3 years, 95% CI [6.81, 7.71]; P < 0.001). Multivariable Cox regression analysis revealed that TIVA was an independent prognostic factor related to recurrence (hazard ratio [HR]: 1.24, 95% CI [1.04, 1.47], P = 0.014) and OS (HR: 1.39, 95% CI [1.12, 1.72], P = 0.002).

Conclusions: Propofol-based TIVA was associated with better RFS and OS than inhalation anesthesia in patients with stage I/II NSCLC who underwent curative resection.

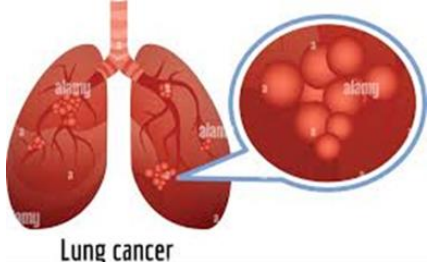


JTD JOURNAL OF THORACIC DISEASE
A PEER-REVIEWED, OPEN ACCESS JOURNAL FOR HIGH-QUALITY RESEARCH IN THORACIC DISEASES

Vol 15, No 9 (September 28, 2023)

Original Article

Check for updates

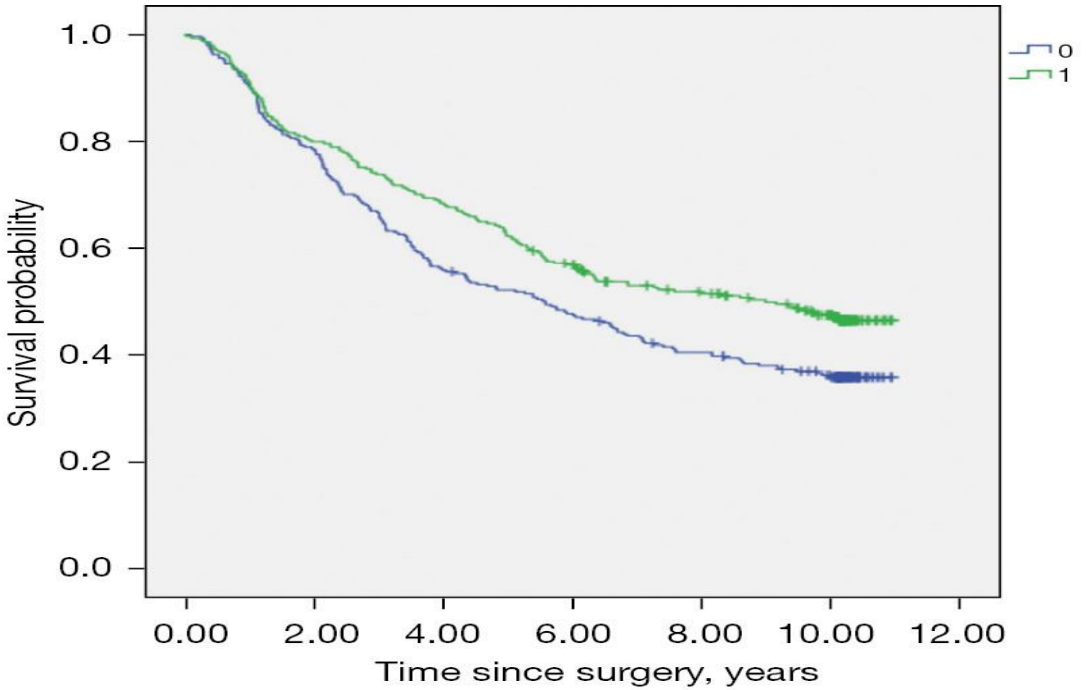


Impact of anesthetic factors on prognosis of patients with non-small cell lung cancer after surgery

Wenzhi Zhu[1], Shuang Li[2], Xinqiang Ji[3], Hongyu Tan[1]

Les facteurs anesthésiques périopératoires peuvent avoir un impact sur le pronostic des patients atteints de tumeur pulmonaire après une intervention chirurgicale.

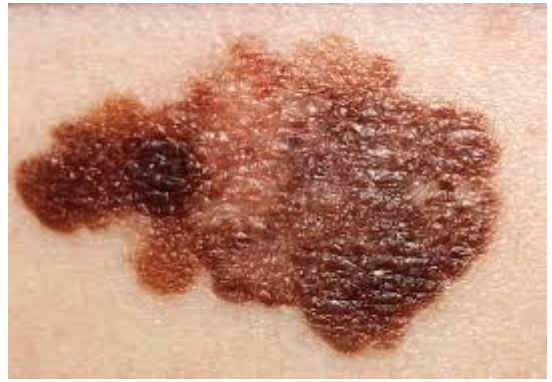
L'exposition périopératoire aux opioïdes et aux glucocorticoïdes était un facteur prédictif indépendant des résultats. Cependant, des équivalents de fentanyl périopératoires supérieurs à 28,2 µg/kg semblent être bénéfiques pour la survie globale.



Kaplan-Meier curves showing overall survival for perioperative fentanyl equivalents (≤28.2 µg/kg =0, >28.2 µg/kg =1), P=0.007.

MELANOMA RESEARCH

Melanoma Research 34(1):p 16-21, February 2024. | **DOI:** 10.1097/CMR.0000000000000936



REVIEW ARTICLES

Impact of anesthesia choice in cutaneous melanoma surgery

Benesch, Matthew G.K.; Skitzki, Joseph J.

[Cutaneous Melanoma Surgery]

distally. Results from observational clinical studies are mixed, but the literature would suggest that patients are at risk of decreased melanoma-specific survival after undergoing general anesthesia compared to regional anesthesia and spinal blocks. With the safety of close observation now established rather than automatic completion or total lymph node dissection for patients with either a positive sentinel lymph node biopsy or significant clinical response to neoadjuvant immunotherapy after index node sampling, the indications for definitive surgery with local or regional anesthesia have increased tremendously in recent years. Therefore, cutaneous melanoma patients might benefit from avoidance of general anesthesia and other perioperative drugs that suppress cell-mediated immunity if the option to circumvent systemic anesthesia agents is feasible.

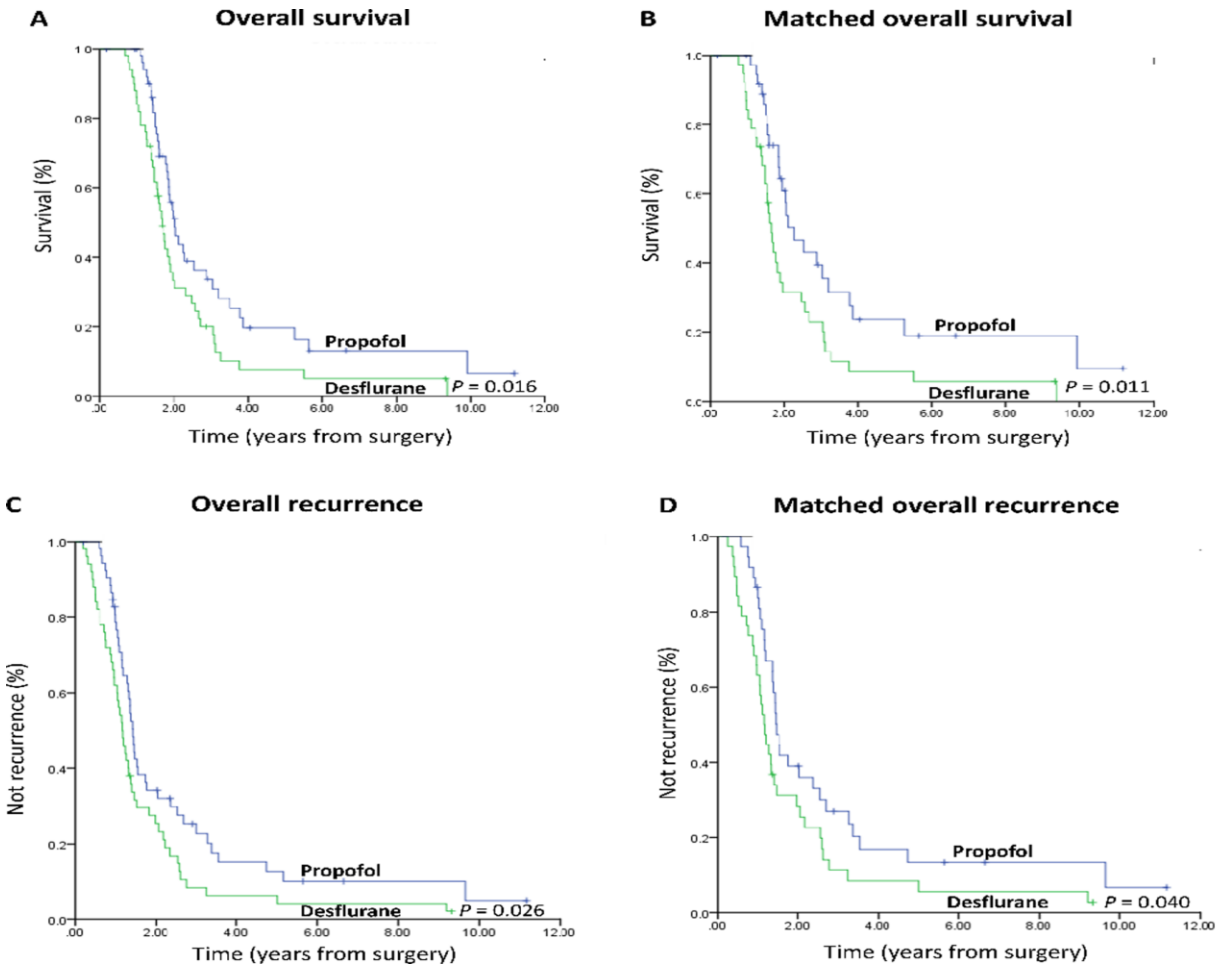
PLoS One. 2021 Aug 5;16(8):e0255627. doi: 10.1371/journal.pone.0255627

Propofol-based total intravenous anesthesia is associated with better survival than desflurane anesthesia in glioblastoma surgery

Yi-Hsuan Huang [1], Zhi-Fu Wu [1,2,3], Meei-Shyuan Lee [4], Yu-Sheng Lou [5], Ke-Li Wu [6], Kuang-I Cheng [2], Hou-Chuan Lai

Conclusions

In this limited sample size, we observed that propofol anesthesia was associated with improved survival and less postoperative recurrence in glioblastoma surgery than desflurane anesthesia. Further investigations are needed to examine the influence of propofol anesthesia on patient outcomes following glioblastoma surgery.



3ème Hypothèse

Anesthésie et récidive du cancer : que savons-nous jusqu'à présent ?

Local Reg Anesth. 2020 Jul 7;13:57–72. doi: 10.2147/LRA.S240567

Anesthesia Options and the Recurrence of Cancer: What We Know so Far?

Anesthesia Options and the Recurrence of Cancer: What We Know so Far?

Juan P Cata[1,2]
Carlos Guerra[3]
German Soto[4]
Maria F Ramirez[1,2]

Multiple (Breast, Gastrointestinal, Gynecological, Sarcoma, Urologic, Other)	Wigmore (2016)[6]	Retrospective	TIVA vs Inhalational	Increased with TIVA	Not studied
Multiple (Breast, Gastrointestinal, Liver, Lung)	Hong (2019)[141]	Retrospective	TIVA vs Inhalational	No difference	Not studied
Multiple (Breast, Gastrointestinal, Urologic, Glioma, Lung)	Jin (2019)[142]	MA (12 studies)	TIVA vs Inhalational	Pooled effects favor TIVA, not individualized by cancer type.	Pooled data from 5 studies on recurrence showed no significant difference. TIVA is favored in breast cancer. Pooled data specifically on RFS on 3 studies favor TIVA.
Ovarian	Elias (2015)[85]	Retrospective	Inhaled Anesthesia (Sevoflurane/ Desflurane) vs TIVA	Not studied	Increased with desflurane

Type of Cancer	Author (Year)	Type of Study	Intervention	Overall Survival	Recurrence-Free Survival
Appendiceal (HIPEC)	Cata (2019)[128]	Retrospective	TIVA (Opioid-sparing) vs Inhalational-Opioid	No difference	No difference
Breast	Sessler (2019)[9]	RCT subanalysis	TIVA vs Inhalational	No difference	No difference
Breast	Lee (2016)[129]	Retrospective	TIVA vs Inhalational	No difference	Increased with TIVA
Breast	Yoo (2019)[130]	Retrospective	TIVA vs Inhalational	No difference	No difference
Breast	Yan (2018)[125]	RCT (Not powered for OS or RFS)	TIVA vs Inhalational	No difference	No difference
Cholangiocarcinoma	Lai (2019)[131]	Retrospective	TIVA vs Inhalational	Increased with TIVA	TIVA group showed a decreased rate of metastasis.
Colorectal	Wu (2018)[132]	Retrospective	TIVA vs Inhalational (Desflurane-specific)	Increased with TIVA	Not studied
Esophageal	Jun (2017)[133]	Retrospective	TIVA vs Inhalational	Increased with TIVA	Increased with TIVA
Gastric	Zheng (2018)[134]	Retrospective	TIVA vs Inhalational	Increased with TIVA	Not studied
Gastric	Oh (2019)[135]	Retrospective	TIVA vs Inhalational	No difference	No difference
Glioblastoma	Cata (2017)[136]	Retrospective	Isoflurane ± Propofol vs Desflurane ± Propofol	No difference	No difference
Hepatocellular	Lai (2019)[137]	Retrospective	TIVA vs Inhalational (Desflurane-specific)	Increased with TIVA	Increased with TIVA
Lung Lung	Oh (2018)[138] Xu (2017)[139]	Retrospective RCT (Not powered for OS or RFS)	TIVA vs Inhalational TIVA vs Epidural/ Inhalational	No difference No difference	No difference No difference
Multiple (Breast, Esophageal, Lung)	Yap (2019)[140]	MA (10 studies)	TIVA vs Inhalational	Increased with TIVA	Pooled data from 6 studies showed increased with TIVA
Multiple (Breast, Gastrointestinal, Gynecological, Sarcoma, Urologic, Other)	Wigmore (2016)[6]	Retrospective	TIVA vs Inhalational	Increased with TIVA	Not studied
Multiple (Breast, Gastrointestinal, Liver, Lung)	Hong (2019)[141]	Retrospective	TIVA vs Inhalational	No difference	Not studied
Multiple (Breast, Gastrointestinal, Urologic, Glioma, Lung)	Jin (2019)[142]	MA (12 studies)	TIVA vs Inhalational	Pooled effects favor TIVA, not individualized by cancer type.	Pooled data from 5 studies on recurrence showed no significant difference. TIVA is favored in breast cancer. Pooled data specifically on RFS on 3 studies favor TIVA.
Ovarian	Elias (2015)[85]	Retrospective	Inhaled Anesthesia (Sevoflurane/ Desflurane) vs TIVA	Not studied	Increased with desflurane

Abbreviations: RCT, randomized controlled trial; HIPEC, hyperthermic intraperitoneal chemotherapy; TIVA, total intravenous anesthesia; OS, overall survival; RFS, recurrence-free survival; MA, meta-analysis.

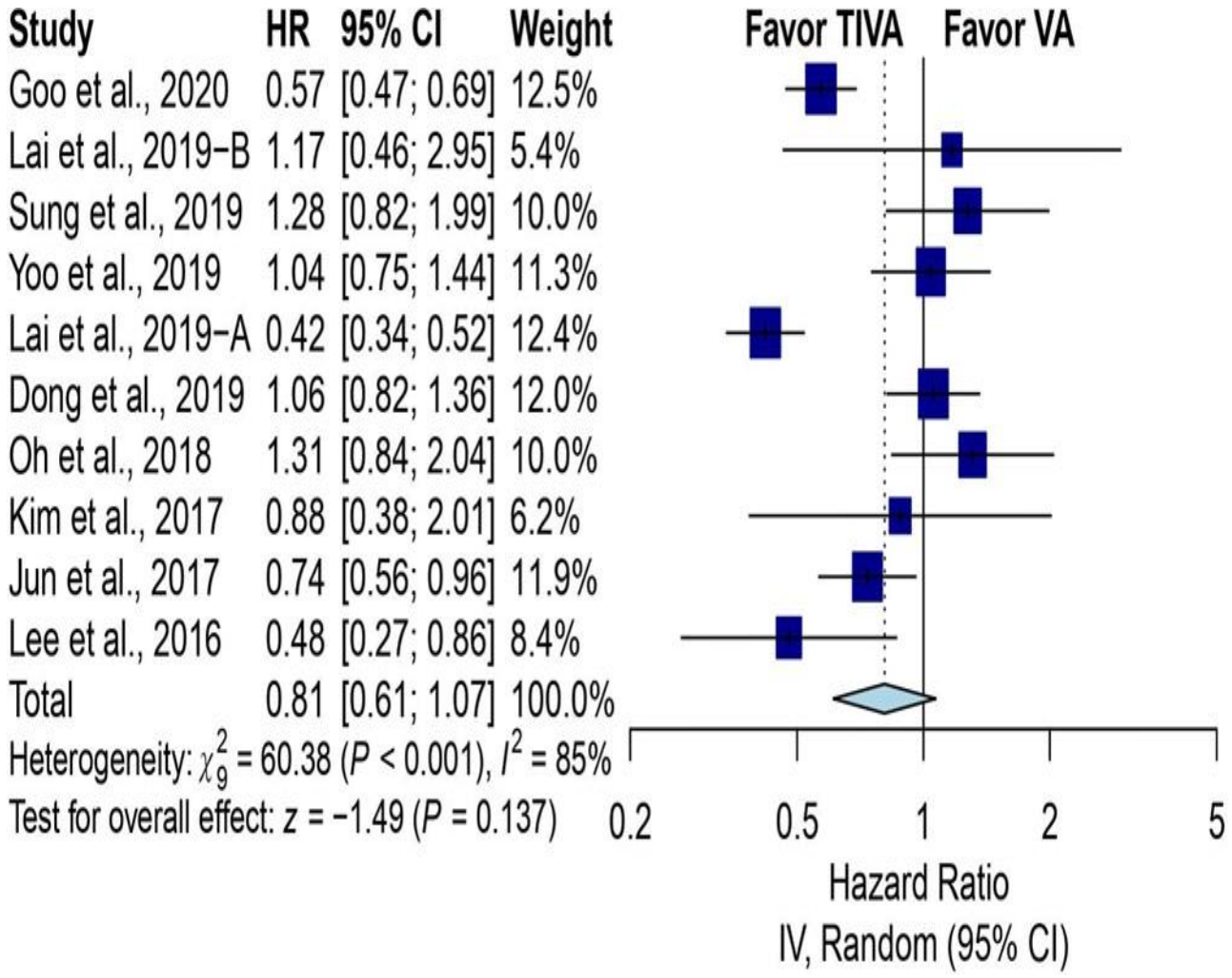
ANESTHESIA & ANALGESIA 132(3):p 623-634, March2021.

FEATURED ARTICLES: META-ANALYSIS

Anesthesia and Long-term Oncological Outcomes: A Systematic Review and Meta-analysis

Chang, Chun-Yu MD[*,†]; Wu, Meng-Yu MD[†,‡]; Chien, Yung-Jiun MD[†,§]; Su, I-Min MD[†,‖]; Wang, Shih-Ching MD[*,†]; Kao, Ming-Chang MD, PhD[*,†]

Conclusions: Propofol-based TIVA is generally associated with better overall survival than volatile anesthesia during cancer surgery. Further large-scaled, high-quality randomized control trials are warranted to confirm our findings.



Front Oncol. 2022 Feb 28;12:759057. doi: 10.3389/fonc.2022.759

Application of Anesthetics in Cancer Patients: Reviewing Current Existing Link With Tumor Recurrence

*Xiaotian Liu and Qian Wang**

Department of Anesthesiology, Children's Hospital of Soochow University, Suzhou, China

Available evidence from experimental cell culture/animal model studies, as well as clinical retrospective studies, indicate that current data are sufficient only to generate a hypothesis that anesthetic or analgesic agents contribute to cancer recurrence and metastasis.

Anesthesia agent/ technique	Study model	Tumor type	Outcome	F
Ropivacaine	SW620 cells *in vitro*	Colon	Ropivacaine causes a concentration-dependent blockade of NaV1.5 variants, inhibiting migration and invasion of metastatic cancer cells	
Xenon and sevoflurane	*In vitro*	Breast	Xenon, but not sevoflurane, inhibits tumor cell migration and expression of angiogenesis biomarkers, RANTES	
Lidocaine and sevoflurane	4T1 murine model (female BALB/c mice)	Breast	Under sevoflurane anesthesia, lidocaine enhances the metastasis-inhibiting action of cisplatin	
Lidocaine and sevoflurane	4T1 murine model (female BALB/c mice)	Breast	Lidocaine decreases pulmonary metastasis combined with sevoflurane, perhaps *via* anti-inflammatory and anti-angiogenic effects	
Lidocaine	*In vitro* and xenograft model *in vivo*	Hepatocellular (HepG2 cells)	Lidocaine exerts potent antitumor activity in hepatocellular carcinoma	
Lidocaine and levobupivacaine	HEK-293 cells *in vitro*	–	Lidocaine and levobupivacaine potently inhibited aNaV1.5, inhibiting migration and invasion of metastatic cancer cells	
Sevoflurane with/ without bupivacaine and morphine	C57BL/6 mice	Liver	The addition of spinal block to sevoflurane general anesthesia attenuates the suppression of the tumoricidal function of liver mononuclear cells, and preserves Th1/Th2 balance, hence reducing the promotion of tumor metastasis.	
Sevoflurane	*In vitro* and *in vivo* mice model	Lung	Promotes the proliferation of Lewis lung carcinoma cells *in vitro* but may not affect proliferation *in vivo*	
Isoflurane	*In vitro* use of ovarian cancer (SK-OV3) cells	Ovarian	Isoflurane exposure significantly increases angiogenic markers vascular endothelial growth factor (VEGF), insulin-like growth factor (IGF)-1 and IGF-1R expression, cell cycle progression, and cell proliferation in tumor cells	
Isoflurane and propofol.	*In vitro* use of prostate cancer (PC3) cell line	Prostate	Isoflurane increases tumor malignancy *via* modulation of the HIF-1α pathway	
Propofol	*In vitro* and nude mice (bladder cancer stem cells)	Bladder	Blocks the activation of the Hedgehog pathway to repress the growth of cancer cells and the tumor formation	
Propofol and desflurane	A retrospective cohort study in human	Pancreatic	Propofol is associated with improved survival compared with desflurane	
Propofol and desflurane	A retrospective cohort study in human	Colon	Propofol is associated with better survival irrespective of tumor-node-metastasis stage	
Total IV anesthesia and inhalation anesthesia	A retrospective cohort study in human	Breast	No significant difference in recurrence-free survival or overall survival between the two groups	
Desflurane or propofol	Retrospective comparative study	Breast	Neither propofol nor desflurane anesthesia for breast cancer surgery by an experienced surgeon affects patient prognosis and survival	
Volatile IV Anesthesia	Retrospective comparative study	Several types	There is an association between the type of anesthetic delivered and patients' survival.	
Inhalation vs intravenous anesthesia	Retrospective study	Colorectal	Inhalation anesthesia is associated with an increased risk of recurrence after colorectal cancer surgery	

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https://doi.org/10.17085/apm.24041
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Review

Anesthesia and cancer recurrence: a narrative review

Hyun Joo Ahn

Department of Anesthesiology and Pain Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

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Revised April 24, 2024
Accepted April 24, 2024

Current Oncology 2023, 30(6), 5309-5321; https://doi.org/10.3390/curroncol30060403

Anaesthetic Techniques and Strategies: Do They Influence Oncological Outcomes?

by Liam Murphy [1,*], John Shaker [1] and Donal J. Buggy [1,2,3]

- Les données actuellement disponibles sont insuffisantes pour confirmer un lien de cause à effet entre une intervention périopératoire et un résultat oncologique à long terme.
- L'effet protumoral ou antitumoral apparent démontré dans les études in vitro ou in vivo n'était pas clair dans les contextes cliniques. Par conséquent, ce processus semble être beaucoup plus complexe que nous le pensions initialement, probablement en raison de la biologie hétérogène des différentes tumeurs.
- En l'absence d'une recommandation convaincante de niveau 1 recommandant un changement de pratique, le bénéfice oncologique à long terme ne devrait pas faire partie de la décision sur le choix de la technique d'anesthésie pour la chirurgie de résection tumorale malgré les nombreuses études qui ont été publiées.
- Plusieurs essais cliniques multicentriques, randomisés et contrôlés sont actuellement en cours pour apporter un éclairage sur ce sujet.

La recherche en onco-anesthésie est en pleine expansion.

Nous espérons que de futures études multicentriques prospectives de grande ampleur et de haute qualité apporteront des réponses plus précises pour guider notre choix anesthésiques.