

A&I

ANÄSTHESIOLOGIE & INTENSIVMEDIZIN

Offizielles Organ: Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin e. V. (DGAI)
Berufsverband Deutscher Anästhesistinnen und Anästhesisten e. V. (BDA)

Organ: Deutsche Interdisziplinäre Vereinigung für Intensiv- und Notfallmedizin e. V. (DIVI)



Chanarin-Dorfman Syndrome

orphan**a**nesthesia

a project of the German Society
of Anaesthesiology and Intensive Care Medicine

SUPPLEMENT NR. 4 | 2025

OrphanAnesthesia –

ein krankheitsübergreifendes Projekt des Wissenschaftlichen Arbeitskreises Kinderanästhesie der Deutschen Gesellschaft für Anästhesiologie und Intensivmedizin e.V.

Ziel des Projektes ist die Veröffentlichung von Handlungsempfehlungen zur anästhesiologischen Betreuung von Patientinnen und Patienten mit seltenen Erkrankungen. Damit will OrphanAnesthesia einen wichtigen Beitrag zur Erhöhung der Patientensicherheit leisten.

Patientinnen und Patienten mit seltenen Erkrankungen benötigen für verschiedene diagnostische oder therapeutische Prozeduren eine anästhesiologische Betreuung, die mit einem erhöhten Risiko für anästhesieassoziierte Komplikationen einhergehen. Weil diese Erkrankungen selten auftreten, können Anästhesistinnen und Anästhesisten damit keine Erfahrungen gesammelt haben, sodass für die Planung der Narkose die Einholung weiterer Information unerlässlich ist. Durch vorhandene spezifische Informationen kann die Inzidenz von mit der Narkose assoziierten Komplikationen gesenkt werden. Zur Verfügung stehendes Wissen schafft Sicherheit im Prozess der Patientenversorgung.

Die Handlungsempfehlungen von OrphanAnesthesia sind standardisiert und durchlaufen nach ihrer Erstellung einen Peer-Review-Prozess, an dem eine Anästhesistin bzw. ein Anästhesist sowie eine weitere Krankheitsexpertin bzw. ein weiterer Krankheitsexperte (z. B. Pädiaterin bzw. Pädiater oder Neurologin bzw. Neurologe) beteiligt sind. Das Projekt ist international ausgerichtet, sodass die Handlungsempfehlungen grundsätzlich in englischer Sprache veröffentlicht werden.

Ab Heft 5/2014 werden im monatlichen Rhythmus je zwei Handlungsempfehlungen als Supplement der A&I unter www.ai-online.info veröffentlicht. Als Bestandteil der A&I sind die Handlungsempfehlungen damit auch zitierfähig. Sonderdrucke können gegen Entgelt bestellt werden.

OrphanAnesthesia –

a project of the Scientific Working Group of Paediatric Anaesthesia of the German Society of Anaesthesiology and Intensive Care Medicine

The target of OrphanAnesthesia is the publication of anaesthesia recommendations for patients suffering from rare diseases in order to improve patients' safety. When it comes to the management of patients with rare diseases, there are only sparse evidence-based facts and even far less knowledge in the anaesthetic outcome. OrphanAnesthesia would like to merge this knowledge based on scientific publications and proven experience of specialists making it available for physicians worldwide free of charge.

All OrphanAnesthesia recommendations are standardized and need to pass a peer review process. They are being reviewed by at least one anaesthesiologist and another disease expert (e.g. paediatrician or neurologist) involved in the treatment of this group of patients.

The project OrphanAnesthesia is internationally oriented. Thus all recommendations will be published in English.

Starting with issue 5/2014, we'll publish the OrphanAnesthesia recommendations as a monthly supplement of A&I (Anästhesiologie & Intensivmedizin). Thus they can be accessed and downloaded via www.ai-online.info. As being part of the journal, the recommendations will be quotable. Reprints can be ordered for payment.

Bisher in A&I publizierte Handlungsempfehlungen finden Sie unter:

www.ai-online.info/Orphsuppl
www.orphananesthesia.eu

Find a survey of the recommendations published until now on:

www.ai-online.info/Orphsuppl
www.orphananesthesia.eu

Projektleitung

Prof. Dr. Tino Münster, MHBA

Chefarzt
Klinik für Anästhesie und
operative Intensivmedizin
Krankenhaus Barmherzige
Brüder Regensburg
Prüfeninger Straße 86
93049 Regensburg,
Deutschland
Tel.: 0941 369-2350

E-Mail: Tino.Muenster@barmherzige-regensburg.de

orphananesthesia

Anaesthesia recommendations for Chanarin-Dorfman Syndrome

Disease name: Chanarin-Dorfman Syndrome

ICD 10: E75.5

Synonyms: Neutral Lipid Storage Disease with ichthyosis

Disease summary:

Chanarin-Dorfman syndrome (CDS) is an autosomal recessive, multisystemic metabolic disorder. The characteristic feature of congenital ichthyosis is the deposition of lipids in cells. The first case was described by Dorfman in 1974 (1). Although the actual metabolic defect in CDS patients is unknown, available data suggest an abnormality in intracellular triglyceride metabolism. Mutation of the CGI-58 gene (also known as ABHD5) on chromosome 3p-21 causes triglyceride accumulation (2). ABHD5 constitutes a multimeric protein pivotal in activating intracellular lipases, notably adipose triglyceride lipase (ATGL), a key participant in the lipolysis process. Computational simulations employing machine learning-driven homology modeling approaches have proposed that mutations in the E41, R116, and G328 genes disrupt hydrogen bonding networks, resulting in a consequential inhibition of ATGL activation (3,4).

The presence of lipid vacuoles in neutrophil granulocytes in peripheral blood smears from patients with ichthyosis is diagnostic. It is a rare but interesting condition that should be considered when evaluating an isolated elevation of alanine aminotransferase (ALT) (5). Myopathy is observed in 60% of these patients. The objective of this article is to improve comprehension regarding anaesthesia management for patients with CDS.

► **Citation:** Koç A, Eren N: Chanarin-Dorfman Syndrome. Anästh Intensivmed 2025;66:S88–S97.
DOI: 10.19224/ai2025.S088

1

Medicine is in progress

Perhaps new knowledge



Every patient is unique

Perhaps the diagnosis is wrong



Find more information on the disease, its centres of reference and patient organisations on Orphanet: www.orpha.net

Emergency information

A	AIRWAY / ANAESTHETIC TECHNIQUE	Given the possibility of muscle spasms and limited joint movement in ichthyosis patients, prioritise difficult airway management. Be mindful of using flexible intubation methods (laryngeal mask, videolaryngoscope, fiberoscope, and emergency cricotracheotomy). / If there are no contraindications, choose regional anaesthesia, otherwise be prepared for TIVA.
B	BLOOD PRODUCTS (COAGULATION)	Thoroughly examine the bleeding tendency and have blood and plasma products prepared prior to the operation.
C	CIRCULATION	Given the potential cardiac complications linked to hyperlipidaemia, conduct a comprehensive cardiac consultation prior to the operation and utilise both noninvasive and invasive cardiac monitoring during the procedure.
D	DRUGS	Avoid using succinylcholine and, if inhalation anaesthesia is needed, choose low-flow inhalation anesthesia.
E	EQUIPMENT	Exercise caution during the transfer to prevent potential skin trauma and closely monitor the patient in the Post Anaesthesia Care Unit (PACU) after the operation.

Typical surgery

Patients' complaints are usually multisystemic. Therefore, patients may require surgery for cataracts, hearing problems, skin involvement, muscle involvement, and cardiomyopathy (6). Ocular manifestations have been identified in 46% of documented cases and are characterised by the development of cataracts. Furthermore, occurrences of nystagmus, strabismus, or ectropion may also be observed (7).

Muscular involvement may manifest through elevated creatine kinase levels and lipid accumulation within muscle fibers. Ocular manifestations can manifest as cataracts, nystagmus, and strabismus. Additional findings potentially observed in this clinical disorder include hearing loss, cardiomyopathy, intellectual disability, growth retardation, microcephaly, and intestinal involvement (8,9).

Type of anaesthesia

There is no clear recommendation for general or regional anaesthesia. Regional or local anaesthesia may be used. As general anaesthesia decreases liver perfusion, it may exacerbate preexisting liver injury in these patients. Hepatotoxicity should be considered when selecting anaesthetics. Like all drugs, inhalational anaesthetics undergo processes of distribution, metabolism, and elimination in the body. Anaesthetics undergo significant metabolic reactions in which reactive and potentially toxic products are often formed. These metabolic and chemical processes may depend on age, interactions with other drugs, and genetic predisposition. Halothane, isoflurane, and desflurane undergo oxidative metabolic reactions mediated by cytochrome P450 to produce trifluoroacetylolate (TFA). In all patients exposed, modified tissue proteins (haptens) are then formed. In susceptible individuals, these modified liver proteins might cause liver damage and patient death as a result of an immune response: The exact mechanisms underlying these processes are still unclear (10). Total intravenous anaesthesia (TIVA) may be a reasonable option in patients with CDS.

Caution should be exercised, as hepatic perfusion is compromised by hypotension, hypercapnia, and sympathetic stimulation. Normocapnic ventilation should be used throughout the procedure to avoid hepatic encephalopathy (11). In recent years, TIVA has become an alternative to inhalation anaesthesia due to its target-controlled applicability. Oh SK et al. (12), observed in their study involving 730 patients that TIVA application resulted in a higher level of safety among patients with elevated transferase levels.

The potential for cutaneous trauma arising from ichthyosis and its associated susceptibility to infections warrants consideration. Furthermore, anticipation of coagulopathic tendencies,

potentially stemming from incipient liver dysfunction, is prudent. Consequently, caution is advised in the selection of regional anaesthesia.

Necessary additional pre-operative testing (beside standard care)

A comprehensive evaluation, including complete blood cell counts and blood biochemistry encompassing measurements of urea, creatinine, potassium, sodium, and creatine kinase (CK), is warranted. This assessment is imperative given the presence of progressive adult proximal weakness, episodes of rhabdomyolysis characterised by myoglobinuria potentially induced by vigorous exercise and extended fasting, recurrent episodes of weakness, and indications of muscle weakness and clinical observation. An EMG should be performed. This monitors the effects of dyslipidaemia on the cardiovascular system, and a cardiology consultation with ECG and ECO should be performed.

Hepatomegaly, steatosis, and worsening liver function tests may be observed. An abdominal USG may be performed to determine liver enzymes, function tests, and hepatomegaly. If muscle weakness is present and regional anaesthesia is planned, consultation is helpful for legal reasons. Vigilant observation of cutaneous manifestations is imperative, and any potential skin infection should be meticulously investigated without disregard.

Particular preparation for airway management

Since spasm of the masseter muscle and limitation of joint movement may be observed in these patients due to ichthyosis, attention should be given to difficult airways and conditions for difficult airways (flexible intubation style, laryngeal mask, video laryngoscope, fiberscope, emergency cricotracheostomy). Since liver failure can lead to bleeding disorders, intubation should be performed more carefully in these patients, and damage to the larynx and trachea should be avoided. Moreover, a meticulous assessment of the airway is essential, particularly in patients presenting with characteristics such as a small oral cavity, enlarged tongue, and restricted neck mobility.

Particular preparation for transfusion or administration of blood products

These patients may require increased blood transfusions due to bleeding disorders resulting from liver failure. Blood type and crossmatch must be correct. Blood and blood products should be prepared before surgery. Extensive coagulation tests (bleeding time, fibrinogen level) should be performed before surgery.

Particular preparation for anticoagulation

There is no evidence to support the need for particular anticoagulation.

Particular precautions for positioning, transportation and mobilisation

In these patients, the skin structures are fragile due to ichthyosis. The use of endotracheal tubes and ECG pallets can damage the skin. Because patients with ichthyosis tend to lose heat, heating pads can be used on the couch to maintain normothermia during anaesthesia. Because weak muscle strength weakens the bone structures in case of existing myopathies, it is sensitive during transport and surgery, and softening silicone or gel pads can be used during positioning.

Interactions of chronic disease and anaesthesia medications

Increased serum creatine phosphokinase may occur due to myopathies. The use of succinylcholine should be avoided in these patients because it may cause hyperkalaemia and malignant hyperthermia (13). Nondepolarising agents should be preferred as muscle relaxants. Hepatotoxic agents should be avoided whenever possible. For this reason, it may be more appropriate to use TIVA rather than inhalational anaesthetics in the induction and maintenance of general anaesthesia.

Anaesthetic procedure

TIVA may be used in conjunction with general anesthesia. Because the skin is sensitive due to ichthyosis, care should be taken to avoid ichthyosis and cellulitis in the area of application when regional anesthesia is performed.

Succinylcholine, a neuromuscular blocking agent that depolarizes muscle, is contraindicated in individuals with Chanarin-Dorfman syndrome owing to the potential to worsen metabolic and muscular complications inherent in this disorder. Chanarin-Dorfman syndrome, a rare genetic condition, is typified by irregularities in lipid metabolism, notably the accumulation of triglycerides in diverse bodily tissues. Succinylcholine's mechanism can induce the release of potassium from muscle cells, potentially leading to hyperkalemia, marked by elevated levels of potassium in the bloodstream. Nondepolarising muscle relaxants may be used.

Antagonisation of neuromuscular blockade with pyridostigmine or neostigmine appears to be possible.

There are (no) reports of successful administration of sugammadex.

Particular or additional monitoring

Neuromuscular blockade monitoring is strongly recommended when a neuromuscular blocker is used. It is useful to obtain baseline values before injecting the nondepolarising neuromuscular blocker. Moreover, an insufficient neuromuscular blockade could result in skin sensitivity and discomfort during the surgical procedure. Monitor body temperature to avoid chills and increased oxygen requirements. In cases of cardiomyopathy, transoesophageal echocardiography is very useful.

Neuromuscular monitoring

Depth of anaesthesia: BIS, body temperature , transesophageal echocardiography

Due to ichthyosis on the eyelids, it is recommended to wear eye protection and use tearless solutions during surgery.

The careful monitoring and preservation of liver function during anaesthesia administration are fundamental prerequisites for enhancing patient safety and refining drug management strategies within the perioperative context. A comprehensive pre-operative assessment of

hepatic biomarkers, alongside diligent intraoperative surveillance of these markers, holds paramount importance. These measures are particularly critical in customising anaesthesia approaches, precisely modulating drug metabolism, and mitigating potential complications, especially in patients with underlying hepatic pathophysiology. A collaborative effort among medical specialists, underpinned by an interdisciplinary approach, establishes an optimal framework for navigating the complexities of anaesthesia, ultimately leading to favourable perioperative outcomes.

Possible complications

Inhalation anaesthetics might cause hepatotoxicity.

Difficult mask ventilation and difficult intubation may occur due to myopathies.

Because skin structures are sensitive, there is a risk of bleeding during procedures.

Sedatives (benzodiazepines) may cause respiratory failure (11). Anaesthesia-associated rhabdomyolysis is an infrequent surgical complication that manifests postoperatively with myalgia, weakness, and potential renal failure if not promptly addressed. Underlying predisposing conditions such as muscular dystrophies and myopathies may contribute to the onset of this complication (14).

Post-operative care

The extent of postoperative monitoring and possible admission to the intensive care unit depend on both the surgical procedure and the patient's pre-operative condition.

Prolonged immobilization was avoided. Concomitant muscle atrophy may worsen the condition.

Prolonged immobilisation and bed confinement may increase tissue damage in cases of ichthyosis.

There might be an acute psychiatric disorder.

There might be an epileptic status.

Disease-related acute problems and effect on anaesthesia and recovery

TIVA should be preferred over inhalation anaesthetics during general anaesthesia. Succinylcholine should be avoided because of Hepatotoxicity. Nondepolarising muscle relaxants should be used as muscle relaxants (11,15).

Because ichthyotic skin is sensitive, cellulitis-like skin infections might occur.

Ambulatory anaesthesia

Like general anaesthesia preparation

Obstetrical anaesthesia

Like general anaesthesia

preparation reliable data are not
available.

References

- Özkale Y, Erol İ, Canan O, Durdu M. Chanarin Dorfman Syndrome: A case report Cukurova Med J 2015;40:614-18. <https://doi.org/10.17826/cutf.71286>
- Bruno C, Bertini E, et al. Clinical and genetic characterization of Chanarin-Dorfman syndrome. Biochem Biophys Res Commun 2008
- Shahoei R, Pangeni S, Sanders MA, Zhang H, Mladenovic-Lucas L, Roush WR, Halvorsen G, Kelly CV, Granneman JG, Huang YM. Molecular Modeling of ABHD5 Structure and Ligand Recognition. Front Mol Biosci 2022;28:935375. doi: 10.3389/fmolb.2022.935375.
- Mangukiya N P, Kaleem S, Meghana D, et al. Chanarin-Dorfman Syndrome (CDS): A Rare Lipid Metabolism Disorder. Cureus August 21, 2023; 15: e43889. doi:10.7759/cureus.43889
- Di Donato S, F. Taroni F. "Disorders of lipid metabolism" in Myology, A. G. Engel and Franzini-Armstrong, Eds., 1587-1621, McGraw Hill, New York, 2004.
- Bolattürk F, Göl Ö, Yetkin M. Chanarin Dorfman Sendromu: Olgu sunumu. Bozok Tıp Dergisi 2018;10.16919/bozoktip.349928.
- Kalyon S, Gökden Y, Demirel N, Erden B, Türkyılmaz A. Chanarin-Dorfman syndrome. Turk J Gastroenterol. 2019;30:105-108. doi:10.5152/tjg.2018.18014).
- Emre S, Unver N, Evans SE, et al. Molecular analysis of Chanarin-Dorfman syndrome (CDS) patients: Identification of novel mutations in the ABHD5 gene. Eur J Med Genet, 2010;53:141-144. doi:10.1016/j.ejmg.2010.03.002
- C. Pena-Penabad, M. Almagro, W. Martinez, J. Garcia-Silva, J. Del Pozo, M.T. Yebra, Sanchez-Manzano, E. Fonseca Dorfman-Chanarin syndrome (neutral lipid storage disease): new clinical features. Br J Dermatol 2001;144: 415-418
- Martin JL. Volatile anesthetics and liver injury: a clinical update or what every anesthesiologist should know. Can J Anesth 2005;52:125-9. <https://doi.org/10.1007/BF03027715>
- Butterworth JF, Mackey DC, Wasnick JD. Morgan & Mikhail Clin Anesthesiol 2021;33:717
- Oh SK, Lim BG, Kim YS, Kim SS. Comparison of the postoperative liver function between total intravenous anesthesia and inhalation anesthesia in patients with preoperatively elevated liver transaminase levels: A retrospective cohort study. Ther Clin Risk Manag 2020;16:223-232
- Ogawa M, Doi K, Mitsufuji T, Satoh K, Takatori T. Drug-induced hepatitis following sevoflurane anesthesia in a child. Masui 1991;40:1542-5
- Veropalumbo, C., D'Aniello, R., Sangermano, M., Paoletta, G., & Vajro, P.. Hypertransaminasemia: is it always liver disease? The case of subclinical myopathies and macroenzymes. Int J Gastroenterol Hepatol 2013;1:8-17.
- Koç A, Eren N. Anesthesia management in patient with Chanarin Dorfman Syndrome. Turk J Anesthesiol Reanim 2019;27:151-154

Date last modified: October 2023

This recommendation was prepared by:

Author(s)

Alparslan
KOÇ¹
Nurhan
EREN¹

*¹Erzincan Binali Yildirim University Mengucek Gazi Training and Research
Hospital Anesthesiology and Reanimation Clinic, Erzincan, Turkey*

Disclosure The authors have no financial or other competing interests to disclose. This recommendation was unfunded.

This recommendation was reviewed by:

Reviewers

Hayrettin
DAŞKAYA
Mehmet
TOPTAŞ

Disclosure The reviewers have no financial or other competing interest to disclose.

Herausgeber



DGAI

Deutsche Gesellschaft
für Anästhesiologie und
Intensivmedizin e. V.
Präsident: Prof. Dr. G. Marx,
Aachen



BDA

Berufsverband Deutscher
Anästhesistinnen und
Anästhesisten e. V.
Präsidentin: Prof. Dr.
G. Beck, Mannheim

Schriftleitung

Präsident/in der Herausgeberverbände
Gesamtschriftleiter/Editor-in-Chief:
Prof. Dr. Dr. Kai Zacharowski,
ML FRCA FESAIC, Frankfurt
Stellvertretender Gesamtschriftleiter/
Deputy Editor:
Prof. Dr. T. Volk, Homburg/Saar
CME-Schriftleiter/CME-Editor:
Prof. Dr. W. Zink, Ludwigshafen

Redaktionskomitee/Editorial Board

Priv.-Doz. Dr. E. Adam, Frankfurt
Prof. Dr. M. Adamzik, Bochum
Dr. J. Aulenkamp, Essen
Prof. Dr. G. Beck, Mannheim
Prof. Dr. T. Brenner, Essen
Prof. Dr. A. Brinkmann, Heidenheim
Prof. Dr. M. Coburn, Bonn
Prof. Dr. S.M. Coldewey, Jena
Prof. Dr. V. von Dossow, Bad Oeynhausen
Prof. Dr. B. Ellger, Dortmund
Prof. Dr. K. Engelhard, Mainz
Prof. Dr. M. Fischer, Göttingen
Prof. Dr. D. Fries, Innsbruck
Prof. Dr. K. Hahnenkamp, Greifswald
Prof. Dr. A.R. Heller, Augsburg
Prof. Dr. B. Jungwirth, Ulm
Prof. Dr. T. Loop, Freiburg
Prof. Dr. K. Meissner, Göttingen
Prof. Dr. W. Meißner, Jena
Prof. Dr. P. Meybohm, Würzburg
Prof. Dr. T. Müller-Wolff, Ludwigsburg
Prof. Dr. H. Mutlak, Offenbach
Prof. Dr. C. Nau, Lübeck
Priv.-Doz. Dr. V. Neef, Frankfurt
Prof. Dr. B. O'Brien, Berlin
Dr. B. Oehler, Heidelberg
Prof. Dr. S.G. Sakka, Koblenz
Prof. Dr. M. Sander, Gießen
Prof. Dr. B. Saugel, Hamburg
Prof. Dr. S. Schäfer, Oldenburg
Priv.-Doz. Dr. H. Schöchl, Salzburg
Prof. Dr. A. Steinbicker, Köln
Dr. M.T. Völker, Leipzig
Prof. Dr. N.-M. Wagner, Würzburg
Prof. Dr. F. Wappler, Köln
Prof. Dr. M. Weigand, Heidelberg

Redaktion/Editorial Staff

Korrespondenzadresse:
Neuwieder Straße 9 | 90411 Nürnberg |
Deutschland | Tel.: 0911 9337812
E-Mail: redaktion@ai-online.info

Verlag & Druckerei

Aktiv Druck & Verlag GmbH
An der Lohwiese 36 |
97500 Ebelsbach | Deutschland
www.aktiv-druck.de



Geschäftsführung

Wolfgang Schröder | Jan Schröder |
Nadja Schwarz
Tel.: 09522 943560 | Fax: 09522 943567
E-Mail: info@aktiv-druck.de

Anzeigen | Vertrieb

Pia Müller | Robert Kux
Tel.: 09522 943570 | Fax: 09522 943577
E-Mail: anzeigen@aktiv-druck.de

Verlagsrepräsentanz

Jürgen Distler
Neuwieder Straße 9 | 90411 Nürnberg
Tel.: 0171 9432534
E-Mail: jdistler@bda-ev.de

Herstellung | Gestaltung

Pia Müller | Robert Kux | Stefanie Triebert
Tel.: 09522 943570 | Fax: 09522 943577
E-Mail: ai@aktiv-druck.de

Titelbild

Gestaltung: Klaus Steigner
Paumgartnerstraße 28 | 90429 Nürnberg
E-Mail: mazyblue@klaus-steigner.de
www.klaus-steigner.de

Erscheinungsweise 2025

Der 66. Jahrgang erscheint jeweils zum
Monatsanfang, Heft 7/8 als Doppelausgabe.

Bezugspreise (inkl. Versandkosten):

• Einzelhefte	30,- €
• Jahresabonnement:	
Europa (ohne Schweiz)	258,- €
(inkl. 7 % MwSt.)	
Schweiz	266,- €
Rest der Welt	241,- €

Mitarbeiter aus Pflege, Labor, Studenten und Auszubildende (bei Vorlage eines entsprechenden Nachweises)

Europa (ohne Schweiz)	94,- €
(inkl. 7 % MwSt.)	
Schweiz	90,- €
Rest der Welt	94,- €

**Für Mitglieder der DGAI und/oder
des BDA ist der Bezug der Zeitschrift
im Mitgliedsbeitrag enthalten.**

Allgemeine Geschäfts- und Liefer- bedingungen

Die allgemeinen Geschäfts- und Liefer-
bedingungen entnehmen Sie bitte dem Im-
pressum auf www.ai-online.info

Indexed in **CINAHL; Current Contents®/
Clinical Medicine, EBSCO; EMBASE/
Excerpta Medica; Medical Documen-
tation Service; Research Alert;
Sci Search; Scopus; SUBIS Current
Awareness in Biomedicine; VINITI;
Russian Academy of Science.**

Nachdruck | Urheberrecht

Die veröffentlichten Beiträge sind urheber-
rechtlich geschützt. Jegliche Art von Ver-
vielfältigungen – sei es auf mechanischem,
digitalem oder sonst möglichem Wege –
bleibt vorbehalten. Die Aktiv Druck & Ver-
lags GmbH ist allein autorisiert, Rechte zu
vergeben und Sonderdrucke für gewerb-
liche Zwecke, gleich in welcher Sprache,
herzustellen. Anfragen hierzu sind nur an
den Verlag zu richten. Jede im Bereich ei-
nes gewerblichen Unternehmens zulässig
hergestellte oder benutzte Kopie dient ge-
werblichen Zwecken gem. § 54 (2) UrhG.
Die Wiedergabe von Gebrauchsnamen,
Handelsnamen, Warenbezeichnungen
usw. in dieser Zeitschrift berechtigt auch
ohne besondere Kennzeichnung nicht zu
der Annahme, dass solche Namen im Sinne
der Warenzeichen- und Markenschutz-Ge-
setzgebung als frei zu betrachten wären
und daher von jedermann benutzt werden
dürften.

Wichtiger Hinweis

Für Angaben über Dosierungsanweisun-
gen und Applikationsformen kann vom
Verlag und den Herausgebern keine Ge-
währ übernommen werden. Derartige An-
gaben müssen vom jeweiligen Anwender
im Einzelfall anhand anderer Literaturstel-
len auf ihre Richtigkeit überprüft werden.
Gleiches gilt für berufs- und verbands-
politische Stellungnahmen und Empfeh-
lungen.

Die Beiträge aus der A&I
finden Sie online unter:
www.ai-online.info

CONTACT US

Please do not hesitate to contact us. We will be glad to answer and provide further information to you at any time.

.....
Name

.....
First Name

.....
Department / Hospital

.....
Place

.....
Telephone

.....
E-Mail

.....
Date / Signature

Please contact me for further information

☐

I would like to participate in the project

☐

ADDRESS

German Society of Anaesthesiology and
Intensive Care Medicine
Neuwieder Straße 9 | 90411 Nuremberg | Germany
Tel.: +49-911-933780
Email: info@orphananesthesia.eu