

S3-Leitlinie (Leitlinienreport)

Zahnimplantate bei medikamentöser Behandlung mit Knochenantiresorptiva (inkl. Bisphosphonate)

AWMF-Registernummer: 083-026

Stand: Juli 2016

Gültig bis: Juli 2021

Federführende Fachgesellschaften:

- Deutsche Gesellschaft für Implantologie im Zahn-, Mund- und Kieferbereich (DGI)
- Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK)

Beteiligung weiterer AWMF-Fachgesellschaften:

- Deutsche Gesellschaft für Kieferorthopädie (DGKFO)
- Deutsche Gesellschaft für Mund-, Kiefer- und Gesichtschirurgie e.V. (DGMKG)
- Deutsche Gesellschaft für Parodontologie e. V. (DG PARO)
- Deutsche Gesellschaft für Prothetische Zahnmedizin und Biomaterialien e.V. (DGPro)

Beteiligung weiterer Fachgesellschaften/ Organisationen:

- Arbeitsgemeinschaft für Kieferchirurgie (AGKi)
- Berufsverband Deutscher Oralchirurgen (BDO)
- Bundesverband der implantologisch tätigen Zahnärzte in Europa (BDIZ EDI)
- Bundeszahnärztekammer (BZÄK)
- Deutsche Gesellschaft für Ästhetische Zahnmedizin (DGÄZ)
- Deutsche Gesellschaft für Computergestützte Zahnheilkunde (DGCZ)
- Deutsche Gesellschaft für Zahnärztliche Implantologie (DGZI)
- Freier Verband Deutscher Zahnärzte (FVDZ)
- Kassenzahnärztliche Bundesvereinigung (KZBV)
- Verband Deutscher Zahntechniker-Innungen (VDZI)

publiziert
bei:

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gültig bis: Juli 2021

Die "Leitlinien" der Wissenschaftlichen Medizinischen Fachgesellschaften sind systematisch entwickelte Hilfen für Ärzte/ Zahnärzte zur Entscheidungsfindung in spezifischen Situationen. Sie beruhen auf aktuellen wissenschaftlichen Erkenntnissen und in der Praxis bewährten Verfahren und sorgen für mehr Sicherheit in der Medizin, sollen aber auch ökonomische Aspekte berücksichtigen. Die "Leitlinien" sind für Ärzte/ Zahnärzte rechtlich nicht bindend und haben daher weder haftungsbegründende noch haftungsbefreiende Wirkung.

1. Geltungsbereich und Zweck

Die Deutsche Gesellschaft für Implantologie und die Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde haben sich u.a. des Ziel gesetzt gemeinsam die Entwicklung und Weiterführung wissenschaftlich begründeter und praktikabler Leitlinien in der Zahnmedizin zu fördern und zu unterstützen. Grundlage dieser Bestrebung sind medizinisch-wissenschaftliche Erkenntnisse der Fachgesellschaften der DGZMK, der DGI, dem Konsens medizinischer Fachexperten, Anwender und Patienten sowie auf dem Regelwerk zur Leitlinienerstellung der AWMF. Leitlinien bedürfen einer regelmäßigen Aktualisierung, um auf dem neuesten Stand des medizinischen Wissens zu sein. Die Umsetzung der AWMF-Regularien soll Basis zur Entwicklung qualitativ hochwertiger zahnmedizinischer Leitlinien sein. Leitlinien dienen der Qualitätssicherung und des Qualitätsmanagements in der Zahnmedizin und sollen gezielt in der täglichen Routine Anwendung finden. Ziel ist es einen therapeutischen Korridor für den praktisch tätigen Implantologen zu formulieren, in dem Bereiche soliden und abgesicherten Wissens beschrieben werden und andererseits Bereiche offen gehalten werden, in denen bislang noch keine definitive Stellungnahmen formuliert werden kann, da die wissenschaftliche Datenlage unzureichend ist.

Diese Leitlinie richtet sich neben den betroffenen Patienten an Zahnärzte, Zahnärzte mit Tätigkeitsschwerpunkt Implantologie, Fachzahnärzte für Oralchirurgie, Mund-, Kiefer-, Gesichtschirurgen und Kostenträger.

Zum Zeitpunkt der Erstellung gibt es keine Ausnahmen von der Leitlinie.

2. Zusammensetzung der Leitliniengruppe:

Zusammensetzung der Leitliniengruppe / Expertengruppe:

| <u>Vertreter / Experte</u> | <u>Funktion</u> | 09.09.2015 T = Teilnahme | 10.09.2015 T = Teilnahme | |
|---|-------------------------|-----------------------------|-----------------------------|--------------------------|
| Prof. Dr. Dr. Knut A. Grötz, Wiesbaden | Koordinator | T | T | Stimmenthaltung |
| Prof. Dr. Dr. Christian Walter, Mainz | Federführender Autor | T | T | Stimmberechtigt |
| Dr. Tim F. Wolff, Wiesbaden | Methodiker | T | T | nicht stimmberechtigt |

Erarbeitungsgruppe:

| <u>Vertreter / Experte</u> | 09.09.2015 T = Teilnahme | 10.09.2015 T = Teilnahme | |
|--|-----------------------------|-----------------------------|--|
| Prof. Dr. Dr. Bilal Al-Nawas, Mainz | T | T | Stimmberechtigt |
| Prof. Dr. Dr. Dr. Robert Sader, Frankfurt | T | T | Stimmberechtigt |
| Prof. Dr. Dr. Stefan Haßfeld, Dortmund | T | T | Stimmberechtigt |
| Dr. Martin Ullner, Hochheim | T | T | Stimmberechtigt |
| Prof. Dr. Ina Kopp, Marburg | T | T | zeitweilig als Audit und Moderatorin der AWMF |

Die endgültige Abstimmung der Leitlinie fand im Plenum einer Konsensuskonferenz in Aenzen vom 9. bis zum 10.09.2015 statt (Teilnehmerliste siehe Langversion der Leitlinie), in der insgesamt 4 Leitlinienthemen verabschiedet wurden (siehe 3.4).

Die Vorstände der beteiligten Fachgesellschaften stimmten der Leitlinie zwischen dem 21.03.2016 und dem 14.07.2016 zu. Hierbei wurden seitens der DG PARO rein redaktionelle Anmerkungen zum Leitlinientext vorgebracht, welche vollständig im Text umgesetzt wurden. Der Vorstand des VDZI enthielt sich, da dessen Mandatsträger an der o.g. Konsensuskonferenz nur als Mandatsträger für andere, ebenfalls dort verabschiedete Leitlinienthemen teilgenommen hatte.

3. Methodische Exaktheit

Recherche nach existierenden Leitlinien

Leitlinienrecherche

Recherche, Auswahl und Bewertung wissenschaftlicher Belege (Evidenzbasierung)

Formulierung einer PICO-Frage

Formulierung von Key-Words auf das zu erwartende Outcome

Priorisierung der Outcomes

Systematische Literaturrecherche

Auswahl der Studien

Formulierung der Empfehlung und strukturierte Konsensfindung (08.09.2015-09.09.2015)

Formale Konsensfindung

Berücksichtigung von Nutzen, Nebenwirkungen-relevanten Outcomes

Formulierung der Empfehlung

3.1. Recherche nach existierenden Leitlinien

Es wurde die International Guidelines Library mit dem Schlagwort bisphosphonate durchsucht. Dabei wurden keine themenbezogenen Leitlinien gefunden.

3.2. Recherche, Auswahl und Bewertung wissenschaftlicher Belege (Evidenzbasierung)

Der Methodik von GRADE folgend wurde zunächst eine PICO-Frage formuliert, um die Selektionskriterien (Suchwörter, Key-Words, Verknüpfungen, Ein- und Ausschlusskriterien) für die Literaturrecherche zu definieren:

„Für welches Subkollektiv der Patienten mit antiresorptiver Therapie erzielt eine Versorgung mit dentalen Implantaten gegenüber dem Verzicht auf dentale Implantate eine Verbesserung der Kaufunktionen und Lebensqualität ohne mit einem unangemessenen ONJ Risiko einherzugehen?“

Um relevante Outcomes und eine folgende Literaturrecherche bei Pubmed anzufertigen, wurden Key-Word Verknüpfungen gebildet.

1. Outcome: ONJ Risiko

- 1.1 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (dental implant OR Periimplantitis)
- 1.2. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND denture
- 1.3. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (jaw augmentation OR sinus lift)
- 1.4. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND antibiotics AND dental implant
- 1.5. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND xerostomia
- 1.6. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND ctx
- 1.7 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND medication time

2. Outcome: Kaufunktion

- 2.1. masticatory efficiency AND dental implant
- 2.2. tmj disorders AND dental implant AND prevention

3. Outcome: Lebensqualität

- 3.1. quality of life AND dental implant AND social eating
- 3.2. oral health related quality of life AND dental implant NOT elderly patients NOT oral cavity cancer

4. Outcome: Prognose der Restbeziehung

- 4.1. prognosis remaining dentition AND dental implant

5. Outcome: zu erwartende Prognose zukünftiger Implantate

- 5.1. dental implant AND prognosis AND (bisphosphonate OR denosumab)
- 5.2. (bisphosphonate OR denosumab) AND persisting alveolar socket
- 5.3. (bisphosphonate OR denosumab) AND sharp bone edges AND jaw NOT children NOT osteogenesis imperfect
- 5.4. (bisphosphonate OR denosumab) AND ossification AND jaw NOT children NOT osteogenesis imperfect
- 5.5. (bisphosphonate OR denosumab) AND bone remodeling AND post extraction AND jaw NOT children NOT osteogenesis imperfect
- 5.6. (bisphosphonate OR denosumab) AND radiologic changes AND jaw NOT children NOT osteogenesis imperfecta

6. Handrecherche / weitere Internetrecherche

Es ergab sich folgende Priorisierung der Outcomes:

| Patient | Intervention | Comparativ | Outcome |
|---|---|---|---|
| Antiresorptive Therapie mit Bisphosphonaten oder Denosomab | Dentale Implantate Zum Ersatz von 1 oder >1 Zahn | Verzicht auf (zusätzliche) Implantate durch <ul style="list-style-type: none"> keine prothetische Versorgung oder festsitzende Versorgung mit Brücken auf Zähnen oder herausnehmbare "konventionelle" Versorgung ohne (zusätzliche) Implantate | <ul style="list-style-type: none"> ONJ Risiko (Beeinflussung des Gesamtrisikos durch Implantate, z.B. durch die Vermeidung von ZE-Druckstellen) Kaufunktion (inklusive prophylaktische / therapeutische Beeinflussung von Kiefergelenk und Kauorgan) Lebensqualität (insbesondere durch die Beeinflussung des QoL-Merkmals "Essen in Gesellschaft") Prognose der Restbezahnung (Beeinflussung dieser z.B. bei der Indikation der Pfeilervermehrung) zu erwartende Prognose zukünftiger Implantate (unter Berücksichtigung der Implantatprognose durch Grunderkrankung, antiresorptive Therapie und weitere Einflussfaktoren) |

| Outcome | Relevanz (Zahl von 1 - 9) |
|--|---------------------------|
| <ul style="list-style-type: none"> ONJ Risiko (Beeinflussung des Gesamtrisikos durch Implantate, z.B. durch die Vermeidung von ZE-Druckstellen) | 7,5 |
| <ul style="list-style-type: none"> Kaufunktion (inklusive prophylaktische / therapeutische Beeinflussung von Kiefergelenk und Kauorgan) | 6,3 |
| <ul style="list-style-type: none"> Lebensqualität (insbesondere durch die Beeinflussung des QoL-Merkmals "Essen in Gesellschaft") | 6,3 |
| <ul style="list-style-type: none"> Prognose der Restbezahnung (Beeinflussung dieser z.B. bei der Indikation der Pfeilervermehrung) | 5,6 |
| <ul style="list-style-type: none"> zu erwartende Prognose zukünftiger Implantate (unter Berücksichtigung der Implantatprognose durch Grunderkrankung, antiresorptive Therapie und weitere Einflussfaktoren) | 4,3 |

Es erfolgte eine systematische Literaturrecherche mit PubMed. Als Suchwörter wurden die oben genannten Key-Word Verknüpfungen gewählt, so dass eine hohe Vollständigkeit zu erzielen war.

In der am 06.06.2015 durchgeführten Literaturrecherche wurden insgesamt 505 Publikationen bei Pubmed gefunden. Zusätzlich erbrachte die Handrecherche weitere 17 Publikationen, die in die Bewertung mit eingebracht wurden. Insgesamt wurden 522 Publikationen in der ersten Literaturrecherche gesichtet (siehe Anhang 1).

Am 10.07.2015 erfolgte ein konstituierendes Treffen ohne Anwesenheit des Methodikers (Prof. Dr. Dr. B. Al-Nawas, Prof. Dr. Dr. K. Grötz, Prof. Dr. Dr. C. Walter). Die Publikationen wurden nach folgenden Kriterien evaluiert: Eingeschlossen wurden retrospektive, prospektive Studien am Menschen sowie Fallserien mit über 10 Patienten.

Bei der Sichtung der Literaturrecherche am 10.07.2015 (Literaturauswahl nach methodischen Kriterien) zeigte sich zu den Punkten 1.6. etc. eine große Zahl von Literaturtreffern, die inhaltlich aber keine Auswertung der Outcomes für die PICO-Frage zuließen. Deshalb war die Recherche in den unten genannten Punkten um die jeweiligen Inhalte der PICO-Frage zu ergänzen.

1.6. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND ctx AND dental Implant -> neue Anzahl an Literaturquellen = 5

1.7 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND medication time AND dental Implant -> neue Anzahl an Literaturquellen = 2

2.1. (bisphosphonate OR denosumab) AND masticatory efficiency AND dental implant -> neue Anzahl = 0

2.2. (bisphosphonate OR denosumab) AND tmj disorders AND dental implant AND prevention -> neue Anzahl = 0

3.1. (bisphosphonate OR denosumab) AND quality of life AND dental implant -> neue Anzahl = 5

3.2. (bisphosphonate OR denosumab) AND oral health related quality of life AND dental implant NOT elderly patients NOT oral cavity cancer -> neue Anzahl = 1

4.1. (bisphosphonate OR denosumab) AND prognosis remaining dentition AND dental implant -> neue Anzahl = 0

5.4. (bisphosphonate OR denosumab) AND ossification AND jaw NOT children NOT osteogenesis imperfect AND dental implant -> neue Anzahl = 9

5.5. (bisphosphonate OR denosumab) AND bone remodeling AND post extraction AND jaw NOT children NOT osteogenesis imperfect AND dental implant -> neue Anzahl = 1

5.6. (bisphosphonate OR denosumab) AND radiologic changes AND jaw NOT children NOT osteogenesis imperfecta AND dental implant -> neue Anzahl = 1

Alle anderen Key-Word Recherche Punkte blieben unverändert. Somit kamen 24 neue Literaturquellen für eine weitere Auswertung in Frage. Insgesamt resultierten nach erneuter methodischer Auswertung aller Key Words Verknüpfungen 50 auszuwertende Literaturstellen inklusive der mittels Handsuche eingefügten Literaturstellen für die Leitlinienerstellung (siehe Anhang 2). Die Evidenztabelle zu diesen Studien sind der zugehörigen Publikation¹ zu entnehmen, die als Anlage den Leitliniendokumenten beigefügt ist.

1. Outcome: ONJ Risiko

- 1.1 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (dental implant OR Periimplantitis) Anzahl: 18
- 1.2 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND denture Anzahl: 12
- 1.3 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (jaw augmentation OR sinus lift) Anzahl: 0
- 1.4 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND antibiotics AND dental implant Anzahl: 0
- 1.5 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND xerostomia Anzahl: 0
- 1.6 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND ctx Anzahl: 0
- 1.7 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND medication time Anzahl: 0

¹ Walter C., Al-Nawas B., Wolff T, Schiegnitz E., Grötz KA; Dental implants in patients treated with antiresorptive medication – a systematic literature review; International Journal of Implant Dentistry 2016(2):9; DOI: 10.1186/s40729-016-0041-7

2. Outcome Kaufunktion

- 2.1. masticatory efficiency AND dental implant
Anzahl: 0
- 2.2. tmj disorders AND dental implant AND prevention
Anzahl: 0

3. Outcome Lebensqualität

- 3.1. quality of life AND dental implant
Anzahl: 1
- 3.2. oral health related quality of life AND dental implant NOT elderly patients NOT oral cavity cancer
Anzahl: 0

4. Outcome Prognose der Restbezahnung

- 4.1. prognosis remaining dentition AND dental implant
Anzahl: 0

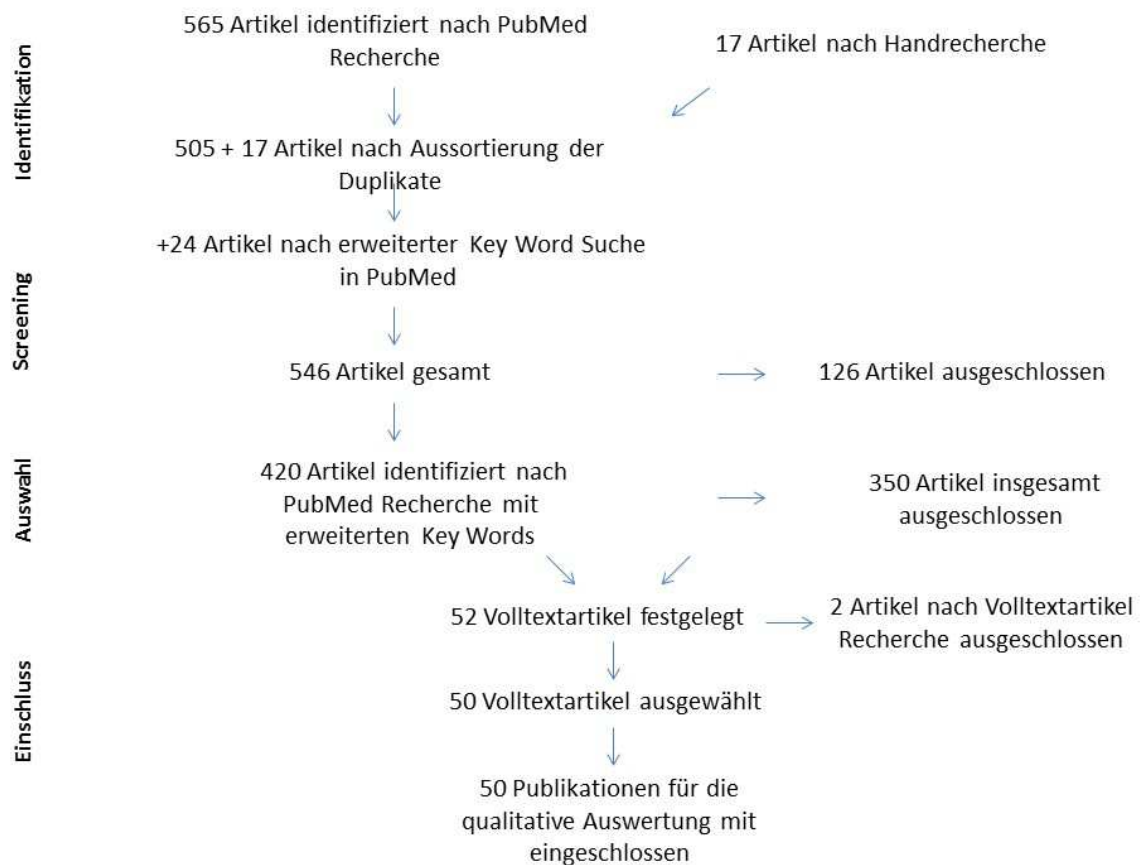
5. Outcome: Prognose zukünftiger Implantate

- 5.1. dental implant AND prognosis AND (bisphosphonate OR denosumab)
Anzahl: 0
- 5.2. (bisphosphonate OR denosumab) AND persisting alveolar socket
Anzahl: 2
- 5.3. (bisphosphonate OR denosumab) AND sharp bone edges AND jaw NOT children NOT osteogenesis imperfect
Anzahl: 0
- 5.4. (bisphosphonate OR denosumab) AND ossification AND jaw NOT children NOT osteogenesis imperfect
Anzahl: 0
- 5.5. (bisphosphonate OR denosumab) AND bone remodeling AND post extraction AND jaw NOT children NOT osteogenesis imperfect
Anzahl: 0
- 5.6. (bisphosphonate OR denosumab) AND radiologic changes AND jaw NOT children NOT osteogenesis imperfect AND dental implant
Anzahl: 0

6. Handrecherche weitere Internetrecherche

Anzahl: 17

Beigefügt ist das Schaudiagramm zur Literaturrecherche und folgend die 50 Publikationen für die qualitative Auswertung:



3.3. Empfehlungformulierung

Es wurden Handlungsempfehlungen mit drei unterschiedlichen Empfehlungsgraden formuliert:

„soll“ = Nutzen eindeutig/überwiegt Schaden für die meisten Patienten oder umgekehrt

„sollte“ = Nutzen weniger eindeutig oder relevante Patientengruppen haben keinen Benefit

„kann“ = offen, unklare Evidenz, Einzelfallempfehlung

3.4. Konsensfindung

Die Formulierungen der Empfehlungen und Konsensfindung fanden am 09.09.2015-10.09.2015 in Aachen, Deutschland, im Rahmen einer strukturierten Konsensuskonferenz statt. Die formulierten Statements und Empfehlungen wurden gemäß den Richtlinien der AWMF in Kleingruppen erarbeitet und im Plenum diskutiert sowie abgestimmt (Empfehlungen siehe Leitlinie „Zahnimplantate bei medikamentöser Behandlung mit Knochenantiresorptiva (inkl. Bisphosphonate)“). Im Vorfeld wurden

Ziele, Vorgehensweise, Abstimmungsverfahren und Tagungsort festgelegt und hierzu die Konsentierenden eingeladen.

Am ersten Tag der Konsensuskonferenz wurde analog eines nominalen Gruppenprozesses in Kleingruppen gearbeitet. Die Kleingruppen wurden hierbei jeweils durch zuvor methodisch eingewiesene Moderatoren angeleitet und zeitweilig durch die AWMF-Leitlinienberaterin Frau Prof. Ina Kopp auditiert. Am zweiten Tag erfolgte die Vorstellung und Abstimmung der Leitlinienthemen im Plenum im Rahmen einer strukturierten Konsensuskonferenz, die durch Frau Prof. Kopp neutral und unabhängig moderiert wurde.

Tag 1: Kleingruppe (Nominaler Gruppenprozess):

- Präsentation der zu konsentierenden Aussagen / Empfehlungen
- Möglichkeit zur Stille Notiz: Welcher Empfehlung/Empfehlungsgrad stimmen Sie nicht zu? Ergänzung, Alternative?
- Registrierung der Stellungnahmen im Umlaufverfahren und Zusammenfassung von Kommentaren durch den Moderator
- Vorabstimmung über Diskussion der einzelnen Kommentare – Erstellung einer Rangfolge
- Debattieren / Diskussion der Diskussionspunkte
- Endgültige Abstimmung über jede Empfehlung und alle Alternativen
- Schritte wurden für jede Empfehlung wiederholt

Tag 2: Plenum (Konsensuskonferenz):

- Präsentation der Ergebnisse der Kleingruppendiskussion dem Gesamtplenum von den Gruppensprechern
- Stellungnahmen wurden zur Abstimmung gebracht
- Unterstützung Plenarsitzung durch unabhängige Moderatoren
- Das Ergebnis wurde am Ende der Konferenz festgeschrieben.

Ein Konsens wurde erzielt bei mind. 75% Zustimmung zu einer Empfehlung, dies war für alle abgestimmten Empfehlungen der Fall.

4. Interessenkonflikterklärungen

Die Original-Formulare sind im Sekretariat der DGI hinterlegt.

| Name | Vorname | Titel | 1* | 2* | 3* | 4* | 5* | 6* | 7* | 8* | 9* | Bewertung |
|----------|-------------|---------------|------|------|------|------|------|------|------|------|------|---|
| Al-Nawas | Bilal | Prof. Dr. Dr. | Nein | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | Thematische Relevanz zum Thema Bisphosphonat |
| Bach | Georg | Dr. | Nein | Nein | Nein | Nein | Ja | Nein | Ja | Nein | Nein | Stimmenthaltung bei Laser vs. Andere therap. Interventionen |
| Bartsch | Klaus | | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Thematisch Relevanten COI Stimmenthaltung erforderlich |
| Beck | Jörg | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | keine finanziellen Interessenkonflikte keine Stimmenthaltung |
| Becker | Jürgen | Prof. Dr. | Nein | Ja | Ja | Ja | Nein | Nein | Ja | Nein | Nein | Ko-Koordinator (Schwarz) --> keine thematisch relevanten COI Thematisch relevante COI --> peer review der Koordinationstätigkeit durch Mitglied der LL-Gruppe ohne fin. COI keine Stimmberechtigung, da Koordinator |
| Berger | Christian | | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Finanziellen COI Stimmenthaltung erforderlich |
| Beuer | Florian | Prof. Dr. | Ja | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | Stimmenthaltung bei Fragestellungen zu Implantaten vs. Alternativen Interventionen |
| Blume | Markus | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | keine thematisch relevanten COI keine Stimmenthaltung erforderlich |
| Bormann | Kai Hendrik | Prof. Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Keine thematische Relevanz zur LL (LL Behandelt nicht die Differentialindikation Implantate vs. Andere Optionen) |

| | | | | | | | | | | | | |
|-------------|-------------|---------------|------|------|------|------|------|------|------|------|------|--|
| Gómez Román | German | Prof. Dr. | Ja | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Keine thematische Relevanz Keine Stimmenthaltung |
| Grötz | Knut | Prof. Dr. Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | |
| Haßfeld | Stefan | Prof. Dr. Dr. | Ja | Ja | Ja | Nein | Ja | Nein | Ja | Nein | Nein | Keine thematische Relevanz Keine Stimmenthaltung |
| Hoffmann | Jürgen | Prof. Dr. Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Keine thematische Relevanz keine Stimmenthaltung erforderlich |
| Iglhaut | Gerhard | Dr. | Nein | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | keine thematische Relevanz für die LL- Fragestell. Keine Enthaltung erforderlich |
| Jakobs | Wolfgang | Dr. Dr. | Nein | Ja | Ja | Nein | Ja | Nein | Ja | Nein | Nein | keine thematische Relevanz zur LL (COI betreffen nur L-Anästhesieverfahren) (LL behandelt nicht die Differentialindikation Implantate vs. Andre Optionen) |
| Kebuschull | Moritz | PD Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Stimmenthaltung bei Fragen um Mundhygiene (e- vs konv. Zahnbürste) |
| Liepe | Stefan | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | keine finanziellen Interessenkonflikte keine Stimmenthaltung erforderlich |
| Lux | Christopher | Prof. Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | keinen finanziellen COI keine Stimmenthaltung erforderlich |
| Mehl | Christian | PD Dr. | Nein | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | Stimmenthaltung bei Fragestellungen zu Implantaten vs. Alternativen Verfahren |
| Naujokat | Hendrik | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Keine finanziellen COI Keine Stimmenthaltung |
| Palm | Frank | Dr. Dr. | Ja | Ja | Ja | Nein | Nein | Ja | Nein | Nein | Nein | Stimmenthaltung bei Fragestellungen zu Implantaten vs. Alternativen Verfahren |
| Ritter | Lutz | PD Dr. Dr. | Ja | Ja | Nein | Ja | Nein | Nein | Ja | Nein | Nein | keine thematisch relevanten COI keine Stimmenthaltung erforderlich |

| | | | | | | | | | | | | |
|-----------|-----------|---------------|------|------|------|------|------|------|------|------|------|--|
| Sader | Robert | Prof. Dr. | Nein | Nein | Ja | Nein | Nein | Nein | Ja | Nein | Nein | Keine thematische Relevanz Keine Stimmenthaltung |
| Schlee | Markus | Dr. | Ja | Ja | Ja | Ja | Ja | Ja | Ja | Nein | Nein | Stimmenthaltung bei allen formalen Abstimmungen nur als beratender Experte |
| Schmidt | Joachim | Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Stimmenthaltung bei Fragestellungen zu Implantaten vs. Alternativen Verfahren |
| Schwarz | Frank | Prof. Dr. | Nein | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | keine thematisch relevanten COI nicht stimmberechtigt (Koordinator) |
| Sommer | Mathias | Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Keine finanziellen COI Keine Stimmenthaltung |
| Stiesch | Meike | Prof. Dr. | Nein | Ja | Ja | Nein | Nein | Nein | Nein | Nein | Nein | keine thematisch relevanten COI |
| Stiller | Michael | PD Dr. Dr. | Ja | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | keine thematisch relevanten COI keine Enthaltung erforderlich |
| Terheyden | Hendrik | Prof. Dr. Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Koordinator, nicht Stimmberechtigt Peer Review durch ein Mitglied der LL- Gruppe, ohne finanzielle COI |
| Tetsch | Jan | Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Nein | Nein | Nein | Koordinator, nicht Stimmberechtigt Peer Review durch ein Mitglied der LL- Gruppe, ohne finanzielle COI |
| Ullner | Martin | Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Keine Stimmberechtigung (Koordinator) Ko-Koordinator (Tim Wolf) ohne finanzielle COI |
| Wagner | Wilfried | Prof. Dr. | Ja | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | |
| Walter | Christian | Prof. Dr. Dr. | Nein | Ja | Nein | Nein | Ja | Nein | Ja | Nein | Nein | geringfügige Relevanz (<1000 € für Vorträge) keine Stimmenthaltung |
| Wiegner | Jörg Ulf | Dr. | Nein | Ja | Nein | Nein | Nein | Nein | Ja | Nein | Nein | Keine thematische Relevanz zur LL (LL Behandelt nicht die Differentialindikation Implantate vs. Andere Optionen) |

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|--|--------|---------------|------|------|------|------|------|------|----|------|------|--|
| Wiltfang | Jörg | Prof. Dr. Dr. | Ja | Ja | Ja | Nein | Nein | Nein | Ja | Nein | Nein | Keine direkten finanziellen Interessenkonflikte keine Stimmenthaltung |
| Wolf | Thomas | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Ja | Nein | keine finanziellen Interessenkonflikte keine direkten finanziellen COI keine Stimmenthaltung |
| Wolff | Tim | Dr. | Nein | Nein | Nein | Nein | Nein | Nein | Ja | Nein | Nein | kein Stimmrecht |
| <ol style="list-style-type: none"> 1. Berater- bzw. Gutachtertätigkeit oder bezahlte Mitarbeit in einem wissenschaftlichen Beirat eines Unternehmens der Gesundheitswirtschaft (z.B. Arzneimittelindustrie, Medizinproduktindustrie), eines kommerziell orientierten Auftragsinstituts oder einer Versicherung 2. Honorare für Vortrags- und Schulungstätigkeiten oder bezahlte Autoren- oder Co-Autorenschaften im Auftrag eines Unternehmens der Gesundheitswirtschaft, eines kommerziell orientierten Auftragsinstituts oder einer Versicherung 3. Finanzielle Zuwendungen (Drittmittel) für Forschungsvorhaben oder direkte Finanzierung von Mitarbeitern der Einrichtung von Seiten eines Unternehmens der Gesundheitswirtschaft, eines kommerziell orientierten Auftragsinstituts oder einer Versicherung 4. Eigentümerinteresse an Arzneimitteln/Medizinprodukten (z. B. Patent, Urheberrecht, Verkaufslizenz) 5. Besitz von Geschäftsanteilen, Aktien, Fonds mit Beteiligung von Unternehmen der Gesundheitswirtschaft 6. Persönliche Beziehungen zu einem Vertretungsberechtigten eines Unternehmens Gesundheitswirtschaft 7. Mitglied von in Zusammenhang mit der Leitlinienentwicklung relevanten Fachgesellschaften/Berufsverbänden, Mandatsträger im Rahmen der Leitlinienentwicklung 8. Politische, akademische (z.B. Zugehörigkeit zu bestimmten „Schulen“), wissenschaftliche oder persönliche Interessen, die mögliche Konflikte begründen könnten 9. Gegenwärtiger Arbeitgeber, relevante frühere Arbeitgeber der letzten 3 Jahre | | | | | | | | | | | | |

Anhang 1: Ergebnis der ersten Literaturrecherche

1. Outcome: ONJ Risiko

1.1 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (dental implant OR Periimplantitis)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe | Doppelt vorhanden |
|-----|----------|-----------------------------------|------------------|--|---|--------------------------------------|----------------|-------------------|
| 1 | 25956267 | Matsuo A | 2015 | Evaluation of dental implants as a risk factor for the development of bisphosphonate-related osteonecrosis of the jaw in breast cancer patients. | Odontology. | Retrospective Fallserie | - | |
| 2 | 25764480 | Al-Sabbagh M | 2015 | Osteoporosis and bisphosphonate-related osteonecrosis in a dental school implant patient population. | Implant Dent. | Retrospective Fallserie | + | |
| 3 | 25734949 | Doh RM | 2015 | Teriparatide therapy for bisphosphonate-related osteonecrosis of the jaw associated with dental implants. | Implant Dent. | Narratives Review / Case Report | - | |
| 4 | 25701305 | Nisi M | 2015 | Risk factors influencing BRONJ staging in patients receiving intravenous bisphosphonates: a multivariate analysis. | Int J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 5 | 25639776 | Boquete-Castro A | 2015 | Denosumab and osteonecrosis of the jaw. A systematic analysis of events reported in clinical trials. | Clin Oral Implants Res. | Systematisches Review / Meta Analyse | + | |
| 6 | 25327450 | Fernández Ayora A | 2015 | Dramatic osteonecrosis of the jaw associated with oral bisphosphonates, periodontitis, and dental implant removal. | J Clin Periodontol. | Narratives Review / Case Report | - | |
| 7 | 25234534 | Holzinger D | 2014 | Effect of dental implants on bisphosphonate-related osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 8 | 24784521 | Lin WS | 2014 | CAD/CAM-fabricated telescopic prostheses on | Gen Dent. | Case Report | - | |

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|----|----------|---------------------------------|------|--|---|-------------------------------------|---|--|
| | | | | periodontally compromised abutments of a patient undergoing intravenous bisphosphonate treatment for osteoporosis: a case report. | | | | |
| 9 | 24665825 | Petropoulos VC | 2014 | Treatment of a Patient with Implant Failure and Jaw Osteonecrosis: Successful Retreatment Using Implants. | J Oral Implantol. | Case Report | - | |
| 10 | 24665168 | Gupta S | 2013 | Bisphosphonates related osteonecrosis of the jaw. | Natl J Maxillofac Surg. | Systematisches Review | - | |
| 11 | 24593250 | Rugani P | 2014 | Implant placement adjacent to successfully treated Bisphosphonate-related osteonecrosis of the jaw (BRONJ). | J Oral Implantol. | Case Report | - | |
| 12 | 24420526 | Borm JM | 2013 | [Risk assessment in patients undergoing osseous antiresorptive therapy in dentistry. An update]. | Schweiz Monatsschr Zahnmed. | Case Reports | - | |
| 13 | 24168902 | Kim JW | 2014 | Bisphosphonate-related osteonecrosis of the jaw at a previously grafted sinus. | Implant Dent. | Case Report | - | |
| 14 | 23964780 | Chadha GK | 2013 | Osseointegration of dental implants and osteonecrosis of the jaw in patients treated with bisphosphonate therapy: a systematic review. | J Oral Implantol. | Systematisches Review | - | |
| 15 | 23920073 | Pasoff M | 2013 | C-terminal cross-linking telopeptide as a serologic marker for bisphosphonate-related osteonecrosis of the jaw: review of 2 cases. | J Can Dent Assoc. | Cese Reports | - | |
| 16 | 23866309 | López-Cedrún JL | 2013 | Oral bisphosphonate-related osteonecrosis of the jaws in dental implant patients: a case series. | Br J Oral Maxillofac Surg. | Retrospektive Multycenter Fallserie | + | |
| 17 | 23763951 | Albanese A | 2013 | Platelet-rich plasma (PRP) in dental and oral surgery: from the wound healing to bone regeneration. | Immun Ageing. | Narratives Review | - | |
| 18 | 23763726 | Mattheos N | 2013 | Dental implant placement with bone augmentation in a patient who received intravenous bisphosphonate treatment for osteoporosis. | J Can Dent Assoc. | Case Report | - | |

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|----|----------|-------------------------------------|------|---|--|---------------------------|---|--|
| 19 | 23664688 | Bascones-Martínez A | 2013 | [Oral secondary effects of radiotherapy and chemotherapy in cancer of the cervicofacial region]. | Med Clin (Barc). | Narratives Review | - | |
| 20 | 23445465 | Tam Y | 2014 | Osteonecrosis of the jaw after implant surgery in patients treated with bisphosphonates--a presentation of six consecutive cases. | Clin Implant Dent Relat Res. | Case Reports | + | |
| 21 | 23294978 | Boffano P | 2013 | Pathological mandibular fractures: a review of the literature of the last two decades. | Dent Traumatol. | Narratives Review | - | |
| 22 | 23278625 | Kwon TG | 2014 | Osteonecrosis associated with dental implants in patients undergoing bisphosphonate treatment. | Clin Oral Implants Res. | Retrospektive Fallserie | + | |
| 23 | 25737876 | Kalra S | 2013 | Dental complications and management of patients on bisphosphonate therapy: A review article. | J Oral Biol Craniofac Res. | Narratives Review | - | |
| 24 | 23264610 | Abtahi J | 2013 | Effect of local vs. systemic bisphosphonate delivery on dental implant fixation in a model of osteonecrosis of the jaw. | J Dent Res. | Tierexperimentelle Studie | - | |
| 25 | 23075811 | Sverzut CE | 2012 | Mandibular bisphosphonate-related osteonecrosis after dental implant rehabilitation: a case report. | Implant Dent. | Case Report | - | |
| 26 | 23021595 | Annussek T | 2012 | Short time administration of antirheumatic drugs - methotrexate as a strong inhibitor of osteoblast's proliferation in vitro. | Head Face Med. | In-Vitro Studie | - | |
| 27 | 22945738 | Gupta R | 2012 | Early dental implant failure in patient associated with oral bisphosphonates. | Indian J Dent Res. | Case Report | - | |
| 28 | 22924366 | Zadik Y | 2012 | The importance of a thorough medical and pharmacological history before dental implant placement. | Aust Dent J. | Case Report | - | |
| 29 | 22892237 | Holzinger D | 2013 | Long-term success of surgery in bisphosphonate-related osteonecrosis of the jaws (BRONJs). | Oral Oncol. | Retrospektive Fallserie | - | |
| 30 | 22524823 | Kim BC | 2012 | Mandibular reconstruction with vascularized osseous | Asian Pac J Cancer Prev. | Narratives Review | - | |

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| | | | | free flaps: a review of the literature. | | | | |
| 31 | 22507063 | Otomo-Corgel J | 2012 | Osteoporosis and osteopenia: implications for periodontal and implant therapy. | Periodontol 2000. | Narratives Review | - | |
| 32 | 22506684 | Chadha GK | 2012 | Osseointegration of dental implants and osteonecrosis of the jaw in patients treated with bisphosphonate therapy: A systematic review. | J Oral Implantol. | Systematisches Review | - | |
| 33 | 22486711 | Saldanha S | 2012 | Dental implications of bisphosphonate-related osteonecrosis. | Gerodontology. | Narratives Review | - | |
| 34 | 22415216 | Jacobsen C | 2013 | Osteopathology induced by bisphosphonates and dental implants: clinical observations. | Clin Oral Investig. | Retrospektive Fallserie | + | |
| 35 | 22376948 | Conte-Neto N | 2012 | Epidemiological aspects of rheumatoid arthritis patients affected by oral bisphosphonate-related osteonecrosis of the jaws. | Head Face Med. | Narratives Review / Literatur Review | - | |
| 36 | 24558532 | Flichy-Fernández AJ | 2012 | Bone necrosis around dental implants: A patient treated with oral bisphosphonates, drug holiday and no risk according to serum CTX. | J Clin Exp Dent. | Case Report | - | |
| 37 | 22257870 | Zadik Y | 2012 | Painful trigeminal neuropathy induced by oral bisphosphonate-related osteonecrosis of the jaw: a new etiology for the numb-chin syndrome. | Quintessence Int. | Case Report | - | |
| 38 | 22228462 | Yuan K | 2012 | Dental implant failure associated with bacterial infection and long-term bisphosphonate usage: a case report. | Implant Dent. | Case Report | - | |
| 39 | 22201102 | Tanaka S | 2012 | [Potential use of parathyroid hormone (PTH) in the treatments for oral diseases]. | Clin Calcium. | Narratives Review | - | |
| 40 | 22133390 | Stewart DL | 2011 | Prosthetic treatment of a patient taking nitrogen-containing bisphosphonates to preserve the integrity of the epithelial attachment: a clinical report. | J Prosthet Dent. | Case Report | - | |
| 41 | 22126353 | Liddelow G | 2011 | Patient-related risk factors for implant therapy. A | Aust Dent J. | Systematisches Review | - | |

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| | | | | critique of pertinent literature. | | | | |
| 42 | 22091898 | Shannon J | 2011 | Bisphosphonates and osteonecrosis of the jaw. | J Am Geriatr Soc. | Narratives Review | - | |
| 43 | 22041409 | Hellstein JW | 2011 | Managing the care of patients receiving antiresorptive therapy for prevention and treatment of osteoporosis: executive summary of recommendations from the American Dental Association Council on Scientific Affairs. | J Am Dent Assoc. | Narratives Review | - | |
| 44 | 21883630 | Tripathi A | 2011 | Bisphosphonate therapy for skeletal malignancies and metastases: impact on jaw bones and prosthodontic concerns. | J Prosthodont. | Narratives Review | - | |
| 45 | 21882508 | Verbruggen KH | 2011 | [Placing of oral implants in patients using bisphosphonates]. | Ned Tijdschr Tandheelkd. | Narratives Review | - | |
| 46 | 21881516 | Lee CY | 2011 | Identification and treatment of bisphosphonate-associated actinomycotic osteonecrosis of the jaws. | Implant Dent. | Narratives Review | - | |
| 47 | 23738968 | Famili P | 2011 | Survival of dental implants among post-menopausal female dental school patients taking oral bisphosphonates: a retrospective study. | Compend Contin Educ Dent. | Retrospektive Fallserie | + | |
| 48 | 21486510 | Franken AA | 2011 | [Bisphosphonate-related osteonecrosis of the jaw]. | Ned Tijdschr Geneesk. | Narratives Review | - | |
| 49 | 21477374 | Borromeo GL | 2011 | Is bisphosphonate therapy for benign bone disease associated with impaired dental healing? A case-controlled study. | BMC Musculoskelet Disord. | Prospektive kontrollierte klinische Studie | - | |
| 50 | 21440820 | Fleisher KE | 2011 | Risk factors for bisphosphonate-related osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Narratives Review / Letter | - | |
| 51 | 21425753 | Garg A | 2011 | Study investigates novel approach to bone loss in the jaw. | Dent Implantol Update. | Case Report | - | |
| 52 | 22567443 | Junquera L | 2011 | Multiple myeloma and bisphosphonate-related osteonecrosis of the mandible associated with dental | Case Rep Dent. | Case Report | - | |

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| | | | | implants. | | | | |
| 53 | 21163625 | Manfredi M | 2011 | Bisphosphonate-related osteonecrosis of the jaws: a case series of 25 patients affected by osteoporosis. | Int J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 54 | 21122971 | Huja SS | 2011 | Effects of short-term zoledronic acid treatment on bone remodeling and healing at surgical sites in the maxilla and mandible of aged dogs. | J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 55 | 21119471 | Goiato MC | 2010 | Care required when using bisphosphonates in dental surgical practice. | J Craniofac Surg. | Narratives Review | - | |
| 56 | 20949756 | de Souza Loureiro CC | 2010 | Advantages and disadvantages of the use of bisphosphonates in oral and maxillofacial surgery. | Int Dent J. | Narratives Review | - | |
| 57 | 20946206 | Kwon YD | 2011 | Retrospective study of two biochemical markers for the risk assessment of oral bisphosphonate-related osteonecrosis of the jaws: can they be utilized as risk markers? | Clin Oral Implants Res. | Retrospektive Fallserie | + | |
| 58 | 20561470 | Bedogni A | 2010 | Oral bisphosphonate-associated osteonecrosis of the jaw after implant surgery: a case report and literature review. | J Oral Maxillofac Surg. | Case Report | - | |
| 59 | 20498766 | Shin EY | 2010 | Implant failure associated with oral bisphosphonate-related osteonecrosis of the jaw. | J Periodontal Implant Sci. | Case Report | - | |
| 60 | 20434422 | Koka S | 2010 | Survival of dental implants in post-menopausal bisphosphonate users. | J Prosthodont Res. | Retrospektive Fallserie | + | |
| 61 | 20415805 | Narongroeknawin P | 2010 | Bisphosphonate-associated osteonecrosis of the jaw, with healing after teriparatide: a review of the literature and a case report. | Spec Care Dentist. | Case Report / Narratives Review | - | |
| 62 | 20399289 | Kassolis JD | 2010 | Histopathologic findings in bone from edentulous alveolar ridges: a role in osteonecrosis of the jaws? | Bone. | Retrospektive Fallserie | - | |
| 63 | 20367090 | Javed F | 2010 | Osseointegration of dental implants in patients | J Periodontol. | Systematisches Review | - | |

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| | | | | undergoing bisphosphonate treatment: a literature review. | | | | |
| 64 | 20307764 | Lazarovici TS | 2010 | Bisphosphonate-related osteonecrosis of the jaw associated with dental implants. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 65 | 20116705 | Goss A | 2010 | The nature and frequency of bisphosphonate-associated osteonecrosis of the jaws in dental implant patients: a South Australian case series. | J Oral Maxillofac Surg. | Case Reports | + | |
| 66 | 20095203 | Koka S | 2009 | Osteoporosis, fracture risk, and prosthodontic implications. | Int J Prosthodont. | Narratives Review | - | |
| 67 | 20072741 | El-Halaby A | 2009 | Autogenous bone grafting in a patient on long-term oral bisphosphonate therapy: case report. | Int J Periodontics Restorative Dent. | Case Report | - | |
| 68 | 19793318 | Shirota T | 2009 | Bisphosphonate-related osteonecrosis of the jaw around dental implants in the maxilla: report of a case. | Clin Oral Implants Res. | Case Report | - | |
| 69 | 19772941 | Lo JC | 2010 | Prevalence of osteonecrosis of the jaw in patients with oral bisphosphonate exposure. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 70 | 19767707 | Montoya-Carralero JM | 2010 | Dental implants in patients treated with oral bisphosphonates: a bibliographic review. | Med Oral Patol Oral Cir Bucal. | Narratives Review | - | |
| 71 | 19767691 | Mellado-Valero A | 2010 | Implant treatment in patients with osteoporosis. | Med Oral Patol Oral Cir Bucal. | Narratives Review | - | |
| 72 | 19753815 | Bourgeois SL Jr | 2009 | Bisphosphonate medications--the good, the bad, and the ugly. | Tex Dent J. | Narratives Review | - | |
| 73 | 19681933 | Favia G | 2011 | Osteonecrosis of the posterior mandible after implant insertion: a clinical and histological case report. | Clin Implant Dent Relat Res. | Case Report | - | |
| 74 | 19663954 | Madrid C | 2009 | What impact do systemically administered bisphosphonates have on oral implant therapy? A systematic review. | Clin Oral Implants Res. | Systematisches Review | - | |
| 75 | 19570696 | Siddiqi A | 2009 | Bisphosphonate-induced osteonecrosis of the jaw: a | Oral Surg Oral Med Oral | Narratives Review | - | |

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|----|----------|-------------------------------------|------|--|---|--------------------|---|--|
| | | | | medical enigma? | Pathol Oral Radiol Endod. | | | |
| 76 | 19561566 | Flichy-Fernández AJ | 2009 | Bisphosphonates and dental implants: current problems. | Med Oral Patol Oral Cir Bucal. | Narratives Review | - | |
| 77 | 19537656 | Pirih FQ | 2009 | Case report of implant placement in a patient with Paget's disease on bisphosphonate therapy. | J Mich Dent Assoc. | Case Report | - | |
| 78 | 19446233 | McLeod NM | 2009 | Oral bisphosphonates and dental implants. | J Oral Maxillofac Surg. | Letter / Comment | - | |
| 79 | 19371821 | Marx RE | 2009 | Reconstruction of defects caused by bisphosphonate-induced osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Narratives Review | - | |
| 80 | 19371813 | Assael LA | 2009 | Oral bisphosphonates as a cause of bisphosphonate-related osteonecrosis of the jaws: clinical findings, assessment of risks, and preventive strategies. | J Oral Maxillofac Surg. | Narratives Review | - | |
| 81 | 19217014 | Torres J | 2009 | Dental implants in a patient with Paget disease under bisphosphonate treatment: a case report. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Case Report | - | |
| 82 | 19212230 | Kraut RA | 2009 | Current therapy: a moving target. | Implant Dent. | Letter / Editorial | - | |
| 83 | 19122270 | Urade M | 2009 | [New development in bisphosphonate treatment. Bisphosphonate therapy and osteonecrosis of the jaws]. | Clin Calcium. | Narratives Review | - | |
| 84 | 19071040 | Alons K | 2009 | Treating low- and medium-potency bisphosphonate-related osteonecrosis of the jaws with a protocol for the treatment of chronic suppurative osteomyelitis: report of 7 cases. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Case Reports | - | |
| 85 | 19047674 | Edwards BJ | 2008 | Updated recommendations for managing the care of patients receiving oral bisphosphonate therapy: an advisory statement from the American Dental Association Council on Scientific Affairs. | J Am Dent Assoc. | Letter | - | |
| 86 | 18807554 | Marx RE | 2008 | Editorial opinion versus real data and knowledge of the | Int J Oral Maxillofac | Editorial | - | |

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|----|----------|--------------------------------|-----------|---|--|---------------------------------|---|--|
| | | | | literature. | Implants. | | | |
| 87 | 18797941 | Pigrau C | 2009 | Osteomyelitis of the jaw: resistance to clindamycin in patients with prior antibiotics exposure. | Eur J Clin Microbiol Infect Dis. | Retrospektive Fallserie | - | |
| 88 | 18789194 | Dai M | 2008 | Point of care. | J Can Dent Assoc. | Narratives Review | - | |
| 89 | 18683394 | Wynn RL | 2008 | Do Fosamax-type drugs increase the risk of osteonecrosis of the jaw for patients receiving dental implants? | Gen Dent. | Narratives Review | - | |
| 90 | 18423296 | Bell BM | 2008 | Oral bisphosphonates and dental implants: a retrospective study. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 91 | 18423292 | Ferrari S | 2008 | Fibula free flap with endosseous implants for reconstructing a resected mandible in bisphosphonate osteonecrosis. | J Oral Maxillofac Surg. | Case Report | - | |
| 92 | 18380548 | Elad S | 2008 | Re: Fugazzoto PA, Lightfoot WS, Jaffin R, Kumar A.(J Periodontol 2007; 78: 1664-1669). | J Periodontol. | Letter | - | |
| 93 | 18363257 | Phillips G | 2007-2008 | Bisphosphonate therapy and dental treatment. | J Indiana Dent Assoc. | Narratives Review | - | |
| 94 | 18201600 | Grant BT | 2008 | Outcomes of placing dental implants in patients taking oral bisphosphonates: a review of 115 cases. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 95 | 17880759 | Berardi D | 2007 | Potential applications of biphosphonates in dental surgical implants. | Int J Immunopathol Pharmacol. | Narratives Review | - | |
| 96 | 17760533 | Fugazzotto PA | 2007 | Implant placement with or without simultaneous tooth extraction in patients taking oral bisphosphonates: postoperative healing, early follow-up, and the incidence of complications in two private practices. | J Periodontol. | Retrospektive Fallserie | + | |
| 97 | 17335384 | Wang HL | 2007 | Effect of long-term oral bisphosphonates on implant wound healing: literature review and a case report. | J Periodontol. | Narratives Review / Case Report | - | |
| 98 | 17335360 | Otomo-Corgel J | 2007 | Implants and oral bisphosphonates: risky business? | J Periodontol. | Letter / Comment | - | |

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| 99 | 17272882 | Urade M | 2007 | [Bisphosphonates and osteonecrosis of the jaws]. | Clin Calcium. | Narratives Review | - | |
| 100 | 17223592 | Brooks JK | 2007 | Osteonecrosis of the jaws associated with use of risedronate: report of 2 new cases. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Case Reports | - | |
| 101 | 17066981 | Garg AK | 2006 | Bisphosphonates and avascular necrosis of alveolar bone: a potential threat to dental implants. | Dent Implantol Update. | Narratives Review | - | |
| 102 | 16966893 | Scully C | 2006 | Dental endosseous implants in patients on bisphosphonate therapy. | Implant Dent. | Narratives Review | - | |
| 103 | 16960697 | Piesold JU | 2006 | [Osteonecrosis of the jaws by long term therapy with bisphosphonates]. | Mund Kiefer Gesichtschir. | Narratives Review | - | |
| 104 | 16796276 | Jeffcoat MK | 2006 | Safety of oral bisphosphonates: controlled studies on alveolar bone. | Int J Oral Maxillofac Implants. | Randomisierte kontrollierte klinische Studie | + | |
| 105 | 16243172 | Marx RE | 2005 | Bisphosphonate-induced exposed bone (osteonecrosis/osteopetrosis) of the jaws: risk factors, recognition, prevention, and treatment. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |

1.2. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND denture

| NR. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-------------------------|------------------|--|------------------------------------|-------------------------|---------------------|-------------------|
| 106 | 25860198 | Koy S | 2015 | [Bisphosphonate-associated osteonecrosis of the jaw]. | Schmerz. | Retrospektive Fallserie | - | |
| 107 | 25414052 | Khan AA | 2015 | Diagnosis and management of osteonecrosis of the jaw: a systematic review and international consensus. | J Bone Miner Res. | Systematisches Review | - | |
| 108 | 25212129 | Niibe K | 2015 | Osteonecrosis of the jaw in patients with dental | J Prosthodont Res. | Letter | + | |

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|-----|----------|----------------------------------|------|---|---|------------------------------|---|----------|
| | | | | protheses being treated with bisphosphonates or denosumab. | | | | |
| 109 | 24954080 | de Almeida FC | 2014 | New uses for rehabilitation protocol for oral sinus communications in ARONJ patients. | J Prosthodont. | Case Report | - | |
| 110 | 23928436 | Damm DD | 2013 | Bisphosphonate-related osteonecrosis of the jaws: a potential alternative to drug holidays. | Gen Dent. | Case Report | - | |
| 111 | 23204084 | Smidt A | 2012 | Forced eruption as an alternative to tooth extraction in long-term use of oral bisphosphonates: review, risks and technique. | J Am Dent Assoc. | Case Reports | - | |
| 25 | | | | Mandibular bisphosphonate-related osteonecrosis after dental implant rehabilitation: a case report. | Implant Dent. | | - | X in 1.1 |
| 29 | | | | Long-term success of surgery in bisphosphonate-related osteonecrosis of the jaws (BRONJs). | Oral Oncol. | | - | X in 1.1 |
| 112 | 22862971 | Hasegawa Y | 2012 | Influence of dentures in the initial occurrence site on the prognosis of bisphosphonate-related osteonecrosis of the jaws: a retrospective study. | Oral Surg Oral Med Oral Pathol Oral Radiol. | Retrospektive Fallserie | + | |
| 113 | 22704590 | Jabbour Z | 2012 | The outcomes of conservative and surgical treatment of stage 2 bisphosphonate-related osteonecrosis of the jaws: a case series. | Int J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 40 | | | | Prosthetic treatment of a patient taking nitrogen-containing bisphosphonates to preserve the integrity of the epithelial attachment: a clinical report. | J Prosthet Dent. | | - | X in 1.1 |
| 114 | 21539523 | Lo JC | 2011 | Oral health considerations in older women receiving oral bisphosphonate therapy. | J Am Geriatr Soc. | Retrospektive Kohortenstudie | - | |
| 115 | 21510356 | Alloh Amichia YC | 2010 | [Prosthetic rehabilitation after osteonecrosis of the jaws due to histiocytosis X and treatment with | Odontostomatol Trop. | Case Reports | - | |

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|-----|----------|-------------------------------|------|--|---|-------------------------------------|---|----------|
| | | | | bisphosphonates apropos of a case]. | | | | |
| 49 | | | | Is bisphosphonate therapy for benign bone disease associated with impaired dental healing? A case-controlled study. | BMC Musculoskelet Disord. | | - | X in 1.1 |
| 53 | | | | Bisphosphonate-related osteonecrosis of the jaws: a case series of 25 patients affected by osteoporosis. | Int J Oral Maxillofac Surg. | | - | X in 1.1 |
| 116 | 21140589 | Kyrgidis A | 2010 | Root canal therapy for the prevention of osteonecrosis of the jaws: an evidence-based clinical update. | Aust Endod J. | Narratives Review | - | |
| 117 | 21122968 | Hoefert S | 2011 | Relevance of a prolonged preoperative antibiotic regime in the treatment of bisphosphonate-related osteonecrosis of the jaw. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 118 | 20522142 | Kyrgidis A | 2010 | The role of dental hygienist in the prevention of osteonecrosis of the jaw in patients wearing dentures. | Int J Dent Hyg. | Comment / Letter | - | |
| 119 | 20452814 | Madrid C | 2010 | Bisphosphonate-related osteonecrosis of the jaws: how to manage cancer patients. | Oral Oncol. | Narratives Review | - | |
| 120 | 20437036 | Crépin S | 2010 | Osteonecrosis of the jaw induced by clodronate, an alkylbiphosphonate: case report and literature review. | Eur J Clin Pharmacol. | Systematisches Review / Case Report | - | |
| 121 | 20362762 | Göllner M | 2010 | Prosthetic treatment of a patient with bisphosphonate-induced osteonecrosis of the jaw using a removable dental prosthesis with a heat-polymerized resilient liner: a clinical report. | J Prosthet Dent. | Case Report | - | |
| 122 | 19805682 | Vahtsevanos K | 2009 | Longitudinal cohort study of risk factors in cancer patients of bisphosphonate-related osteonecrosis of the jaw. | J Clin Oncol. | Retrospektive Kohortenstudie | + | |
| 123 | 19797544 | Kyrgidis A | 2009 | Osteonecrosis of the jaw. | J Am Dent Assoc. | Comment / Letter | - | |

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|-----|----------|-------------------------------------|------|--|---|-------------------------|---|----------|
| 124 | 19592261 | Kos M | 2010 | Bisphosphonate-related osteonecrosis of the jaws: a review of 34 cases and evaluation of risk. | J Craniomaxillofac Surg. | Retrospektive Fallserie | + | |
| 125 | 19495814 | Rustemeyer J | 2010 | Bisphosphonate-associated osteonecrosis of the jaw: what do we currently know? A survey of knowledge given in the recent literature. | Clin Oral Investig. | Narratives Review | - | |
| 126 | 19446234 | Kyrgidis A | 2009 | Increased risk for bisphosphonate-related osteonecrosis of the jaws in patients wearing dentures could be attributable to impaired mucosal cell wound healing. | J Oral Maxillofac Surg. | Comment / Letter | - | |
| 127 | 19410063 | Takagi Y | 2009 | Osteonecrosis associated with short-term oral administration of bisphosphonate. | J Prosthet Dent. | Case Report | - | |
| | | | | Dental implants in a patient with Paget disease under bisphosphonate treatment: a case report. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | | | X in 1.1 |
| 128 | 19138190 | Barrow SY | 2008 | Is your knowledge up-to-date? Bisphosphonate-related osteonecrosis of the jaw. | Int J Dent Hyg. | Case Report | - | |
| 129 | 19114948 | Kyrgidis A | 2009 | Letter to the editor: novel evidence on bisphosphonate related osteochemonecrosis of the jaws suggests tooth extractions and overdentures as risk factors. | Med Oral Patol Oral Cir Bucal. | Comment / Letter | - | |
| 130 | 18801674 | Carmagnola D | 2008 | Dental and periodontal history of oncologic patients on parenteral bisphosphonates with or without osteonecrosis of the jaws: a pilot study. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Retrospektive Fallserie | + | |
| 88 | | | | Point of care. | J Can Dent Assoc. | | - | X in 1.1 |
| 131 | 18703870 | Barragan-Adjemian C | 2009 | Bisphosphonate-related osteonecrosis of the jaw: model and diagnosis with cone beam computerized tomography. | Cells Tissues Organs. | Retrospektive Fallserie | - | |
| 132 | 18602738 | Walter C | 2008 | Prevalence and risk factors of bisphosphonate-associated osteonecrosis of the jaw in prostate cancer patients with advanced disease treated with | Eur Urol. | Retrospektive Fallserie | + | |

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|-----|----------|-----------------------------|------|--|--|----------------------------------|---|----------|
| | | | | zoledronate. | | | | |
| 133 | 18574158 | Kyrgidis A | 2008 | Bisphosphonate-related osteonecrosis of the jaws: a case-control study of risk factors in breast cancer patients. | J Clin Oncol. | Retrospektive Fallserie | + | |
| 134 | 18460263 | Sambrook PN | 2008 | Osteonecrosis of the jaw. | Curr Rheumatol Rep. | Narratives Review | - | |
| 135 | 18364618 | Watts NB | 2008 | Osteonecrosis of the jaw. | South Med J. | Narratives Review | - | |
| 136 | 18248160 | Vescovi P | 2008 | Nd:YAG laser biostimulation in the treatment of bisphosphonate-associated osteonecrosis of the jaw: clinical experience in 28 cases. | Photomed Laser Surg. | Retrospektive Fallserie | + | |
| 137 | 18176650 | Kumar SK | 2008 | Osteonecrosis of the jaws secondary to bisphosphonate therapy: a case series. | J Contemp Dent Pract. | Case Report | + | |
| 138 | 17785387 | Levin L | 2007 | Denture-related osteonecrosis of the maxilla associated with oral bisphosphonate treatment. | J Am Dent Assoc. | Case Report | - | |
| 139 | 17598065 | Yarom N | 2007 | Osteonecrosis of the jaw induced by orally administered bisphosphonates: incidence, clinical features, predisposing factors and treatment outcome. | Osteoporos Int. | Retrospektive Multicenter Studie | + | |
| 140 | 17572168 | Reid IR | 2007 | Is bisphosphonate-associated osteonecrosis of the jaw caused by soft tissue toxicity? | Bone. | Editorial / Narratives Review | - | |
| 141 | 22460753 | Borgioli A | 2007 | Bisphosphonate-related osteonecrosis of the jaw: the Florence experience. | Clin Cases Miner Bone Metab. | Retrospektive Fallserie | + | |
| 103 | | | | [Osteonecrosis of the jaws by long term therapy with bisphosphonates]. | Mund Kiefer Gesichtschir. | | - | X in 1.1 |
| 142 | 16941133 | Walter C | 2007 | Prevalence of bisphosphonate associated osteonecrosis of the jaw within the field of osteonecrosis. | Support Care Cancer. | Retrospektive Fallserie | + | |
| 143 | 16872925 | Marunick M | 2006 | Prosthetic treatment during active osteonecrosis related to radiation and bisphosphonate therapy: a clinical report. | J Prosthet Dent. | Case Report | - | |

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|-----|----------|----------------------------|------|---|----------------------------------|---------------------------------|---|--|
| 144 | 16416712 | Cheng A | 2005 | The dental implications of bisphosphonates and bone disease. | Aust Dent J. | Case Report / Narratives Review | - | |
| 145 | 16314620 | Bamias A | 2005 | Osteonecrosis of the jaw in cancer after treatment with bisphosphonates: incidence and risk factors. | J Clin Oncol. | Retrospektive Fallserie | + | |
| 146 | 9922427 | Bouquot JE | 1999 | Ischemic osteonecrosis under fixed partial denture pontics: radiographic and microscopic features in 38 patients with chronic pain. | J Prosthet Dent. | Retrospektive Fallserie | - | |

1.3. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (jaw augmentation OR sinus lift)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|----------------------------|------------------|--|--|-------------------------------------|---------------------|-------------------|
| 147 | 24369277 | Takeuchi Y | 2014 | [Progress and problems in oral bisphosphonate]. | Clin Calcium. | Narratives Review | - | |
| 148 | 24327103 | Yamada Y | 2014 | Current trends in stem cell therapy for improvement of bone quality. | Histol Histopathol. | Narratives Review | - | |
| | | | | Bisphosphonate-related osteonecrosis of the jaw at a previously grafted sinus. | Implant Dent. | | - | X in 1.1 |
| | | | | Dental implant placement with bone augmentation in a patient who received intravenous bisphosphonate treatment for osteoporosis. | J Can Dent Assoc. | | - | X in 1.1 |
| | | | | Autogenous bone grafting in a patient on long-term oral bisphosphonate therapy: case report. | Int J Periodontics Restorative Dent. | | - | X in 1.1 |
| | | | | Current therapy: a moving target. | Implant Dent. | | - | X in 1.1 |
| 149 | 19063908 | Deng X | 2009 | Alendronate augments interleukin-1beta release from macrophages infected with periodontal pathogenic | Toxicol Appl Pharmacol. | In Vitro Studie / Narratives Review | - | |

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| | | | | bacteria through activation of caspase-1. | | | | |
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1.4. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND antibiotics AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|------|-----------|------------------|---|---|------------|---------------------|-------------------|
| 23 | | | | Dental complications and management of patients on bisphosphonate therapy: A review article. | J Oral Biol Craniofac Res. | | - | X in 1.1 |
| 29 | | | | Long-term success of surgery in bisphosphonate-related osteonecrosis of the jaws (BRONJs). | Oral Oncol. | | - | X in 1.1 |
| 34 | | | | Osteopathology induced by bisphosphonates and dental implants: clinical observations. | Clin Oral Investig. | | - | X in 1.1 |
| 38 | | | | Dental implant failure associated with bacterial infection and long-term bisphosphonate usage: a case report. | Implant Dent. | | - | X in 1.1 |
| 42 | | | | Bisphosphonates and osteonecrosis of the jaw. | J Am Geriatr Soc. | | - | X in 1.1 |
| 46 | | | | Identification and treatment of bisphosphonate-associated actinomycotic osteonecrosis of the jaws. | Implant Dent. | | - | X in 1.1 |
| 53 | | | | Bisphosphonate-related osteonecrosis of the jaws: a case series of 25 patients affected by osteoporosis. | Int J Oral Maxillofac Surg. | | - | X in 1.1 |
| 58 | | | | Oral bisphosphonate-associated osteonecrosis of the jaw after implant surgery: a case report and literature review. | J Oral Maxillofac Surg. | | - | X in 1.1 |
| 59 | | | | Implant failure associated with oral bisphosphonate-related osteonecrosis of the jaw. | J Periodontal Implant Sci. | | - | X in 1.1 |
| 64 | | | | Bisphosphonate-related osteonecrosis of the jaw associated with dental implants. | J Oral Maxillofac Surg. | | - | X in 1.1 |

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|-----|--|--|--|--|---|--|---|----------|
| 83 | | | | [New development in bisphosphonate treatment. Bisphosphonate therapy and osteonecrosis of the jaws]. | Clin Calcium. | | - | X in 1.1 |
| 84 | | | | Treating low- and medium-potency bisphosphonate-related osteonecrosis of the jaws with a protocol for the treatment of chronic suppurative osteomyelitis: report of 7 cases. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | | - | X in 1.1 |
| 87 | | | | Osteomyelitis of the jaw: resistance to clindamycin in patients with prior antibiotics exposure. | Eur J Clin Microbiol Infect Dis. | | - | X in 1.1 |
| 97 | | | | Effect of long-term oral bisphosphonates on implant wound healing: literature review and a case report. | J Periodontol. | | - | X in 1.1 |
| 100 | | | | Osteonecrosis of the jaws associated with use of risedronate: report of 2 new cases. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | | - | X in 1.1 |
| 105 | | | | Bisphosphonate-induced exposed bone (osteonecrosis/osteopetrosis) of the jaws: risk factors, recognition, prevention, and treatment. | J Oral Maxillofac Surg. | | - | X in 1.1 |

1.5. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND xerostomia

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|------|-----------|------------------|--|----------------------------------|------------|---------------------|-------------------|
| 19 | | | | [Oral secondary effects of radiotherapy and chemotherapy in cancer of the cervicofacial region]. | Narratives Review | | - | X in 1.1 |

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|-----|----------|-------------------------------|------|---|---|---------------------------------|---|--|
| 150 | 22434497 | Wilberg P | 2012 | Oral health is an important issue in end-of-life cancer care. | Support Care Cancer. | Retrospektive Fallserie | - | |
| 151 | 21764202 | Vestergaard P | 2012 | Oral bisphosphonate use increases the risk for inflammatory jaw disease: a cohort study. | J Oral Maxillofac Surg. | Retrospektive Cohortenstudie | - | |
| 152 | 20306090 | Brennan MT | 2010 | Systematic reviews of oral complications from cancer therapies, Oral Care Study Group, MASCC/ISOO: methodology and quality of the literature. | Support Care Cancer. | Systematisches Review | - | |

1.6. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND ctx

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-----------------------------|------------------|---|--|---------------------------|---------------------|-------------------|
| 153 | 25726720 | Kim JW | 2015 | Biomarkers for Bisphosphonate-Related Osteonecrosis of the Jaw. | Clin Implant Dent Relat Res. | Tierexperimentelle Studie | - | |
| 154 | 25683041 | Schwartz HC | 2015 | American Association of Oral and Maxillofacial Surgeons position paper on medication-related osteonecrosis of the jaw--2014 update and CTX. | J Oral Maxillofac Surg. | Comment / Letter | - | |
| 155 | 25244263 | Ağaçayak KS | 2014 | Experimental investigation of relationship between trauma and bisphosphonate-related osteonecrosis. | Niger J Clin Pract. | Tierexperimentelle Studie | - | |
| 9 | | | | Treatment of a Patient with Implant Failure and Jaw Osteonecrosis: Successful Retreatment Using Implants. | J Oral Implantol. | | - | X in 1.1 |
| 156 | 24341133 | Lee PB | 2013 | Evaluation of serum biomarkers IL-17 and CTX for BRONJ: a pilot clinical case-control study. | J Calif Dent Assoc. | Case Report | - | |
| 157 | 23954759 | Kim JW | 2013 | Prospective biomarker evaluation in patients with osteonecrosis of the jaw who received bisphosphonates. | Bone. | Retrospektive Fallserie | - | |
| | | | | C-terminal cross-linking telopeptide as a serologic | J Can Dent Assoc. | | - | X in 1.1 |

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| | | | | marker for bisphosphonate-related osteonecrosis of the jaw: review of 2 cases. | | | | |
| 158 | 23543695 | Migliorati CA | 2013 | Assessing the association between bisphosphonate exposure and delayed mucosal healing after tooth extraction. | J Am Dent Assoc. | Retrospektive Fallserie | - | |
| 159 | 23508560 | Lee JJ | 2013 | Factors predicting the prognosis of oral alendronate-related osteonecrosis of the jaws: a 4-year cohort study. | Head Neck. | Retrospektive Chorotenstudie | - | |
| 160 | 23317355 | Conte Neto N | 2013 | Experimental development of bisphosphonate-related osteonecrosis of the jaws in rodents. | Int J Exp Pathol. | Tierexperimentelle Studie | - | |
| 161 | 23285320 | Carini F | 2012 | Multiple systemic diseases complicated by bisphosphonate osteonecrosis: a case report. | Ann Stomatol (Roma). | Case Report | - | |
| 162 | 23219943 | Hokugo A | 2013 | Equilibrium-dependent bisphosphonate interaction with crystalline bone mineral explains anti-resorptive pharmacokinetics and prevalence of osteonecrosis of the jaw in rats. | Bone. | Tierexperimentelle Studie | - | |
| 163 | 22783453 | Carini F | 2012 | Surgical protocol in patients at risk for bisphosphonate osteonecrosis of the jaws: clinical use of serum telopeptide CTX in preventive monitoring of surgical risk. | Ann Stomatol (Roma). | Retrospektive Fallserie | - | |
| | | | | Bone necrosis around dental implants: A patient treated with oral bisphosphonates, drug holiday and no risk according to serum CTX. | J Clin Exp Dent. | | - | X in 1.1 |
| 164 | 22223192 | O'Connell JE | 2012 | A role for C-terminal cross-linking telopeptide (CTX) level to predict the development of bisphosphonate-related osteonecrosis of the jaws (BRONJ) following oral surgery? | Ir J Med Sci. | Prospektive Fallserie | - | |
| 165 | 22218418 | Kwon YD | 2012 | Short-term teriparatide therapy as an adjunctive modality for bisphosphonate-related osteonecrosis of | Osteoporos Int. | Case Reports / Fallserie | - | |

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|-----|----------|-------------------------------|------|--|---|--|---|----------|
| | | | | the jaws. | | | | |
| 166 | 21809068 | Atalay B | 2011 | Bisphosphonate-related osteonecrosis: laser-assisted surgical treatment or conventional surgery? | Lasers Med Sci. | Retrospektive Fallserie | - | |
| 167 | 21332734 | Borromeo GL | 2011 | A review of the clinical implications of bisphosphonates in dentistry. | Aust Dent J. | Narratives Review | - | |
| 168 | 21037195 | Grbic JT | 2010 | The incidence of osteonecrosis of the jaw in patients receiving 5 milligrams of zoledronic acid: data from the health outcomes and reduced incidence with zoledronic acid once yearly clinical trials program. | J Am Dent Assoc. | Prospektive kontrollierte klinische Studie | - | |
| | | | | Retrospective study of two biochemical markers for the risk assessment of oral bisphosphonate-related osteonecrosis of the jaws: can they be utilized as risk markers? | Clin Oral Implants Res. | | - | X in 1.1 |
| 169 | 20728033 | Lazarovici TS | 2010 | Serologic bone markers for predicting development of osteonecrosis of the jaw in patients receiving bisphosphonates. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 170 | 20674404 | Fleisher KE | 2010 | Predicting risk for bisphosphonate-related osteonecrosis of the jaws: CTX versus radiographic markers. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Retrospektive Fallserie | - | |
| 171 | 20360666 | Vescovi P | 2010 | Bisphosphonate-Related Osteonecrosis of the Jaw (BRONJ) therapy. A critical review. | Minerva Stomatol. | Narratives Review | - | |
| 172 | 20147814 | Lee CY | 2010 | CTX biochemical marker of bone metabolism. Is it a reliable predictor of bisphosphonate-associated osteonecrosis of the jaws after surgery? Part II: a prospective clinical study. | Implant Dent. | Prospektive kontrollierte klinische Studie | - | |
| 173 | 20116729 | Dodson TB | 2010 | CTX and its role in managing patients exposed to oral bisphosphonates. | J Oral Maxillofac Surg. | Comment / Letter | - | |
| 174 | 20070853 | Lund T | 2010 | Multiple myeloma: changes in serum C-terminal | Eur J Haematol. | Prospektive unselektierte | - | |

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| | | | | telopeptide of collagen type I and bone-specific alkaline phosphatase can be used in daily practice to detect imminent osteolysis. | | Cohortenstudie | | |
| 175 | 20009603 | Lee CY | 2009 | CTX biochemical marker of bone metabolism. Is it a reliable predictor of bisphosphonate-associated osteonecrosis of the jaws after surgery? Part I: biological concepts with a review of the literature. | Implant Dent. | Narratives Review | - | |
| 176 | 19925985 | Kwon YD | 2009 | Correlation between serum C-terminal cross-linking telopeptide of type I collagen and staging of oral bisphosphonate-related osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 177 | 19446200 | Kunchur R | 2009 | Clinical investigation of C-terminal cross-linking telopeptide test in prevention and management of bisphosphonate-associated osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Prospektive randomisierte kontrollierte Studie | - | |
| | 19371821 | | | Reconstruction of defects caused by bisphosphonate-induced osteonecrosis of the jaws. | J Oral Maxillofac Surg. | | - | X in 1.1 |
| 178 | 19257812 | Baim S | 2009 | Assessing the clinical utility of serum CTX in postmenopausal osteoporosis and its use in predicting risk of osteonecrosis of the jaw. | J Bone Miner Res. | Narratives Review | - | |
| 179 | 18486811 | American Society for Bone and Mineral Research Task Force on Osteonecrosis of the Jaw | 2008 | Oral bisphosphonate-induced osteonecrosis: risk factors, prediction of risk using serum CTX testing, prevention, and treatment. | J Oral Maxillofac Surg. | Comment / Letter | - | |
| 180 | 18486810 | Schwartz HC | 2008 | Serum CTX testing. | J Oral Maxillofac Surg. | Comment / Letter | - | |
| 181 | 18396443 | Bagan JV | 2008 | Collagen telopeptide (serum CTX) and its relationship with the size and number of lesions in osteonecrosis of the jaws in cancer patients on intravenous bisphosphonates. | Oral Oncol. | Prospektive kontrollierte klinische Studie | - | |

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|-----|----------|-------------------------|------|---|---|-------------------------|---|--|
| 182 | 18022461 | Marx RE | 2007 | Oral bisphosphonate-induced osteonecrosis: risk factors, prediction of risk using serum CTX testing, prevention, and treatment. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
|-----|----------|-------------------------|------|---|---|-------------------------|---|--|

1.7 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND medication time

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-----------------------------|------------------|--|---|----------------------------------|---------------------|-------------------|
| 183 | 25544302 | Rotaru H | 2015 | Pedicled buccal fat pad flap as a reliable surgical strategy for the treatment of medication-related osteonecrosis of the jaw. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 184 | 25511956 | Hinson AM | 2015 | Temporal correlation between bisphosphonate termination and symptom resolution in osteonecrosis of the jaw: a pooled case report analysis. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 185 | 25352470 | Janovszky A | 2014 | Periosteal microcirculatory reactions in a zoledronate-induced osteonecrosis model of the jaw in rats. | Clin Oral Investig. | Tierexperimentelle Studie | - | |
| 186 | 25234529 | Ruggiero SL | 2014 | American Association of Oral and Maxillofacial Surgeons position paper on medication-related osteonecrosis of the jaw--2014 update. | J Oral Maxillofac Surg. | Practical Guideline | - | |
| 187 | 24827755 | Hoefert S | 2014 | Atraumatic tooth extraction in patients taking bisphosphonates: a review of literature and experience with three cases. | Oral Maxillofac Surg. | Narratives Review / Case Reports | - | |
| | | | | Treatment of a Patient with Implant Failure and Jaw Osteonecrosis: Successful Retreatment Using Implants. | J Oral Implantol. | | - | X in 1.1 |
| 188 | 24023329 | Assaf AT | 2013 | Incidence of bisphosphonate-related osteonecrosis of the jaw in consideration of primary diseases and | Anticancer Res. | Retrospektive Fallserie | - | |

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|-----|----------|------------------------------|------|---|---|--|---|----------|
| | | | | concomitant therapies. | | | | |
| 189 | 23979955 | Bone HG | 2013 | The effect of three or six years of denosumab exposure in women with postmenopausal osteoporosis: results from the FREEDOM extension. | J Clin Endocrinol Metab. | Prospektive randomisierte kontrollierte Multicenter Studie | - | |
| 190 | 22000426 | Moretti F | 2011 | A prospective clinical trial for assessing the efficacy of a minimally invasive protocol in patients with bisphosphonate-associated osteonecrosis of the jaws. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Prospektive kontrollierte klinische Studie | - | |
| 53 | | | | Bisphosphonate-related osteonecrosis of the jaws: a case series of 25 patients affected by osteoporosis. | Int J Oral Maxillofac Surg. | | - | X in 1.1 |
| 191 | 19748711 | Rogers SN | 2009 | A survey of consultant members of the British Association of Oral and Maxillofacial Surgeons regarding bisphosphonate-induced osteonecrosis of the jaws. | Br J Oral Maxillofac Surg. | Prospektive Studie | - | |
| 192 | 19536569 | Hoefert S | 2010 | Importance of microcracks in etiology of bisphosphonate-related osteonecrosis of the jaw: a possible pathogenetic model of symptomatic and non-symptomatic osteonecrosis of the jaw based on scanning electron microscopy findings. | Clin Oral Investig. | In Vitro Studie | - | |
| 193 | 19195232 | Dao V | 2008 | Bisphosphonate use and health history questionnaire. | N Y State Dent J. | Retrospektive Fallserie | - | |
| 194 | 18834251 | Cetinkaya BO | 2008 | Effects of risedronate on alveolar bone loss and angiogenesis: a stereologic study in rats. | J Periodontol. | Tierexperimentelle Studie | - | |
| 195 | 17346585 | Zahrowski JJ | 2007 | Bisphosphonate treatment: an orthodontic concern calling for a proactive approach. | Am J Orthod Dentofacial Orthop. | Narratives Review | - | |
| 196 | 17299010 | Krueger CD | 2007 | Bisphosphonate-induced osteonecrosis of the jaw. | Ann Pharmacother. | Systematisches Review | - | |

2. Outcome: Kaufunktion

2.1. masticatory efficiency AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-------------------------------|------------------|---|---|--|---------------------|-------------------|
| 197 | 25822743 | Farias-Neto A | 2015 | Changes in patient satisfaction and masticatory efficiency during adaptation to new dentures. | Compend Contin Educ Dent. | Prospektive kontrollierte klinische Fallstudie | - | |
| 198 | 25378781 | Sharma MC | 2014 | Clinical evaluation of overdenture retention using indigenous dental implants. | Med J Armed Forces India. | Prospektive Fallserie | - | |
| 199 | 25307515 | Boven GC | 2015 | Improving masticatory performance, bite force, nutritional state and patient's satisfaction with implant overdentures: a systematic review of the literature. | J Oral Rehabil. | Systematisches Review | - | |
| 200 | 24372288 | Meena A | 2014 | Effect of implant-supported prosthesis on the bite force and masticatory efficiency in subjects with shortened dental arches. | J Oral Rehabil. | Prospektive Fallstudie | - | |
| 201 | 24293924 | Praveen M | 2012 | A New Approach for Management of Kennedy's Class I Condition Using Dental Implants: A Case Report. | J Indian Prosthodont Soc. | Case Report | - | |
| 202 | 24136282 | Liao XL | 2013 | [Effect of early-loaded small diameter implants retained mandibular overdentures on masticatory performance]. | Beijing Da Xue Xue Bao. | Prospektive kontrollierte klinische Studie | - | |
| 203 | 23741602 | Gargari M | 2013 | Development of patient-based questionnaire about aesthetic and functional differences between overdentures implant-supported and overdentures tooth-supported. Study of 43 patients with a follow up of 1 year. | Oral Implantol (Rome). | Prospektive kontrollierte klinische Studie | - | |
| 204 | 23438416 | Witter DJ | 2013 | Clinical interpretation of a masticatory normative indicator analysis of masticatory function in subjects with different occlusal and prosthodontic status. | J Dent. | Prospektive klinische kontrollierte Studie | - | |
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2.2. tmj disorders AND dental implant AND prevention

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|----------------------------|------------------|---|-------------------------------------|-------------------|---------------------|-------------------|
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3. Outcome: Lebensqualität

3.1. quality of life AND dental implant AND social eating

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
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| 271 | 24914912 | Vieira RA | 2014 | Benefits of rehabilitation with implants in masticatory function: is patient perception of change in accordance with the real improvement? | J Oral Implantol. | Prospektive Fallserie | - | |
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3.2. oral health related quality of life AND dental implant NOT elderly patients NOT oral cavity cancer

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
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| 328 | 19291086 | Turkyilmaz I | 2010 | Should edentulous patients be constrained to removable complete dentures? The use of dental implants to improve the quality of life for edentulous patients. | Gerodontology. | Systematisches Review | - | |

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|-----|----------|----------------------------------|------|---|---|--|---|----------|
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| 329 | 18498586 | Mericske-Stern R | 2008 | Prosthetic considerations. | Aust Dent J. | Narratives Review | - | |
| 330 | 18476568 | Zhang XC | 2007 | [Health-related quality of life for patients using implant-supported prostheses]. | Zhonghua Kou Qiang Yi Xue Za Zhi. | Narratives Review | - | |
| 331 | 18217865 | Sobotta BA | 2008 | Cruise medicine: the dental perspective on health care for passengers during a world cruise. | J Travel Med. | Prospektive Fallserie | - | |
| 332 | 17594380 | Thomason JM | 2007 | How do patients perceive the benefit of reconstructive dentistry with regard to oral health-related quality of life and patient satisfaction? A systematic review. | Clin Oral Implants Res. | Systematisches Review | - | |
| 333 | 17594379 | Klineberg I | 2007 | The bases for using a particular occlusal design in tooth and implant-borne reconstructions and complete dentures. | Clin Oral Implants Res. | Systematisches Review | - | |
| 334 | 17594377 | Türp JC | 2007 | In patients with temporomandibular disorders, do particular interventions influence oral health-related quality of life? A qualitative systematic review of the literature. | Clin Oral Implants Res. | Systematisches Review | - | |
| 335 | 17187039 | Jokstad A | 2006 | Implant retained or conventional dentures, which give more patients satisfaction? | Evid Based Dent. | Prospektive randomisierte kontrollierte Studie | - | |
| 336 | 16900816 | Strassburger C | 2006 | Influence of implant and conventional prostheses on satisfaction and quality of life: A literature review. Part 2: Qualitative analysis and evaluation of the studies. | Int J Prosthodont. | Systematisches Review | - | |
| 231 | | | | Measuring chewing ability in randomized controlled trials with edentulous populations wearing implant prostheses. | J Oral Rehabil. | | - | X in 2.1 |
| 337 | 16617194 | Naito M | 2006 | Oral health status and health-related quality of life: a | J Oral Sci. | Systematisches Review | - | |

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|-----|----------|--------------------------------|------|--|---|--|---|----------|
| | | | | systematic review. | | | | |
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| 285 | | | | The impact of conventional and implant supported prostheses on social and sexual activities in edentulous adults Results from a randomized trial 2 months after treatment. | J Dent. | | - | X in 3.1 |
| 339 | 15008238 | Strassburger C | 2004 | Influence of prosthetic and implant therapy on satisfaction and quality of life: a systematic literature review. Part 1--Characteristics of the studies. | Int J Prosthodont. | Meta Analyse | - | |
| 340 | 12656876 | Allen PF | 2003 | A longitudinal study of quality of life outcomes in older adults requesting implant prostheses and complete removable dentures. | Clin Oral Implants Res. | Prospektive kontrollierte klinische Studie | - | |
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| 342 | 11409676 | Allen PF | 2001 | An assessment of sensitivity to change of the Oral Health Impact Profile in a clinical trial. | Community Dent Oral Epidemiol. | Prospektive kontrollierte klinische Studie | - | |
| 289 | | | | Psychosocial effects of implant-retained overdentures. | Int J Oral Maxillofac Implants. | | - | X in 3.1 |

4. Outcome: Prognose der Restbeziehung

4.1. prognosis remaining dentition AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|-------------------|
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|-------------------|

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|-----|----------|------------------------------|------|---|---|--|---|--|
| 343 | 25422827 | Felice P | 2014 | A comparison of two dental implant systems in partially edentulous patients: 1-year post-loading results from a pragmatic multicentre randomised controlled trial. | Eur J Oral Implantol. | Prospektive randomisierte kontrollierte Studie | - | |
| 344 | 24977253 | Krennmair S | 2014 | Immediately loaded distally cantilevered fixed mandibular prostheses supported by four implants placed in both in fresh extraction and healed sites: 2-year results from a prospective study. | Eur J Oral Implantol. | Prospektive Fallserie | - | |
| 345 | 24570982 | Khoury F | 2013 | The bony lid approach in pre-implant and implant surgery: a prospective study. | Eur J Oral Implantol. | Prospektive Fallserie | - | |
| 346 | 24118202 | Cortes AR | 2014 | Transition from failing dentition to full-arch fixed implant-supported prosthesis with a staged approach using removable partial dentures: a case series. | | Retrospektive Fallserie | - | |
| 347 | 23837166 | Polizzi G | 2013 | A two-center retrospective analysis of long-term clinical and radiologic data of TiUnite and turned implants placed in the same mouth.- | Int J Prosthodont. | Retrospektive Fallstudie | - | |
| 348 | 23433626 | Closs LQ | 2012 | Esthetic and functional rehabilitation for oligodontia in the mixed dentition: case report. | J Dent Child (Chic). | Case Report | - | |
| 349 | 23316954 | Noelken R | 2014 | Maintenance of marginal bone support and soft tissue esthetics at immediately provisionalized OsseoSpeed implants placed into extraction sites: 2-year results. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |
| 350 | 22639800 | Schwarz F | 2012 | Combined surgical therapy of peri-implantitis evaluating two methods of surface debridement and decontamination. A two-year clinical follow up report. | J Clin Periodontol. | Prospektive randomisierte kontrollierte Studie | - | |
| 351 | 22336822 | Esposito M | 2012 | Interventions for replacing missing teeth: management of soft tissues for dental implants. | Cochrane Database Syst Rev. | Meta Analyse | - | |
| 352 | 22299095 | Di Alberti L | 2012 | Clinical and radiologic evaluation of 70 immediately loaded single implants in the maxillary esthetic zone: | Int J Oral Maxillofac Implants. | Prospektive und Retrospektive Fallserie | - | |

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|-----|----------|-----------------------------|------|---|--|--|---|--|
| | | | | preliminary results after 1 year of functional loading. | | | | |
| 353 | 22264210 | Pieri F | 2012 | Immediate loading of dental implants placed in severely resorbed edentulous maxillae reconstructed with Le Fort I osteotomy and interpositional bone grafting. | J Periodontol. | Retrospektive Fallserie | - | |
| 354 | 22117841 | Urban T | 2012 | Immediate implant placement in molar regions: a 12-month prospective, randomized follow-up study. | Clin Oral Implants Res. | Prospektive randomisierte kontrollierte Studie | - | |
| 355 | 22092586 | Behneke A | 2012 | Factors influencing transfer accuracy of cone beam CT-derived template-based implant placement. | Clin Oral Implants Res. | Prospektive Fallserie | - | |
| 356 | 22046906 | Allen PF | 2011 | Prosthodontic care for elderly patients. | Dent Update. | Narratives Review | - | |
| 357 | 21834863 | Fischer K | 2013 | Prospective 10-year cohort study based on a randomized, controlled trial (RCT) on implant-supported full-arch maxillary prostheses. part II: prosthetic outcomes and maintenance. | Clin Implant Dent Relat Res. | Prospektive randomisierte kontrollierte Studie | - | |
| 358 | 21834860 | Heschl A | 2013 | Overdentures in the edentulous mandible supported by implants and retained by a Dolder bar: a 5-year prospective study. | Clin Implant Dent Relat Res. | Prospektive Fallserie | - | |
| 359 | 21745324 | Chou YH | 2013 | An interdisciplinary treatment approach combining orthodontic forced eruption with immediate implant placement to achieve a satisfactory treatment outcome: a case report. | Clin Implant Dent Relat Res. | Case Report | - | |
| 360 | 21734963 | Krstl G | 2011 | Current aspects of restoring traumatically fractured teeth. | Eur J Esthet Dent. | Narratives Review | - | |
| 361 | 21284759 | Priest G | 2011 | Revisiting tooth preservation in prosthodontic therapy. | J Prosthodont. | Narratives Review | - | |
| 362 | 21219391 | Gallucci GO | 2011 | Dimensional changes of peri-implant soft tissue over 2 years with single-implant crowns in the anterior maxilla. | J Clin Periodontol. | Prospektive randomisierte kontrollierte Studie | - | |

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|-----|----------|-------------------------------------|------|---|---|--|---|--|
| 363 | 21197503 | Bencharit S | 2010 | Complex prosthodontic treatment with dental implants for a patient with polymyalgia rheumatica: a clinical report. | Int J Oral Maxillofac Implants. | Case Report | - | |
| 364 | 21050641 | Peñarrocha-Diago MA | 2011 | Immediate versus nonimmediate placement of implants for full-arch fixed restorations: a preliminary study. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 365 | 20731584 | Koutouzis T | 2011 | Retrospective evaluation of crestal bone changes around implants with reduced abutment diameter placed non-submerged and at subcrestal positions: the effect of bone grafting at implant placement. | J Periodontol. | Retrospektive kontrollierte klinische Studie | - | |
| 366 | 20662861 | Mura P | 2012 | Immediate loading of tapered implants placed in postextraction sockets: retrospective analysis of the 5-year clinical outcome. | Clin Implant Dent Relat Res. | Retrospektive Fallserie | - | |
| 367 | 20586784 | Bergenblock S | 2012 | Long-term follow-up of CeraOne™ single-implant restorations: an 18-year follow-up study based on a prospective patient cohort. | Clin Implant Dent Relat Res. | Retrospektive Fallserie | - | |
| 368 | 20526254 | Hernández-Alfaro F | 2011 | "Envelope" approach for onlay bone grafting: preliminary surgical and prosthetic results. | Med Oral Patol Oral Cir Bucal. | Prospektive Fallserie | - | |
| 369 | 20450402 | Avila G | 2010 | The influence of the bucco-palatal distance on sinus augmentation outcomes. | J Periodontol. | Prospektive Fallserie | - | |
| 370 | 20303040 | Gökçen-Röhlig B | 2010 | Clinical and radiographic outcomes of implants immediately placed in fresh extraction sockets. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Prospektive kontrollierte klinische Studie | - | |
| 371 | 20070752 | Canullo L | 2010 | Platform switching and marginal bone-level alterations: the results of a randomized-controlled trial. | Clin Oral Implants Res. | Prospektive randomisierte kontrollierte Studie | - | |
| 372 | 19999670 | Kalk W | 2009 | [Treatment planning in patients with a severe reduced dentition]. | Ned Tijdschr Tandheelkd. | Narratives Review | - | |
| 373 | 19906268 | Fermergård R | 2012 | Osteotome sinus floor elevation without bone grafts--a | Clin Implant Dent Relat Res. | Retrospektive Fallstudie | - | |

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| | | | | 3-year retrospective study with Astra Tech implants. | | | | |
| 374 | 19837318 | Danza M | 2009 | Comparison between implants inserted into piezo split and unsplit alveolar crests. | J Oral Maxillofac Surg. | Retrospektive kontrollierte klinische Studie | - | |
| 375 | 19123693 | Jung BA | 2009 | Success rate of second-generation palatal implants. | Angle Orthod. | Prospektive multicenter Studie | - | |
| 376 | 19058503 | Versteegh PA | 2008 | [Prosthetic dilemmas. Prosthetic decisions and planning for partially edentulous patients]. | Ned Tijdschr Tandheelkd. | Case Report | - | |
| 377 | 18940498 | Reich PP | 2008 | Autogenous transplantation of maxillary and mandibular molars. | J Oral Maxillofac Surg. | Prospektive und retrospektive Fallserie | - | |
| 378 | 18717373 | Cappiello M | 2008 | Evaluation of peri-implant bone loss around platform-switched implants. | Int J Periodontics Restorative Dent. | Prospektive klinische und radiografische kontrollierte Studie | - | |
| 379 | 18380569 | Fugazzotto PA | 2008 | Implant placement at the time of mandibular molar extraction: description of technique and preliminary results of 341 cases. | J Periodontol. | Retrospektive Fallserie | - | |
| 380 | 18166089 | Shirakata Y | 2008 | Comparison of injectable calcium phosphate bone cement grafting and open flap debridement in periodontal intrabony defects: a randomized clinical trial. | J Periodontol. | Prospektive randomisierte kontrollierte Studie | - | |
| 381 | 17987861 | Hoffmann O | 2007 | Combined periodontal and implant treatment of a case of aggressive periodontitis. | J Oral Implantol. | Case Report | - | |
| 382 | 17929525 | Bornstein MM | 2007 | Clinical performance of wide-body implants with a sandblasted and acid-etched (SLA) surface: results of a 3-year follow-up study in a referral clinic. | Int J Oral Maxillofac Implants. | Retrospektive Fallserie | - | |
| 383 | 17636847 | Esposito M | 2007 | Interventions for replacing missing teeth: management of soft tissues for dental implants. | Cochrane Database Syst Rev. | Meta Analyse | - | |

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| 384 | 17555415 | Palmer RM | 2007 | Astra Tech single-tooth implants: an audit of patient satisfaction and soft tissue form. | J Clin Periodontol. | Retrospektive Fallserie | - | |
| 385 | 17348889 | Juodzbaly G | 2007 | Soft and hard tissue assessment of immediate implant placement: a case series. | Clin Oral Implants Res. | Prospektive Fallserie | - | |
| 386 | 17190301 | Cornelini R | 2006 | Immediate loading of implants with 3-unit fixed partial dentures: a 12-month clinical study. | Int J Oral Maxillofac Implants. | Prospektive und retrospektive Fallserie | - | |
| 387 | 17100744 | Fröberg KK | 2006 | Immediate loading of Brånemark System Implants: a comparison between TiUnite and turned implants placed in the anterior mandible. | Clin Implant Dent Relat Res. | Prospektive und retrospektive kontrollierte klinische Studie | - | |
| 388 | 16584411 | Ellegaard B | 2006 | Non-grafted sinus implants in periodontally compromised patients: a time-to-event analysis. | Clin Oral Implants Res. | Retrospektive kontrollierte klinische Studie | - | |
| 389 | 16460258 | Fugazzotto PA | 2006 | Implant placement at the time of maxillary molar extraction: technique and report of preliminary results of 83 sites. | J Periodontol. | Retrospektive Fallserie | - | |
| 390 | 16253102 | Cangini F | 2005 | A comparison between enamel matrix derivative and a bioabsorbable membrane to enhance healing around transmucosal immediate post-extraction implants. | J Periodontol. | Prospektive kontrollierte klinische Studie | - | |
| 391 | 15915881 | Becker W | 2005 | Immediate implant placement: diagnosis, treatment planning and treatment steps/or successful outcomes. | J Calif Dent Assoc. | Narratives Review | - | |
| 392 | 15635944 | Belser UC | 2004 | Outcome analysis of implant restorations located in the anterior maxilla: a review of the recent literature. | Int J Oral Maxillofac Implants. | Narratives Review | - | |
| 393 | 15626318 | Cornelini R | 2004 | Deproteinized bovine bone and biodegradable barrier membranes to support healing following immediate placement of transmucosal implants: a short-term controlled clinical trial. | Int J Periodontics Restorative Dent. | Prospektive randomisierte kontrollierte Studie | - | |

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| 394 | 15017303 | Castellon P | 2004 | Immediate Dental Implant Placement in Sockets Augmented With HTR Synthetic Bone. | Implant Dent. | Retrospektive Fallserie | - | |
| 395 | 14579953 | Bornstein MM | 2003 | Early loading of nonsubmerged titanium implants with a sandblasted and acid-etched (SLA) surface: 3-year results of a prospective study in partially edentulous patients. | Int J Oral Maxillofac Implants. | Prospektive Kohorten Studie | - | |
| 396 | 12830496 | Samet N | 2003 | [A systematic approach for removable partial denture design]. | Refuat Hapeh Vehashinayim. | Narratives Review | - | |
| 397 | 12816301 | Yukna RA | 2003 | Evaluation of hard tissue replacement composite graft material as a ridge preservation/augmentation material in conjunction with immediate hydroxyapatite-coated dental implants. | J Periodontol. | Prospektive Fallserie | - | |
| 398 | 12562363 | Botticelli D | 2003 | The jumping distance revisited: An experimental study in the dog. | Clin Oral Implants Res. | Tierexperimentelle Studie | - | |
| 399 | 12453125 | Hardt CR | 2002 | Outcome of implant therapy in relation to experienced loss of periodontal bone support: a retrospective 5- year study. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |
| 400 | 12237798 | Ambard A | 2002 | Rehabilitation of a bulimic patient using endosteal implants. | J Prosthodont. | Case Report | - | |
| 401 | 11915552 | Aires I | 2002 | Immediate placement in extraction sites followed by immediate loading: a pilot study and case presentation. | Implant Dent. | Prospektive und retrospektive kontrollierte Studie | - | |
| 402 | 11807482 | Chaffee NR | 2002 | Prosthetic complications in an implant-retained mandibular overdenture population: initial analysis of a prospective study. | J Prosthet Dent. | Prospektive kontrollierte klinische Studie | - | |
| 403 | 11564112 | Mayfield LJ | 2001 | Evaluation following functional loading of titanium fixtures placed in ridges augmented by deproteinized bone mineral. A human case study. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |

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|-----|----------|-----------------------------------|------|--|---|-----------------------------------|---|--|
| 404 | 11516007 | Kinsel RP | 2001 | Development of gingival esthetics in the terminal dentition patient prior to dental implant placement using a full-arch transitional fixed prosthesis: a case report. | Int J Oral Maxillofac Implants. | Case Report | - | |
| 405 | 11458241 | Schultes G | 2001 | Histologic evaluation of immediate versus delayed placement of implants after tooth extraction. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Tierexperimentelle Studie | - | |
| 406 | 11404872 | Budtz-Jørgensen E | 2000 | Aesthetic considerations for the treatment of partially edentulous patients with removable dentures. | Pract Periodontics Aesthet Dent. | Narratives Review | - | |
| 407 | 11168269 | Simion M | 2001 | Long-term evaluation of osseointegrated implants inserted at the time or after vertical ridge augmentation. A retrospective study on 123 implants with 1-5 year follow-up. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |
| 408 | 11168212 | van Steenberghe D | 2000 | The clinical use of deproteinized bovine bone mineral on bone regeneration in conjunction with immediate implant installation. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |
| 409 | 10453672 | Khoury F | 1999 | Augmentation of the sinus floor with mandibular bone block and simultaneous implantation: a 6-year clinical investigation. | Int J Oral Maxillofac Implants. | Retrospektive Fallserie | - | |
| 410 | 9796148 | Andersson G | 1998 | Oral implant rehabilitation in irradiated patients without adjunctive hyperbaric oxygen. | Int J Oral Maxillofac Implants. | Retrospektive Fallserie | - | |
| 411 | 9590942 | Nir-Hadar O | 1998 | Delayed immediate implants: alveolar bone changes during the healing period. | Clin Oral Implants Res. | Retrospektive Fallserie | - | |
| 412 | 9338869 | Sullivan DY | 1997 | Preliminary results of a multicenter study evaluating a chemically enhanced surface for machined commercially pure titanium implants. | J Prosthet Dent. | Prospektive multicenter Fallserie | - | |
| 413 | 8803340 | Henry PJ | 1996 | Osseointegrated implants for single-tooth replacement: a prospective 5-year multicenter study. | Int J Oral Maxillofac Implants. | Prospektive multicenter Fallserie | - | |

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|-----|---------|-------------------------|------|--|---|--|---|----------|
| 245 | | | | Restoration of the partially edentulous mouth--a comparison of overdentures, removable partial dentures, fixed partial dentures and implant treatment. | J Dent. | | - | X in 2.1 |
| 414 | 8752550 | Jemt T | 1996 | A 5-year prospective multicenter follow-up report on overdentures supported by osseointegrated implants. | Int J Oral Maxillofac Implants. | Prospektive multicenter Fallserie | - | |
| 415 | 8349839 | Rams TE | 1993 | Evaluation of peri-implant sulcular temperature. | J Clin Periodontol. | Prospektive kontrollierte klinische Studie | - | |

5. Outcome: zu erwartende Prognose zukünftiger Implantate

5.1. dental implant AND prognosis AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|---------------------------|------------------|---|--|-------------------------|---------------------|-------------------|
| 416 | 25106010 | Bell C | 2014 | Immediate restoration of NobelActive implants placed into fresh extraction sites in the anterior maxilla. | J Oral Implantol. | Retrospektive Fallserie | - | |
| 10 | | | | Bisphosphonates related osteonecrosis of the jaw. | Nat J Maxillofac Surg. | | - | X in 1.1 |
| 417 | 23299652 | Krieger E | 2013 | [Orthodontic treatment of patients medicated with bisphosphonates-a clinical case report]. | J Orofac Orthop. | Case Report | - | |
| 29 | | | | Long-term success of surgery in bisphosphonate-related osteonecrosis of the jaws (BRONJs). | Oral Oncol. | | - | X in 1.1 |
| 33 | | | | Dental implications of bisphosphonate-related osteonecrosis. | Gerodontology. | | - | X in 1.1 |
| 45 | | | | [Placing of oral implants in patients using bisphosphonates]. | Ned Tijdschr Tandheelkd. | | - | X in 1.1 |
| 46 | | | | Identification and treatment of bisphosphonate- | Implant Dent. | | - | X in 1.1 |

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|-----|----------|----------------------------|------|---|--|-----------------------|---|----------|
| | | | | associated actinomycotic osteonecrosis of the jaws. | | | | |
| 47 | | | | Survival of dental implants among post-menopausal female dental school patients taking oral bisphosphonates: a retrospective study. | Compend Contin Educ Dent. | | - | X in 1.1 |
| 418 | 20553153 | Leonida A | 2012 | Immediate loading in mandible full-arch: pilot study in patients with osteoporosis in bisphosphonate therapy. | J Oral Implantol. | Case Repoort | - | |
| 64 | | | | Bisphosphonate-related osteonecrosis of the jaw associated with dental implants. | J Oral Maxillofac Surg. | | - | X in 1.1 |
| 419 | 20070753 | Kalayci A | 2010 | Evaluation of osteoblastic activity around dental implants using bone scintigraphy. | Clin Oral Implants Res. | Prospektive Fallserie | - | |
| 73 | | | | Osteonecrosis of the posterior mandible after implant insertion: a clinical and histological case report. | Clin Implant Dent Relat Res. | | - | X in 1.1 |
| 420 | 19263627 | Kasai T | 2009 | The prognosis for dental implants placed in patients taking oral bisphosphonates. | J Calif Dent Assoc. | - | - | |
| 94 | | | | Outcomes of placing dental implants in patients taking oral bisphosphonates: a review of 115 cases. | J Oral Maxillofac Surg. | | - | X in 1.1 |
| 421 | 19655490 | Vailati F | 2006 | Severe attachment loss at the maxillary incisors: part 2. | Eur J Esthet Dent. | Case Report | - | |
| 422 | 15755416 | Mulligan R | 2005 | Osteoporosis: diagnostic testing, interpretation, and correlations with oral health--implications for dentistry. | Dent Clin North Am. | Narratives Review | - | |

5.2. (bisphosphonate OR denosumab) AND persisting alveolar socket

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|------------------------------|------------------|--|---|-------------------------|---------------------|-------------------|
| 423 | 20728032 | Hutchinson M | 2010 | Radiographic findings in bisphosphonate-treated patients with stage 0 disease in the absence of bone | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |

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|-----|----------|---------------------------|------|---|---|-------------------------------|---|--|
| | | | | exposure. | | | | |
| 424 | 16982320 | Groetz KA | 2006 | Persisting alveolar sockets-a radiologic symptom of BP-ONJ? | J Oral Maxillofac Surg. | Letter / Narratives Review | + | |

5.3. (bisphosphonate OR denosumab) AND sharp bone edges AND jaw NOT children NOT osteogenesis imperfect

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|---------------------------------|------------------|---|---|-------------------------|---------------------|-------------------|
| 425 | 20674411 | Wilde F | 2007 | The role of surgical therapy in the management of intravenous bisphosphonates-related osteonecrosis of the jaw. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Retrospektive Fallserie | - | |
| 426 | 17972612 | Schortinghuis J | 2007 | [Bisphosphonate-associated osteonecrosis of the jaws. 3. Two case reports]. | Ned Tijdschr Tandheelkd. | Case Report | - | |

5.4. (bisphosphonate OR denosumab) AND ossification AND jaw NOT children NOT osteogenesis imperfect

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|--------------------------|------------------|---|----------------------------------|---------------------------|---------------------|-------------------|
| 427 | 25613174 | Ogata K | 2015 | Evaluation of the therapeutic effects of conditioned media from mesenchymal stem cells in a rat bisphosphonate-related osteonecrosis of the jaw-like model. | Bone. | Tierexperimentelle Studie | - | |
| 428 | 25215248 | Costa FW | 2014 | Clinical aspects, imaging features, and considerations on bisphosphonate-related osteonecrosis risk in a pediatric patient with osteogenesis imperfecta. | Case Rep Dent. | Case Report | - | |

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|-----|----------|-----------------------------------|------|--|--|---------------------------|---|--|
| 429 | 25032151 | Sarkarat F | 2014 | Platelet-Rich Plasma in Treatment of Zoledronic Acid-Induced Bisphosphonate-related Osteonecrosis of the Jaws. | Trauma Mon. | Tierexperimentelle Studie | - | |
| 430 | 24978685 | Imai T | 2014 | "Phoenix jaw"-bone regeneration of the necrotic mandible between pathological fractures: an unusual but evocative course of bisphosphonate-related osteonecrosis. | J Craniofac Surg. | Case Report | - | |
| 431 | 24727159 | Boyce RW | 2014 | Infant cynomolgus monkeys exposed to denosumab in utero exhibit an osteoclast-poor osteopetrotic-like skeletal phenotype at birth and in the early postnatal period. | Bone. | Tierexperimentelle Studie | - | |
| 432 | 24170800 | Ersan N | 2014 | Teriparatide and the treatment of bisphosphonate-related osteonecrosis of the jaw: a rat model. | Dentomaxillofac Radiol. | Tierexperimentelle Studie | - | |
| 433 | 23891015 | Gerard DA | 2014 | Early inhibitory effects of zoledronic acid in tooth extraction sockets in dogs are negated by recombinant human bone morphogenetic protein. | J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 434 | 23746422 | Dayisoylu EH | 2013 | The effects of adjunctive parathyroid hormone injection on bisphosphonate-related osteonecrosis of the jaws: an animal study. | Int J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 435 | 23714970 | González-García M | 2013 | Cell therapy in bisphosphonate-related osteonecrosis of the jaw. | J Craniofac Surg. | Case Report | - | |
| 436 | 23688101 | Kuroshima S | 2014 | Distinctive tooth-extraction socket healing: bisphosphonate versus parathyroid hormone therapy. | J Craniofac Surg. | Tierexperimentelle Studie | - | |
| 437 | 23602673 | Hong P | 2013 | Enhancement of bone consolidation in mandibular distraction osteogenesis: a contemporary review of experimental studies involving adjuvant therapies. | J Plast Reconstr Aesthet Surg. | Systematisches Review | - | |
| 438 | 23265985 | Baiomy AA | 2014 | Experimental comparison of the effects of locally | Oral Surg Oral Med Oral | Tierexperimentelle Studie | - | |

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| | | | | administered zoledronic acid and alendronate on the rate of mandibular distraction osteogenesis in dogs. | Pathol Oral Radiol. | | | | |
| 439 | 23246226 | Ohbayashi Y | 2013 | Adjunct teriparatide therapy with monitoring of bone turnover markers and bone scintigraphy for bisphosphonate-related osteonecrosis of the jaw. | Oral Surg Oral Med Oral Pathol Oral Radiol. | Case Report | - | | |
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| 441 | 22688305 | Bradaschia-Correa V | 2012 | Effect of alendronate on endochondral ossification in mandibular condyles of growing rats. | Eur J Histochem. | Tierexperimentelle Studie | - | | |
| 442 | 22623376 | Aguirre JI | 2012 | Oncologic doses of zoledronic acid induce osteonecrosis of the jaw-like lesions in rice rats (<i>Oryzomys palustris</i>) with periodontitis. | J Bone Miner Res. | Tierexperimentelle Studie | - | | |
| 443 | 22563819 | Patntirapong S | 2012 | Zoledronic acid suppresses mineralization through direct cytotoxicity and osteoblast differentiation inhibition. | J Oral Pathol Med. | In Vitro Studie | - | | |
| 30 | | | | Mandibular reconstruction with vascularized osseous free flaps: a review of the literature. | Asian Pac J Cancer Prev. | | - | | X in 1.1 |
| 444 | 22380992 | Granados-García M | 2011 | Autoclaved bone autograph reconstituted with autologous bone marrow. | Cir Cir. | Tierexperimentelle Studie | - | | |
| 445 | 22359627 | Yu YY | 2012 | Site specific effects of zoledronic acid during tibial and mandibular fracture repair. | PLoS One. | Prospektive kontrollierte Studie | - | | |
| 39 | | | | [Potential use of parathyroid hormone (PTH) in the treatments for oral diseases]. | Clin Calcium. | | - | | X in 1.1 |
| 446 | 22166164 | Said F | 2012 | The effect of etidronate on the periodontium of ovariectomized rats. | J Periodontol. | Tierexperimentelle Studie | - | | |
| 447 | 21945486 | Küçük D | 2011 | Comparison of local and systemic alendronate on distraction osteogenesis. | Int J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | | |
| 448 | 21938481 | Ohe JY | 2012 | Bisphosphonates modulate the expression of OPG and | Clin Oral Investig. | In Vitro Studie | - | | |

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|-----|----------|----------------------------|------|---|---|--|---|----------|
| | | | | M-CSF in hMSC-derived osteoblasts. | | | | |
| 449 | 21856057 | Marolt D | 2012 | Effects of pamidronate on human alveolar osteoblasts in vitro. | J Oral Maxillofac Surg. | In Vitro Studie | | |
| 450 | 21849044 | Cella L | 2011 | Autologous bone marrow stem cell intraslesional transplantation repairing bisphosphonate related osteonecrosis of the jaw. | Head Face Med. | Case Report | - | |
| 451 | 21771209 | Kim JH | 2011 | Effect of alendronate on healing of extraction sockets and healing around implants. | Oral Dis. | Tierexperimentelle Studie | - | |
| 452 | 21392671 | Fujita Y | 2011 | Effects of risedronate on cortical and trabecular bone of the mandible in glucocorticoid-treated growing rats. | Am J Orthod Dentofacial Orthop. | Tierexperimentelle Studie | - | |
| 453 | 21358547 | Wang K | 2011 | Modern concepts in mandibular reconstruction in oral and oropharyngeal cancer. | Am J Orthod Dentofacial Orthop. | Narratives Review | - | |
| 454 | 21351151 | Aghaloo TL | 2011 | Periodontal disease and bisphosphonates induce osteonecrosis of the jaws in the rat. | J Bone Miner Res. | Tierexperimentelle Studie | - | |
| 54 | | | | Effects of short-term zoledronic acid treatment on bone remodeling and healing at surgical sites in the maxilla and mandible of aged dogs. | J Oral Maxillofac Surg. | | - | X in 1.1 |
| 455 | 21122371 | Zhang J | 2010 | [Effect of zoledronic acid on the differentiation and osteoprotegerin production of osteoblasts in rabbit]. | Zhonghua Kou Qiang Yi Xue Za Zhi. | Tierexperimentelle Studie | - | |
| 456 | 21050644 | Pikdöken L | 2011 | Scintigraphic, histologic, and histomorphometric analyses of bovine bone mineral and autogenous bone mixture in sinus floor augmentation: a randomized controlled trial--results after 4 months of healing. | J Oral Maxillofac Surg. | Prospektive randomisierte kontrollierte Studie | - | |
| 457 | 21040464 | Kubek DJ | 2010 | Ovariectomy stimulates and bisphosphonates inhibit intracortical remodeling in the mouse mandible. | Orthod Craniofac Res. | Tierexperimentelle Studie | - | |
| 56 | | | | Advantages and disadvantages of the use of bisphosphonates in oral and maxillofacial surgery. | Int Dent J. | | - | X in 1.1 |

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|-----|----------|------------------------------|------|--|--|--|---|--|
| 458 | 20946575 | Silverman SL | 2011 | Bisphosphonate use in conditions other than osteoporosis. | Ann N Y Acad Sci. | Narratives Review | - | |
| 459 | 20846154 | Aguirre JI | 2010 | Effects of alendronate on bone healing after tooth extraction in rats. | Oral Dis. | Tierexperimentelle Studie | - | |
| 460 | 20200938 | Hokugo A | 2010 | Increased prevalence of bisphosphonate-related osteonecrosis of the jaw with vitamin D deficiency in rats. | J Bone Miner Res. | Tierexperimentelle Studie | - | |
| 461 | 20144497 | Gürbüz B | 2010 | Scintigraphic evaluation of osteoblastic activity in extraction sockets treated with platelet-rich fibrin. | J Oral Maxillofac Surg. | Prospektive randomisierte kontrollierte Studie | - | |
| 462 | 19882100 | Kobayashi Y | 2010 | Zoledronic acid delays wound healing of the tooth extraction socket, inhibits oral epithelial cell migration, and promotes proliferation and adhesion to hydroxyapatite of oral bacteria, without causing osteonecrosis of the jaw, in mice. | J Bone Miner Metab. | Tierexperimentelle Studie | - | |
| 463 | 19681835 | Kim MS | 2009 | Effects of bisphosphonate on the endochondral bone formation of the mandibular condyle. | Anat Histol Embryol. | Tierexperimentelle Studie | - | |
| 464 | 19591974 | Huja SS | 2009 | Zoledronic acid decreases bone formation without causing osteocyte death in mice. | Arch Oral Biol. | Tierexperimentelle Studie | - | |
| 465 | 19580463 | Allen MR | 2010 | Cancer treatment dosing regimens of zoledronic acid result in near-complete suppression of mandible intracortical bone remodeling in beagle dogs. | J Bone Miner Res. | Tierexperimentelle Studie | - | |
| 466 | 19482390 | Ding Y | 2010 | ^{99m} Tc-methylene diphosphonate bone imaging using low-intensity pulsed ultrasound: promotion of bone formation during mandibular distraction osteogenesis in dogs. | Br J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 467 | 19406538 | Liu Y | 2010 | Character of distracted bone in irradiated canine | Br J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |

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|-----|----------|----------------------------|------|--|---|-----------------------------|---|----------|
| | | | | mandibles and electrophysiological changes in the inferior alveolar nerve. | | | | |
| 468 | 18938273 | Stefanik D | 2008 | Disparate osteogenic response of mandible and iliac crest bone marrow stromal cells to pamidronate. | Oral Dis. | Prospektive in Vitro Studie | - | |
| 469 | 18848100 | Tekin U | 2008 | Effects of alendronate on rate of distraction in rabbit mandibles. | J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 194 | | | | Effects of risedronate on alveolar bone loss and angiogenesis: a stereologic study in rats. | J Periodontol. | | - | X in 1.7 |
| 470 | 18775204 | Drake MT | 2008 | Bisphosphonates: mechanism of action and role in clinical practice. | Mayo Clin Proc. | Narratives Review | - | |
| 471 | 18595621 | Radfar L | 2008 | Bisphosphonates, osteonecrosis of the jaw, and dental treatment recommendations. | J Okla Dent Assoc. | Letter | - | |
| 472 | 18423279 | Pampu AA | 2008 | Histomorphometric evaluation of the effects of zoledronic acid on mandibular distraction osteogenesis in rabbits. | J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 473 | 18413829 | Raje N | 2008 | Clinical, radiographic, and biochemical characterization of multiple myeloma patients with osteonecrosis of the jaw. | Clin Cancer Res. | Prospektive Fallserie | - | |
| 474 | 18280968 | Bedogni A | 2008 | Bisphosphonate-associated jawbone osteonecrosis: a correlation between imaging techniques and histopathology. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Retrospektive Fallserie | - | |
| 475 | 18183447 | Kimura M | 2008 | Bisphosphonate treatment increases the size of the mandibular condyle and normalizes growth of the mandibular ramus in osteoprotegerin-deficient mice. | Calcif Tissue Int. | Tierexperimentelle Studie | - | |
| 476 | 17929529 | Shi B | 2007 | Alveolar ridge preservation prior to implant placement with surgical-grade calcium sulfate and platelet-rich plasma: a pilot study in a canine model. | Int J Oral Maxillofac Implants. | Tierexperimentelle Studie | - | |

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|-----|----------|-----------------------------------|------|---|---|--|---|--|
| 477 | 17580062 | Kamoun-Goldrat AS | 2007 | [Osteogenesis imperfecta and dentinogenesis imperfecta: diagnostic frontiers and importance in dentofacial orthopedics]. | Orthod Fr. | Narratives Review | - | |
| 478 | 17236837 | Dannemann C | 2007 | Jaw osteonecrosis related to bisphosphonate therapy: a severe secondary disorder. | Bone. | Retrospektive Fallserie | - | |
| 479 | 17120363 | [No authors listed] | 2006 | Low-down on link between bone-builders and jaw damage. | Johns Hopkins Med Lett Health After 50. | Letter | - | |
| 480 | 16860215 | Pampu AA | 2006 | Experimental evaluation of the effects of zoledronic acid on regenerate bone formation and osteoporosis in mandibular distraction osteogenesis. | J Oral Maxillofac Surg. | Tierexperimentelle Studie | - | |
| 481 | 12797419 | Cehreli MC | 2003 | Biological reactions to a poly(L-lactide)-hydroxyapatite composite: a study in canine mandible. | J Biomater Appl. | Tierexperimentelle Studie | - | |
| 482 | 10890724 | Hunziker J | 2000 | Mandibular bone formation rates in aged ovariectomized rats treated with anti-resorptive agents alone and in combination with intermittent parathyroid hormone. | J Dent Res. | Tierexperimentelle Studie | - | |
| 483 | 10102552 | Meraw SJ | 1999 | Use of alendronate in peri-implant defect regeneration. | J Periodontol. | Tierexperimentelle Studie | - | |
| 484 | 9689615 | O'uchi N | 1998 | Inhibitory effects of YM175, a bisphosphonate, on the progression of experimental periodontitis in beagle dogs. | J Periodontal Res. | Tierexperimentelle Studie | - | |
| 485 | 9619667 | Gülaldi NC | 1998 | Scintigraphic evaluation of healing response after heterograft usage for alveolar extraction cavity. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Prospektive kontrollierte klinische Studie | - | |
| 486 | 9379334 | Yaffe A | 1997 | Local delivery of an amino bisphosphonate prevents the resorptive phase of alveolar bone following mucoperiosteal flap surgery in rats. | J Periodontol. | Tierexperimentelle Studie | - | |
| 487 | 9005411 | Berding G | 1996 | [Bone SPECT of the jaws after fracture, onlay osteoplasty of insertion of implants]. | Nuklearmedizin. | Prospektive Fallserie | - | |

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|-----|---------|--------------------------------|------|---|---|----------------------------------|---|--|
| 488 | 7628781 | Ogura H | 1995 | [Physiology and pharmacology of hard tissues--effect of chemicals on the formation and the resorption mechanism of tooth and bone]. | Nihon Yakurigaku Zasshi. | Narratives Review | - | |
| 489 | 2011362 | Engelke W | 1991 | Assessment of bone remodeling in the temporomandibular joint by serial uptake measurement of technetium 99m-labeled methylene diphosphonate with a cadmium telluride probe. | Oral Surg Oral Med Oral Pathol. | Tierexperimentelle Studie | - | |
| 490 | 3100751 | Ubios AM | 1986 | Effect of diphosphonate on the prevention of X-radiation-induced inhibition of bone formation in rats. | J Oral Pathol. | Tierexperimentelle Studie | - | |
| 491 | 6210558 | Senekowitsch R | 1982 | Evaluation of ossification in jaw defects by radio-nuclide imaging. | Eur J Nucl Med. | Prospektive kontrollierte Studie | - | |
| 492 | 6769081 | Lee HK | 1980 | 99m technetium diphosphonate bone scanning of the mandibular bone graft. | Oral Surg Oral Med Oral Pathol. | Case Report | - | |

5.5. (bisphosphonate OR denosumab) AND bone remodeling AND post extraction AND jaw NOT children NOT osteogenesis imperfect

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-----------------------------|------------------|--|---|---------------------------|---------------------|-------------------|
| 493 | 23348344 | Khojasteh A | 2013 | Healing of extraction sockets and augmented alveolar defects following 1-year treatment with bisphosphonate. | J Craniofac Surg. | Tierexperimentelle Studie | - | |
| 459 | | | | Effects of alendronate on bone healing after tooth extraction in rats. | Oral Dis. | | - | X in 5.4 |
| 494 | 20458574 | Allen MR | 2011 | Compromised osseous healing of dental extraction sites in zoledronic acid-treated dogs. | Osteoporos Int. | Tierexperimentelle Studie | - | |
| 495 | 19371816 | Allen MR | 2009 | The pathogenesis of bisphosphonate-related osteonecrosis of the jaw: so many hypotheses, so few | J Oral Maxillofac Surg. | Narratives Review | - | |

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|-----|---------|--------------------------|------|---|------------------------------------|---------------------------|---|----------|
| | | | | data. | | | | |
| 96 | | | | Implant placement with or without simultaneous tooth extraction in patients taking oral bisphosphonates: postoperative healing, early follow-up, and the incidence of complications in two private practices. | J Periodontol. | | - | X in 1.1 |
| 490 | | | | Effect of diphosphonate on the prevention of X-radiation-induced inhibition of bone formation in rats. | J Oral Pathol. | | - | X in 5.4 |
| 496 | 6219214 | Olson HM | 1982 | Inhibition of post-extraction alveolar ridge resorption in rats by dichloromethane diphosphonate. | J Periodontal Res. | Tierexperimentelle Studie | - | |

5.6. (bisphosphonate OR denosumab) AND radiologic changes AND jaw NOT children NOT osteogenesis imperfecta

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | Doppelt vorhanden |
|-----|----------|-----------------------------|------------------|--|---|--|---------------------|-------------------|
| 497 | 25105817 | Pushalkar S | 2014 | Oral microbiota and host innate immune response in bisphosphonate-related osteonecrosis of the jaw. | Int J Oral Sci. | Prospektive kontrollierte klinische Studie | - | |
| 498 | 25053572 | Fleisher KE | 2014 | Fluorodeoxyglucose positron emission tomography with computed tomography detects greater metabolic changes that are not represented by plain radiography for patients with osteonecrosis of the jaw. | J Oral Maxillofac Surg. | Retrospektive Fallserie | - | |
| 499 | 24586331 | Hesse B | 2014 | Alterations of mass density and 3D osteocyte lacunar properties in bisphosphonate-related osteonecrotic human jaw bone, a synchrotron μ CT study. | PLoS One. | Prospektive In Vitro Studie | - | |
| 500 | 24170801 | Zaman MU | 2013 | A retrospective study of digital subtraction technique to detect sclerotic changes in alveolar bone on intraoral radiographs of bisphosphonate-treated patients. | Dentomaxillofac Radiol. | Retrospektive Fallserie | - | |

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|-----|----------|-----------------------------|------|---|---|-------------------------|---|----------|
| 501 | 19926757 | Morag Y | 2009 | Bisphosphonate-related osteonecrosis of the jaw: a pictorial review. | Radiographics. | Narratives Review | - | |
| 502 | 18068792 | Bisdas S | 2008 | Biphosphonate-induced osteonecrosis of the jaws: CT and MRI spectrum of findings in 32 patients. | Clin Radiol. | Retrospektive Fallserie | - | |
| 503 | 12521065 | Ferreira Rl | 2002 | Bone scintigraphy as an adjunct for the diagnosis of oral diseases. | J Dent Educ. | Narratives Review | - | |
| 504 | 10936843 | Khan O | 2000 | The role of quantitative single photon emission computerized tomography (SPECT) in the osseous integration process of dental implants. | Oral Surg Oral Med Oral Pathol Oral Radiol Endod. | Prospektive Fallserie | - | |
| 482 | | | | Mandibular bone formation rates in aged ovariectomized rats treated with anti-resorptive agents alone and in combination with intermittent parathyroid hormone. | J Dent Res. | | - | X in 5.4 |
| 505 | 8872221 | Bachmann G | 1996 | The role of magnetic resonance imaging and scintigraphy in the diagnosis of pathologic changes of the mandible after radiation therapy. | Int J Oral Maxillofac Surg. | Prospektive Fallserie | - | |

Handrecherche / weitere Internetrecherche

| Nr. | PMID / URL / Quelle | Erstautor | Publikationsjahr | Titel | Studientyp | Qualitätsstufe etc. | |
|-----|---|---------------|------------------|---|-----------------------|---------------------|--|
| 506 | http://www.zm-online.de/hefte/Periimplantoplastik-bei-Bisphosphonaten_283983.html#1 | Buttchereit I | 2015 | Periimplantoplastik bei Bisphosphonaten | Case Report | - | |
| 507 | http://www.awmf.org/leitlinien/detail/II/007-091.html | Grötz K | 2012 | Bisphosphonat-assoziierte Kiefernekrosen S – 3 Leitlinie | Leitlinie / Guideline | + | |
| 508 | www.hsk- | Eberle J | 2013 | Zahnärztliche Betreuung von Tumorpatienten | Narratives Review | - | |

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|-----|---|---------|------|---|---------------------------------|---|--|
| | wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/Zahnärztliche_Betreuung_Tumorpatienten_2013_.pdf.pdf | | | | | | |
| 509 | https://www.dginet.de/web/dgi/laufzettel-bisphosphonate | Grötz K | | Laufzettel Bisphosphonate Risiko-Evaluation bei antiresorptiver Therapie vor Implantation | Letter | + | |
| 510 | www.hsk-wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/03_2013_Groetz.pdf | Grötz K | 2013 | Implantate und Bisphosphonat-Therapie | Systematisches Review | + | |
| 511 | www.hsk-wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/MKG_Link5.pdf | Grötz K | 2010 | Bei welchen Bisphosphonat-Patienten darf ich eigentlich implantieren? Ein systematisches Review | Systematisches Review | + | |
| 512 | www.hsk-wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/MKG_Link12.pdf | Grötz K | 2005 | Osteonekrose des Kiefers unter Bisphosphonat-Langzeittherapie | Case Report / Narratives Review | - | |
| 513 | Groetz, K.A. and T.F. Wolff, Handbuch MKG 2014 : MKG-Update 2014 ONKO II: SUPPORTIVE TU-BETREUUNG. 2014, Wiesbaden: Herausgeber: Groetz, Knut A., Wiesbaden; Schmidt-Westhausen, Andrea M, Berlin; Wagner, Wilfried, Mainz; ISBN 978-3-86302-085-9. | Grötz K | 2014 | MKG-Update 2014 ONKO II: SUPPORTIVE TU-BETREUUNG. | | - | |
| 514 | Groetz, K.A. and B.L.J. Schmidt, Handbuch MKG Update, Kap 4: ONKO II: SUPPORTIVE TU-BETREUUNG. 2013: Herausgeber: Groetz, Knut A., Wiesbaden; Schmidt-Westhausen, Andrea M, Berlin; Wagner, Wilfried, Mainz; ISBN 978-3-86302-052-1. | Grötz K | 2013 | MKG Update 2013 ONKO II: SUPPORTIVE TU-BETREUUNG. | | - | |
| 515 | Groetz, K.A. and B.L.J. Schmidt, Handbuch MKG UPDATE, Kap. 4: ONKO II: AMBULANTE TU-BETREUUNG. 2012: Herausgeber: Groetz, Knut A., Wiesbaden; Schmidt- | Grötz K | 2012 | MKG UPDATE 2012 ONKO II: AMBULANTE TU-BETREUUNG | | - | |

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| | Westhausen, Andrea M., Berlin; Wagner, Wilfried, Mainz; ISBN 978-3-86302-028-6. | | | | | | |
| 516 | Groetz, K.A. and B.L.J. Schmidt, Handbuch MKG UPDATE Kap. 5: ONKO II: AMBULANTE TU-BETREUUNG. 2011: Herausgeber: Groetz, Knut A., Wiesbaden; Schmidt- Westhausen, Andrea M., Berlin; ISBN 978-3-86302-007-1. | Grötz K | 2011 | Handbuch MKG UPDATE 2011 ONKO II: AMBULANTE TU-BETREUUNG. | | - | |
| 517 | Groetz, K.A. and B.L.J. Schmidt, Handbuch MKG UPDATE Kap. 3: ONKO I: AMBULANTE TU-BETREUUNG. 2010: Herausgeber: Groetz, Knut A., Wiesbaden; Schmidt- Westhausen, Andrea M., Berlin; ISBN 978-3-642-11423-6. | Grötz K | 2010 | Handbuch MKG UPDATE 2010 ONKO I: AMBULANTE TU-BETREUUNG | | - | |
| 518 | ISBN 978-3-86302-138-2 | Grötz K | 2015 | MKG-Update 2015 ONKO II: SUPPORTIVE TU- BETREUUNG. | | - | |
| 519 | 23512234 Oral Maxillofac Surg. | Krimmel M | 2014 | Does dental and oral health influence the development and course of bisphosphonate- related osteonecrosis of the jaws (BRONJ)? | Retrospektive Fallserie | + | |
| 520 | 23582590 J Oral Maxillofac Surg. | Tsao C | 2013 | Oral health risk factors for bisphosphonate- associated jaw osteonecrosis. | Retrospektive kontrollierte klinische Studie | + | |
| 521 | 23786404 J Periodontol. | Thumbigere- Math V | 2014 | Periodontal disease as a risk factor for bisphosphonate-related osteonecrosis of the jaw. | Retrospektive kontrollierte klinische Studie | + | |
| 522 | 23525860 Clin Oral Investig. | Walter C | 2014 | Radiologic bone loss in patients with bisphosphonate-associated osteonecrosis of the jaws: a case-control study. | Retrospektive kontrollierte klinische Studie | | |

Anhang 2: einbezogene Studien

1. Outcome: ONJ Risiko

1.1 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (dental implant OR Periimplantitis)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe | |
|-----|----------|---------------------------------|------------------|---|--|-------------------------------------|----------------|--|
| 1 | 25764480 | Al-Sabbagh M | 2015 | Osteoporosis and bisphosphonate-related osteonecrosis in a dental school implant patient population. | Implant Dent. | Retrospektive Fallserie | + | |
| 2 | 25701305 | Nisi M | 2015 | Risk factors influencing BRONJ staging in patients receiving intravenous bisphosphonates: a multivariate analysis. | Int J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 3 | 25234534 | Holzinger D | 2014 | Effect of dental implants on bisphosphonate-related osteonecrosis of the jaws. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 4 | 23866309 | López-Cedrún JL | 2013 | Oral bisphosphonate-related osteonecrosis of the jaws in dental implant patients: a case series. | Br J Oral Maxillofac Surg. | Retrospektive Multycenter Fallserie | + | |
| 5 | 23445465 | Tam Y | 2014 | Osteonecrosis of the jaw after implant surgery in patients treated with bisphosphonates--a presentation of six consecutive cases. | Clin Implant Dent Relat Res. | Case Reports | + | |
| 6 | 23278625 | Kwon TG | 2014 | Osteonecrosis associated with dental implants in | Clin Oral Implants Res. | Retrospektive Fallserie | + | |

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|----|----------|-------------------------------|------|--|---|-------------------------|---|--|
| | | | | patients undergoing bisphosphonate treatment. | | | | |
| 7 | 22415216 | Jacobsen C | 2013 | Osteopathology induced by bisphosphonates and dental implants: clinical observations. | Clin Oral Investig. | Retrospektive Fallserie | + | |
| 8 | 23738968 | Famili P | 2011 | Survival of dental implants among post-menopausal female dental school patients taking oral bisphosphonates: a retrospective study. | Compend Contin Educ Dent. | Retrospektive Fallserie | + | |
| 9 | 20946206 | Kwon YD | 2011 | Retrospective study of two biochemical markers for the risk assessment of oral bisphosphonate-related osteonecrosis of the jaws: can they be utilized as risk markers? | Clin Oral Implants Res. | Retrospektive Fallserie | + | |
| 10 | 20434422 | Koka S | 2010 | Survival of dental implants in post-menopausal bisphosphonate users. | J Prosthodont Res. | Retrospektive Fallserie | + | |
| 11 | 20307764 | Lazarovici TS | 2010 | Bisphosphonate-related osteonecrosis of the jaw associated with dental implants. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 12 | 20116705 | Goss A | 2010 | The nature and frequency of bisphosphonate-associated osteonecrosis of the jaws in dental implant patients: a South Australian case series. | J Oral Maxillofac Surg. | Case Reports | + | |
| 13 | 19772941 | Lo JC | 2010 | Prevalence of osteonecrosis of the jaw in patients with oral bisphosphonate exposure. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |

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|----|----------|-------------------------------|------|---|---|--|---|--|
| 14 | 18423296 | Bell BM | 2008 | Oral bisphosphonates and dental implants: a retrospective study. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 15 | 18201600 | Grant BT | 2008 | Outcomes of placing dental implants in patients taking oral bisphosphonates: a review of 115 cases. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 16 | 17760533 | Fugazzotto PA | 2007 | Implant placement with or without simultaneous tooth extraction in patients taking oral bisphosphonates: postoperative healing, early follow-up, and the incidence of complications in two private practices. | J Periodontol. | Retrospektive Fallserie | + | |
| 17 | 16796276 | Jeffcoat MK | 2006 | Safety of oral bisphosphonates: controlled studies on alveolar bone. | Int J Oral Maxillofac Implants. | Randomisierte kontrollierte klinische Studie | + | |
| 18 | 16243172 | Marx RE | 2005 | Bisphosphonate-induced exposed bone (osteonecrosis/osteopetrosis) of the jaws: risk factors, recognition, prevention, and treatment. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |

1.2. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND denture

| NR. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|----------|-------------------------|------------------|---|------------------------------------|------------|---------------------|--|
| 19 | 25212129 | Niibe K | 2015 | Osteonecrosis of the jaw in patients with dental prostheses being treated with bisphosphonates or | J Prosthodont Res. | Letter | + | |

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|----|----------|-------------------------------|------|---|---|------------------------------|---|--|
| | | | | denosumab. | | | | |
| 20 | 22862971 | Hasegawa Y | 2012 | Influence of dentures in the initial occurrence site on the prognosis of bisphosphonate-related osteonecrosis of the jaws: a retrospective study. | Oral Surg Oral Med Oral Pathol Oral Radiol. | Retrospektive Fallserie | + | |
| 21 | 22704590 | Jabbour Z | 2012 | The outcomes of conservative and surgical treatment of stage 2 bisphosphonate-related osteonecrosis of the jaws: a case series. | Int J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 22 | 19805682 | Vahtsevanos K | 2009 | Longitudinal cohort study of risk factors in cancer patients of bisphosphonate-related osteonecrosis of the jaw. | J Clin Oncol. | Retrospektive Kohortenstudie | + | |
| 23 | 19592261 | Kos M | 2010 | Bisphosphonate-related osteonecrosis of the jaws: a review of 34 cases and evaluation of risk. | J Craniomaxillofac Surg. | Retrospektive Fallserie | + | |
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|----|----------|--------------------------|------|--|---------------------------------------|-------------------------------------|---|--|
| | | | | patients. | | | | |
| 27 | 18176650 | Kumar SK | 2008 | Osteonecrosis of the jaws secondary to bisphosphonate therapy: a case series. | J Contemp Dent Pract. | Case Report | + | |
| 28 | 17598065 | Yarom N | 2007 | Osteonecrosis of the jaw induced by orally administered bisphosphonates: incidence, clinical features, predisposing factors and treatment outcome. | Osteoporos Int. | Retrospektive Multicenter Studie | + | |
| 29 | 16941133 | Walter C | 2007 | Prevalence of bisphosphonate associated osteonecrosis of the jaw within the field of osteonecrosis. | Support Care Cancer. | Retrospektive Fallserie | + | |
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1.3. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND (jaw augmentation OR sinus lift)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

1.4. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND antibiotics AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

1.5. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND xerostomia

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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1.6. (bisphosphonate OR denosumab) AND osteonecrosis jaw AND ctx

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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1.7 (bisphosphonate OR denosumab) AND osteonecrosis jaw AND medication time

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

2. Outcome: Kaufunktion

2.1. masticatory efficiency AND dental implant AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

2.2. tmj disorders AND dental implant AND prevention AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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3. Outcome: Lebensqualität

3.1. quality of life AND dental implant AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|----------|-----------|------------------|--|----------------------------------|------------|---------------------|--|
| 31 | 26146501 | DeBaz C | 2015 | Dental Implant Supported Restorations Improve Quality of Life in Osteoporotic Women. | Int J Dent | | | |

3.2. oral health related quality of life AND dental implant NOT elderly patients NOT oral cavity cancer

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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4. Outcome: Prognose der Restbeziehung

4.1. prognosis remaining dentition AND dental implant AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

5. Outcome: zu erwartende Prognose zukünftiger Implantate

5.1. dental implant AND prognosis AND (bisphosphonate OR denosumab)

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

5.2. (bisphosphonate OR denosumab) AND persisting alveolar socket

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|----------|------------------------------|------------------|--|---|----------------------------|---------------------|--|
| 32 | 20728032 | Hutchinson M | 2010 | Radiographic findings in bisphosphonate-treated patients with stage 0 disease in the absence of bone exposure. | J Oral Maxillofac Surg. | Retrospektive Fallserie | + | |
| 33 | 16982320 | Groetz KA | 2006 | Persisting alveolar sockets-a radiologic symptom of BP-ONJ? | J Oral Maxillofac Surg. | Letter / Narratives Review | + | |

5.3. (bisphosphonate OR denosumab) AND sharp bone edges AND jaw NOT children NOT osteogenesis imperfect

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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5.4. (bisphosphonate OR denosumab) AND ossification AND jaw NOT children NOT osteogenesis imperfect

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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5.5. (bisphosphonate OR denosumab) AND bone remodeling AND post extraction AND jaw NOT children NOT osteogenesis imperfect AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
| | | | | | | | | |

5.6. (bisphosphonate OR denosumab) AND radiologic changes AND jaw NOT children NOT osteogenesis imperfect AND dental implant

| Nr. | PMID | Erstautor | Publikationsjahr | Titel | Journal mit Verlinkung zu PubMed | Studientyp | Qualitätsstufe etc. | |
|-----|------|-----------|------------------|-------|----------------------------------|------------|---------------------|--|
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5.7. Handrecherche / weitere Internetrecherche

| Nr. | PMID / URL / Quelle | Erstautor | Publikationsjahr | Titel | Studientyp | Qualitätsstufe etc. | |
|-----|--|-----------|------------------|--|-----------------------|---------------------|--------------------|
| 34 | http://www.awmf.org/leitlinien/detail/ll/007-091.html | Grötz K | 2012 | Bisphosphonat-assoziierte Kiefernekrosen S – 3 Leitlinie | Leitlinie / Guideline | + | |
| 35 | https://www.dginet.de/web/dgi/laufzettel-bisphosphonate | Grötz K | | Laufzettel Bisphosphonate Risiko-Evaluation bei antiresorptiver Therapie vor Implantation | Letter | + | |
| 36 | www.hsk-wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/03_2013_Groetz.pdf | Grötz K | 2013 | Implantate und Bisphosphonat-Therapie | Systematisches Review | + | Dental implant 1.1 |
| 37 | www.hsk-wiesbaden.de/fileadmin/redaktion/HSK/MKG/Dateien/MKG_Link5.pdf | Grötz K | 2010 | Bei welchen Bisphosphonat-Patienten darf ich eigentlich implantieren? Ein systematisches Review | Systematisches Review | + | Dental implant 1.1 |

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|----|---|-----------------------------------|------|---|--|---|--------------------|
| 38 | 23512234 Oral Maxillofac Surg. | Krimmel M | 2014 | Does dental and oral health influence the development and course of bisphosphonate-related osteonecrosis of the jaws (BRONJ)? | Retrospektive Fallserie | + | Denture |
| 39 | 23582590 J Oral Maxillofac Surg. | Tsao C | 2013 | Oral health risk factors for bisphosphonate-associated jaw osteonecrosis. | Retrospektive kontrollierte klinische Studie | + | Denture |
| 40 | 23786404 J Periodontol. | Thumbigere-Math V | 2014 | Periodontal disease as a risk factor for bisphosphonate-related osteonecrosis of the jaw. | Retrospektive kontrollierte klinische Studie | + | Dental implant 1.1 |
| 41 | 20171469 J Oral Maxillofac Surg. | Martin DC | 2010 | Characteristics of implant failures in patients with a history of oral bisphosphonate therapy. | | + | Dental implant 1.1 |
| 42 | 19438964 Clin Implant Dent Relat Res. | Shabestari GO | 2010 | Implant placement in patients with oral bisphosphonate therapy: a case series | | + | Dental implant 1.1 |
| 43 | 20594057 J Oral Implantol. | Zahid TM | 2011 | Influence of bisphosphonates on alveolar bone loss around osseointegrated implants | | + | Dental implant 1.1 |
| 44 | 23057037 Int J Oral Maxillofac Implants. | Memon S | 2012 | Oral bisphosphonates: early endosseous dental implant success and crestal bone changes. A retrospective study. | | + | Dental implant 1.1 |
| 45 | 22324443 J Clin Periodontol. | Yip JK | 2012 | Association between oral bisphosphonate use and dental implant failure among middle-aged women. | | + | Dental implant 1.1 |

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|----|--|----------------------------------|------|--|---|--------------------------------------|--------------------|
| 46 | 24535075 Clin Oral Investig. | Walter_C | 2014 | Analysis of reasons for osteonecrosis of the jaws. | | + | Dental implant 1.1 |
| 47 | 21798645 J Oral Maxillofac Surg | López-Jornet P | 2011 | Perioperative antibiotic regimen in rats treated with pamidronate plus dexamethasone and subjected to dental extraction: a study of the changes in the jaws. | | + | Antibiotics |
| 48 | 19021059 Leuk Lymphoma | Montefusco V | 2008 | Antibiotic prophylaxis before dental procedures may reduce the incidence of osteonecrosis of the jaw in patients with multiple myeloma treated with bisphosphonates | | + | Antibiotics |
| 49 | 22843941 Anticancer Res | Kyrgidis A | 2012 | Quality of life in breast cancer patients with bisphosphonate-related osteonecrosis of the jaws and patients with head and neck cancer: a comparative study using the EORTC QLQ-C30 and QLQ-HN35 questionnaires. | | + | Lebensqualität |
| 50 | 25639776 | Boquete-Castro A | 2015 | Denosumab and osteonecrosis of the jaw. A systematic analysis of events reported in clinical trials. | Clin Oral Implants Res. | Systematisches Review / Meta Analyse | + |