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01

Frakturen im Alter – was der Gynäkologe dazu beitragen kann

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In Österreich erleiden pro Jahr ca. 14.000 Menschen eine Fraktur des proximalen Oberschenkels, damit liegt unser Land in der weltweiten Inzidenz ganz vorne. Die Kosten für erforderliche Therapien und Remobilisierung werden auf mehr als 700 Mio. € geschätzt. Sturzbedingte Hüftfrakturen bei älteren Menschen gehören zur wichtigsten Ursache für den Verlust von Selbstständigkeit und bedingen dadurch Pflegebedürftigkeit, durch starke Einschränkung der Beweglichkeit stellt dies oftmals einen Grund zur Einweisung in ein Pflege- oder Altenheim dar. Aus rein gynäkologischer Sicht fallen 2 völlig verschiedene kausale Faktoren auf, die im Gesamtaspekt einen wesentlichen Beitrag in diesem Zusammenhang darstellen.
Einerseits bei zunehmender Lebenserwartung der Bevölkerung die häufig im Alter vorhandenen Probleme und Auswirkungen einer Blasenschwäche. Denn eine Harninkontinenz ist die verbreitetste chronische Krankheit unter Frauen, noch deutlich vor Hypertonie, Depression und Diabetes mellitus. Durch eine Nykturie sind ältere Menschen in der Nachtruhe gestört, die mehrfach erforderlichen nächtlichen Toilettengänge bergen ein sehr hohes Sturz- und Verletzungspotential.
Erschwerend negativ beeinflusst wird diese Situation zu allem Überfluss noch durch die zentralnervösen Nebenwirkungen einer anticholinergen medikamentösen Therapie. Letztlich geht es darum, folgenschwere häusliche Stürze mit ev. Frakturen zu verhindern. Diese Aspekte einer sich in höherem Lebensalter negativ auswirkenden Polypharmazie müssen auf jeden Fall in die therapeutischen Überlegungen des Urologen, Gynäkologen, Internisten, Geriaters sowie vor allem in erster Linie auch des betreuenden Hausarztes einfließen. Die eigenen Erfahrungen sowie operativen Ergebnisse untermauern die positiven Effekte auf die Blasenfunktion und Lebensqualität der Frauen, damit nächtliche Toilettengänge massiv reduziert und das Sturzrisiko deutlich gesenkt werden.

Keywords: Oberschenkelfraktur, Beckenbodensenkung, Inkontinenz Nykturie, Polypharmazie

Bei den mit * gekennzeichneten Autoren handelt es sich um die präsentierenden Autoren.

02

Krafttraining kompensiert Veränderungen der Mikroarchitektur bei VeganerInnen

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Kontext: Vegane Ernährung ist ein globaler Trend, die Literatur berichtet jedoch von einer Verringerung der Knochenmineraldichte und ein höheres Frakturrisiko.
Ziele: Primäres Ziel: Untersuchung der trabekulären und kortikalen Mikroarchitektur bei VeganerInnen und Omnivoren.
Sekundär: Analyse der Zusammenhänge zwischen Mikroarchitektur, Ernährungsparametern und körperlicher Aktivität.
Design: Beobachtungsstudie.
Setting: II. Medizinische Abteilung – VINFORCE, Barmherzige Schwestern Krankenhaus (tertiäres Referenzzentrum für gastroenterologische, metabolische und osteologische Erkrankungen).
TeilnehmerInnen: 43 gesunde nicht-adipöse weibliche und männliche Personen mit einer veganen Ernährung über die letzten 5 Jahre; 45 gesunde nicht-adipöse weibliche und männliche Personen mit einer Mischkost über die letzten 5 Jahre.
Diagnostik: Hochauflösende periphere quantitative Computertomographie (HR-pQCT), Serum-Knochenstoffwechselmarker, Ernährungsprotokoll, Sport-Fragebogen.
Ergebnisse: In der veganen Gruppe waren die trabekuläre und kortikale Architektur (Radius BV/TV, Radius Ct.Th, Tibia BV/TV, Tibia Tb.Th, Tibia Ct.Th) verändert, verglichen mit Omnivoren. Nicht-Kraftsport-aktive VeganerInnen hatten verringerte Struktur, verglichen mit nicht-Kraftsport-aktiven Omnivoren. Kraftsport-aktive VeganerInnen und Omnivoren hatten eine ähnliche Mikroarchitektur.
In beiden veganen Subgruppen (Kraftsport-aktive und -inaktive) zeigten sich nur wenige Korrelationen von Nährstoffaufnahme und Mikroarchitektur, ohne konklusive Muster.
Schlussfolgerungen: Die Knochenmikroarchitektur bei VeganerInnen unterschied sich von jener bei Omnivoren, die Unterschiede konnten nicht durch Differenzen bei der Nährstoffaufnahme erklärt werden. Die Unterschiede wurden durch Krafttraining kompensiert. Bei veganem Lebensstil

sollte neben einer sorgfältig geplanten Ernährung regelmäßiges progressives Krafttraining durchgeführt werden.

Keywords: Vegane Ernährung, Knochenmikroarchitektur, Trabekuläre Struktur, Kortikale Mikroarchitektur, Krafttraining

03

Bone microarchitectural parameters in post-menopausal women with prevalent fracture: a high resolution peripheral quantitative computed tomography (HR-pQCT) characterization

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Introduction: High-resolution peripheral quantitative computed tomography (HR-pQCT) provides quantitative three-dimensional parameters of both bone structure and density. Few studies support the evidence, that in regard to fracture prediction, HR-pQCT could be superior to areal BMD. However, widely no consensus exists on its clinical implication.

Methods: We used data of a prospective cohort study of postmenopausal women and men >50 years (PoCOsteo Study). Bone microarchitecture was assessed in female patients ($n = 50$) using HR-pQCT (Scanco Medical AG, XTremeCT, II. Generation; Brüttisellen, Switzerland). Patients were stratified into two arms, depending on whether fracture history was negative (Group 1) or positive (Group 2). Blood samples were drawn in parallel to assess serum routine parameters, bone turnover markers and bone metabolism related hormones. Clinical fractures were ascertained from questionnaires and medical records, whereas vertebral fractures were diagnosed by either conventional radiograph or Dual-X-ray absorptiometry-based vertebral fracture assessment.

Results: Mean age between the group 1 and 2 was comparable ($p = 0.53$). The following HR-pQCT-parameters were significantly lower in Group 2 compared to Group 1: Tt.vBMD (234.1 vs. 292.8, $p < 0.0001$), Ct.Ar (103.2 vs. 124.7, $p < 0.001$), Ct.Th (1.21 vs. 1.50, $p < 0.001$), Tb.N (1.03 vs. 1.21, $p < 0.001$), Tb.vBMD (130.1 vs. 158.0, $p < 0.01$), Tb.Inn.vBMD (78.2 vs. 104.7, $p < 0.01$), BV/TV (0.199 vs. 0.231, $p < 0.01$), Tb.Sp (0.977 vs. 0.825, $p = 0.02$), Ct.vBMD (807.2 vs. 852.5, $p = 0.03$). No significant difference was found in Tb.Meta.vBMD, Tb.Th, Tb.1/N.SD, Ct.Po, Ct.Po.Dm, Tt.Ar, Ct.Ar. Significant differences in bone turnover markers were found only for N-terminal Procollagen 1 (65.0 vs. 30.6 ng/ml, $p < 0.01$) and osteocalcin (24.6 vs. 30.6 ng/ml, $p = 0.05$) (group 1 vs. group 2, respectively), while differences in bone specific alkaline phosphatase (20.1 vs. 30.6 µg/l, $p = 0.06$), crosslaps, tartrate-resistant acid phosphatase and other bone relevant parameters such as parathyroid hormone, thyroid hormone, testosterone and estradiol levels did not reach significance.

Discussion: We found significant differences among the majority of HR-pQCT parameters in women >50 years depending on their fracture history. Tt.vBMD, Ct.Ar, and Ct.Th. appeared to have the strongest association with prior clinical fracture. These results are supportive of the evidence, that HR-pQCT may provide relevant information on bone quality and bone strength by capturing the complex cortical and trabecular microarchitecture. Moreover, the authors favour international standardization of HR-pQCT imaging techniques, procedure of measurement and terminology, to make studies and their results better comparable.

Table 1 Abbreviations

Density	
Tt.vBMD (mg HA/ccm)	Total volumetric Bone Mineral Density
Tb. vBMD (mg HA/ccm)	Trabecular vBMD
Tb.Meta.vBMD (mg HA/ccm)	Meta Trab. vBMD (40 % of trab. Area)
Tb.Inn.vBMD (mg HA/ccm)	Inner Trab. vBMD (60 % of trab. Area)
Ct.vBMD (mg HA/ccm)	Cortical vBMD
Structure	
BV/TV (1)	Trabecular Bone Volume fraction
Tb.N (1/mm)	Trabecular Number
Tb.Th (mm)	Trabecular Thickness
Tb.Sp (mm)	Trabecular Separation
Tb.1/N.SD (mm)	St.Dev. of 1/Tb.N: Inhomogenity of Network
Ct.Th (mm)	Cortical Thickness
Ct.Po (1)	Intra-Cortical Porosity
Ct.Po.Dm (mm)	Cortical Pore Diameter
Geometry	
Tt.Ar (mm^2)	Cross-sectional area
Ct.Pm (mm)	Cortical Endosteal Perimeter
Ct.Ar (mm^2)	Cortical bone area
Tb.Ar (mm^2)	Trabecular bone area
Tb.Meta.Ar (mm^2)	Meta Trabecular bone area
Tb.Inn.Ar (mm^2)	Inner Trabecular bone area

04

Zoledronic Acid Induces Muscle Regeneration After Rotator Cuff Repair in a Rodent Chronic Defect Model

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Background: Zoledronic acid improves bone microarchitecture and biomechanical properties after rodent chronic rotator cuff repair. Besides the positive effects of zoledronic acid on bone microarchitecture, bisphosphonates have positive effects on skeletal muscle function.

Methods: Thirty-four male Sprague-Dawley rats underwent unilateral supraspinatus tenotomy (timepoint 1) with transosseous rotator cuff repair after three weeks (timepoint 2). Eight weeks later, all rats were sacrificed (timepoint 3). The control group obtained 1 ml subcutaneous saline solution, the intervention group was treated with a single subcutaneous dose of 100 µg/kg bodyweight zoledronic acid. All 34 study animals underwent serum micro ribonucleic acid analysis at all three timepoints. Furthermore, histological analyses were conducted.

Results: In the control group, a significant down-regulation was observed for circulating muscle-specific miR-1-3p ($p = 0.004$), miR-133a-3p ($p < 0.001$), and miR-133b ($p < 0.001$). Histological analyses showed

significantly higher rates of regenerating myofibers on the operated side of both study groups compared to the nonoperated side ($p = 0.002$). On the nonoperated side, significantly higher rates of regenerating myofibers were observed in the intervention group compared to the control group ($p = 0.031$). Muscle cross-sectional area revealed significantly smaller myofibers on both sides within the intervention group compared to both sides of the control group ($p < 0.001$).

Conclusions: This study first describes muscle regeneration after rotator cuff repair in chronic rotator cuff lesions. Muscle-specific micro ribonucleic acids showed improved expressions after treatment with zoledronic acid and might be used as biomarkers for muscle regeneration after rotator cuff repair.

Keywords: chronic rotator cuff tears; rotator cuff repair; zoledronic acid; muscle-bone crosstalk; micro ribonucleic acid.

05

Automated detection of vertebral fractures in routine CT scans of the chest and abdomen: external validation of a deep learning algorithm

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Background: Identification and reporting of vertebral fractures in routine CT scans remains an area in need for improvement.

Methods: We utilized 2000 chest/abdomen CT scans in men and women ≥50 years in an observational cohort study. The CT scans were reevaluated to identify prevalent vertebral fractures in a process blinded to clinical information.

The performance of the algorithm in identifying moderate or severe vertebral fractures (grade 2–3) was evaluated by % agreement, sensitivity, specificity, positive and negative predictive value, Cohen's kappa and area under the curve.

Results: Few scans were not available for the evaluation ($n = 57$) and were excluded. Of the remaining 1943 scans 15.3 % had ≥1 vertebral fracture (grade 2–3), while 663 out of 25,102 vertebrae (2.6 %) were fractured (grade 2–3). The subject-level performance showed a 89 % agreement (95 % CI, 88–90 %), 91 % sensitivity (95 % CI, 87–94 %), 89 % specificity (95 % CI, 87–90 %), 59 % PPV (95 % CI, 55–64 %), 98 % NPV (95 % CI, 97–99 %), kappa of 0.66 (95 % CI, 0.62–0.70) and AUC of 0.90 (95 % CI, 0.88–0.91). The vertebra-level performance showed a 98 % agreement (95 % CI, 97–98 %), 72 % sensitivity (95 % CI, 68–75 %), 98 % specificity (95 % CI, 98–99 %), 54 % PPV (95 % CI, 51–57 %), 99 % NPV (95 % CI, 99–99 %), kappa of 0.61 (95 % CI, 0.57–0.63) and AUC of 0.85 (95 % CI, 0.83–0.87).

Conclusions: The algorithm demonstrated excellent performance in the identification of vertebral fractures in chest and abdomen CT scans in patients ≥50 years. Application of such algorithm may help bridge the known reporting gap of vertebral fractures on CT scans.

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Keywords: Osteoporosis; Artificial Intelligence; Computed Tomography; Fracture risk assessment; Screening

06

Comparison of magnesium implant behavior in osteoporotic, old and juvenile rats

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Magnesium (Mg)-based alloys show beneficial properties and render a second removal surgery unnecessary. Therefore, the related risk for implant-induced fractures is limited. On the other hand, aging is associated with low bone-turnover and decreased bone mass and density, and thus increased fracture risk. Since osteoporosis is accompanied by Mg deficiency, we investigated osseointegration and implant degradation of a Mg-Zn-Ca (ZX00) alloy in ovariectomy-induced osteoporotic (Osteo), old healthy (OH), and juvenile healthy (JH) female Sprague Dawley rats via *in vivo* micro-computed tomography (µCT). Therefore, we transcortically implantated cylindrical ZX00 pins (1.6 × 8 mm) into the proximal metaphysis of the tibiae in all groups ($n = 7$ per group). To observe osteoporosis progression, *in vivo* µCT scans were performed 4, 8 and 12 weeks after ovariectomy, and 2, 6, 12 and 24 weeks after ZX00 implantation, respectively. Additionally, high-resolution synchrotron radiation-based µCT (SRµCT) and qualitative histology was performed. Synchrotron radiation-based µCT confirmed lower bone volume fractions in the Osteo group compared to the OH and JH groups. Qualitative histological analysis additionally visualized the enhanced implant degradation in the Osteo group. Hence, ZX00 degrades differently in juvenile and osteoporotic rats. In summary, differences in bone metabolism as wells as changes in pH might influence the degradation behavior, which will need further elucidation.

To date, ZX00 provides an interesting implant material for young and older healthy patients, but it may not be of advantage in pharmacologically untreated osteoporotic conditions.

Keywords: osteoporosis, magnesium-based implants, bioresorbable, osseointegration

07

How many anti-osteoporotic drugs prescriptions were not dispensed due to first COVID-19 lockdown in Austria?

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Background: The aim of the study was to assess alterations in dispensing anti-osteoporotic drugs during the COVID-19 pandemic.

Patients/Methods: The study was a nationwide retrospective register-based observational study. We analysed pseudonymised individual-level patients' data for all patients in Austria ≥50 years of age who were prescribed anti-osteoporotic drugs between January 1, 2016, and November 31, 2020. We

used interrupted time series analysis with autoregressive integrated moving average models (ARIMA) to predict drug dispensing.
Results: Forecasting models showed that the total number of prescriptions dispensed to patients treated with anti-osteoporotic medications declined rapidly in March 2020 and April 2020 with a subsequent compensation in the following months. The largest drops in absolute terms were observed for ibandronate, followed by alendronate, denosumab, zolendronic acid and risedronate. For ibandronate, the lockdown in March 2020 was associated with a decrease of 2950 dispensings, but with a further increase of 236 dispensings every other month. For denosumab, there was a decrease of 778 dispensings, with a further increase of 14 dispensings every month. For zolendronic acid, there was a decrease of 178 dispensings, with a further increase of 23 dispensings every month. For risedronate, there was a decrease of 144 dispensings, with a further decrease of 23 dispensings every month.
Conclusions: The total number of prescriptions dispensed to patients treated with anti-osteoporotic medications declined rapidly during first COVID-19 lockdown. Considering the massive treatment gap for osteoporosis, and the related fracture risk, clinicians should continue treatment, even during a pandemic.
Keywords: COVID-19, anti-osteoporotic therapy, osteoporosis, autoregressive integrated moving average models, dispensing

08
Typical Findings in Bone Biopsies in „Male Idiopathic Osteoporosis"

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Background: Male idiopathic osteoporosis (MIO) is a chronic condition leading to low-traumatic fractures and requires transiliac bone biopsy for further clarification. In the present study we evaluated transiliac bone biopsy specimens retrospectively to identify the most common reasons for MIO.
Methods: Bone biopsy specimens of 30 male adults aged 44.6 ± 13 (mean±-SD) were analyzed histomorphometrically by microscopy and quantitative backscattered electron imaging and were compared to a reference database. Furthermore, demographic data, laboratory results including bone turnover markers, bone mineral density (BMD) and trabecular bone score by DXA were assessed.
Results: BMD measurements at lumbar spine and total hip revealed osteoporotic (46.4 %;44.4 %), osteopenic (39.3 %;40.7 %) and normal (14.3 %;14.8) values (mean −2.3 ± 1.8; −2.0 ± 1.4), respectively. TBS was 1.3 ± 0.1.
Laboratory results including bone turnover markers and testosterone were generally in normal range.
The static histomorphometry parameters were decreased in MIO patients: bone volume (46.6 %), trabecular number (23.3 %) and trabecular thickness (46.7 %) compared to reference values (Z-score<−1 SD).
Dynamic histomorphometry parameters were available in 8 subjects. An increase in osteoid volume and mineralizing surface was found in 28.6 % of patients (Z-score>1 SD). Mineralizing surface was decreased in 42.9 % (Z-score<−2 SD). Bone formation rate was elevated (28.6 %, Z-score>1 SD), decreased (28.6 %, Z-score<−1 SD) or normal (42.9 %, Z-score 0 ± 1 SD). An increase in osteoid surface (Z-score>2 SD) or decrease (Z-score<−2 SD) in osteoblast surface was found in 50 % of subjects.
Conclusion: MIO is a heterogenous group of bone diseases. The most common biopsy findings were low-turnover osteoporosis/osteopenia (40 %), defects in bone microstructure (37 %) and defects in mineralization/osteomalacia (40 %). Bone biopsies are mandatory to differ the various causes of MIO and to initiate specific treatment.
Keywords: Male Idiopathic Osteoporosis, Bone Biopsy, Histomorphometry, Osteomalacia, Fragility Fracture

09
Teriparatide accelerates fracture repair in humans: Preliminary Results of the TERAFRAP Study

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Background: The beneficial effect of teriparatide (TPTD) on fracture healing in osteoporotic fractures has been previously reported, but no detailed analysis of 3-dimensional (3D) structural effects of non-surgical intervened humerus fractures has been performed.
Patients/Methods: In this prospective, randomized, double-blind, placebo-controlled study patients with 2-segmental humerus fracture received 20 µg TPTD or placebo for 12 weeks (W12). Patients aged 60–90 years (y) were randomized within 8 days after fracture. All patients received calcium and vitamin D. Multidetector CT scans of fracture were performed at baseline and W12.The primary study endpoint was the assessment of 3D structural properties of fracture repair at W12. 129 radiomic features and their differences between treatment time points were computed for a spherical region (20 mm radius), whose center was defined by manual annotations of the fracture locations. A Random Forest (RF) was trained to extract 5 most important features (IF) to distinguish between baseline and W12. Features were then used to train a TPTD/placebo RF classifier.:
Results: 40 patients (74.5 ± 9.7y, 72.5 % females) completed the study at W12 (TPTD $N = 17$, placebo $N = 23$). 25(OH)-Vitamin D level increased from baseline to W12 (30.1 ± 15.8 vs.36.2 ± 9.1 ng/ml). Bone turnover markers were comparable at baseline (CTX $p = 0.876$, P1NP $p = 0.859$) and increased significantly in TPTD group compared to placebo (CTX $p = 0.004$, P1NP $p = 0.005$). Classification of the two patient groups was demonstrated (f-score = 0.77, recall = 0.83, precision = 0.7143) by a RF for differential radiomic IF.
Conclusions: Differential radiomic features resulted in increased performance of patient group classification in contrast to pure radiomic features, which indicates accessible 3D structural differences between TPTD and placebo at W12, supported by significant changes of bone turnover markers in TPTD treated patients.
Keywords: Teriparatide, osteoporotic fracture, fracture healing, radiomic features, machine learning.

10

Antagomir-146a and its effects on bone structure and biomarkers in a postmenopausal animal model

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Please note that this is an ongoing project that currently does not have any results. Our aim is to present this interesting topic to a broader audience and get valuable feedback to directly incorporate into our scientific efforts.

Background: Osteoporosis is the most prevalent bone disease worldwide, resulting in more than 3.5 million osteoporotic fractures per year in Europe. It is mainly characterized by bone loss in aging humans. Significant progress has been made in recent years regarding therapeutic options, but fracture risk could only be reduced by about 50 %. An interesting new approach lies in gene therapy. Recent experimental studies have shown that microRNA-146a supports bone loss by inhibition of osteoanabolic genes. MicroRNA-146a-deficient knockout mice did not sustain bone loss after induction of menopause. Our study investigates a potential therapeutic substance that can suppress microRNA-146a in vivo, named antagomir-146a.

Methods: After proving the efficacy of the substance in cell culture, it will be applied in an osteoporotic mouse model. 8–12-week-old female mice will either undergo ovariectomy, inducing a postmenopausal hormonal state, or sham surgery. They will then receive either the active substance or a control agent two times per week. Bone structure and bone turnover markers as well as mRNA und microRNA levels will be assessed in vivo by micro-CT scans and blood drawings and statistically compared to the control groups.

Results: According to previous experimental studies, we expect to see less or no bone loss and corresponding biomarkers in the treatment group compared to control.

Conclusions: Antagomir-146a is another promising addition to the relatively new research field of microRNA-therapeutics. This study will hopefully translate the previous experimental knowledge into a functioning therapeutical animal model and thus incite broader interest in the subject.

Keywords: osteoporosis, gene therapy, microRNA, animal model, microCT

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Chronic kidney disease in hypoparathyroidism: Single center retrospective observational study

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Background: Hypoparathyroidism (HPT) is a rare endocrine disorder caused by an inadequate production or secretion of parathyroid hormone (PTH). Long-term complications of HPT include renal function decline and chronic kidney disease (CKD).

Methods: We identified 177 patients with chronic HPT in Styria and analysed their data from 2011–2022 using MEDOCS.

Results: The cohort consisted of 126 women (71 %) and 51 men (29 %). The average eGFR of the cohort at the last point of evaluation was 64 ml/min/1.7 m^2. eGFR data was available for 145 patients, of which 61 patients (42 %) had CKD grade 3 (30 to 59 ml/min/1.7 m^2) or worse. Patients with CKD grade 3 or worse had hypercalcemic episodes more often (0.25 vs. 0.66; $p = 0.009$) and had more hospital stays (2 vs. 3; $p = 0.032$). These patients had a higher chance to develop anemia (OR 4.4; 95 %CI [1.9–10.3] $p < 0.001$) and higher rates of cardiovascular diseases (OR 3.2; 95 %CI [1.5–6.5] $p = 0.002$). The average eGFR loss per year was 1.5 ml/min/1.7 m^2 and correlated positively with the daily dose of active vitamin D ($p < 0.001$).

Conclusions: 25 % of our patients were diagnosed with CKD grade 3 or worse, while 42 % of patients had an eGFR below 60 ml/min/1.7 m^2, implicating that CKD frequently is underdiagnosed in HPT patients.
The median eGFR lost per year was 1.5 ml/min/1.7 m^2, which is 50 % higher than values found in large population studies. It correlated positively with the amount of calcitriol taken per day, suggesting that a higher calcitriol dose negatively affects renal health. CKD patients also had anemia and cardiovascular diseases more often, altogether resulting in more hospital stays. Prevention of these complications will be an important field of future research.

Keywords: hypoparathyroidism, chronic kidney disease, calcium, comorbidities

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Fractures in hypoparathyroidism: Single center retrospective observational study

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Background: Hypoparathyroidism (HPT) is a rare endocrine disorder characterized by hypocalcemia due to inadequately low levels of parathormone (PTH). PTH is also a key regulator in bone metabolism, and its lack leads to reduced bone turnover. In this study we assessed number and type of fractures in chronic HPT patients.

Methods: Retrospective observational study at the Medical University Hospital Graz evaluating data from 2004–2022.

Results: Our cohort included 184 patients (70 % female, 30 % male). 156 patients (85 %) had postsurgical HPT and 28 patients (15 %) had nonsurgical HPT. The mean age of nonsurgical and postsurgical patients was 45 and 65 years, respectively. 27 patients (15 %) had a total of 50 fractures in the observed timeframe. 17 (34 %) were vertebral fractures, 14 (28 %) were lower extremity fractures including 5 (10 %) femoral neck fractures, 6 (12 %) were upper extremity fractures including 3 (6 %) hand fractures and 5 (10 %) were head fractures. 8 (30 %) out of 27 nonsurgical patients had fractures, compared to only 19 (13 %) out of 156 postsurgical patients (OR 2–95; 95 %CI [1.1–7.7] $p = 0.022$). Especially leg fractures including femoral neck fractures occurred significantly more often in patients with nonsurgical HPT (25 % vs. 3 %; $p = 0.013$).

Conclusions: Despite being on average 20 years younger, patients with nonsurgical HPT had significantly more fractures than patients with postsurgical HPT. BMD measurements do not seem to be a reliable indicator of fracture risk in these patients, as fractures can occur at normal or high BMD. Possible explanations could be the earlier onset of disease or changes to bone microarchitecture. However, further research is necessary to fully understand the underlying pathomechanisms.

Keywords: hypoparathyroidism, calcium, fractures