BONE DENSITOMETER 2017

SUMMARY

- Trends of the market

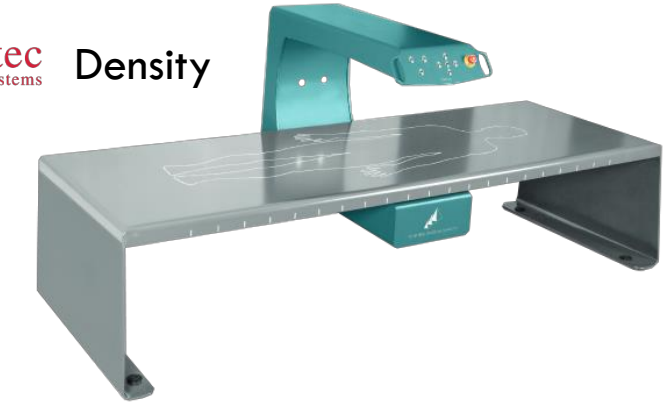
- Our Products situation
  - 3D DXA : situation
  - Visceral Fat
  - Les grands développements de 2017

NEW EQUIPMENTS

Aria

HOLOGIC Horizon

eurotec medical systems Density



Swissray Elite

OsteoSys Excellus

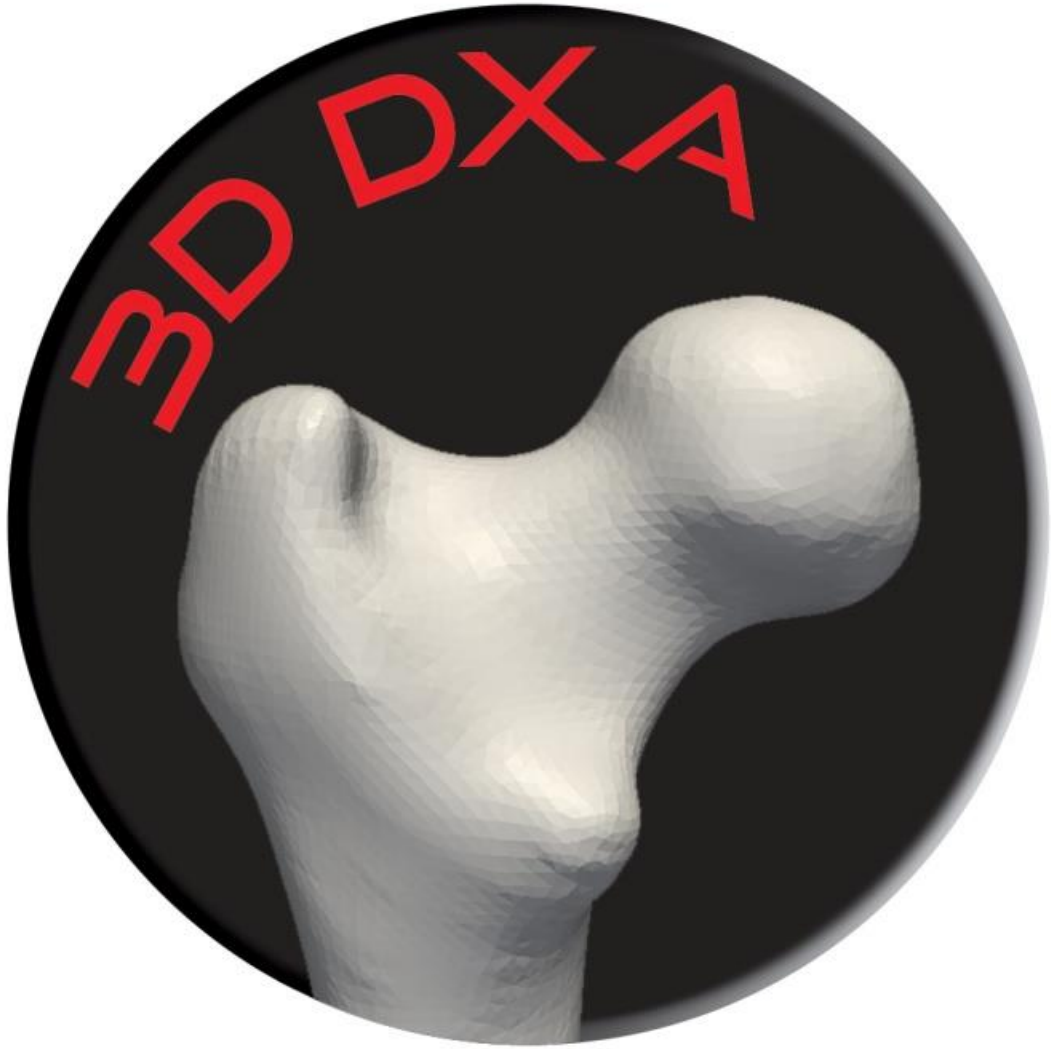
3D-DXA

- New Studies (made by the Australian Distributor)

- First semester of 2017:

Automatic calculation

Follow up patient



Volumetric Bone Mineral Content changes assessed by 3D-DXA after two years of Alendronate Treatment

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INTRODUCTION

Hip fractures are the most serious of all fragility fractures, leading to increased mortality in older people of both sexes. Hip fractures result from a structural failure due to forces exceeding the bone load-bearing capacity. Upper femur structural failures depends on bone geometry and spatial distribution of bone mass. There is a growing consensus that studying the determinants of specific hip fracture types in three dimensions will improve our understanding of fracture mechanics in order to prevent it.

The current clinical standard for fracture prediction is dual energy X-ray absorptiometry (DXA) of the femoral neck. However standard D dimensional bone "density", as a projection of the mineral cont trabecular bone. Three-dimensional (3D) imaging methods car and trabecular compartments separately, and differentiate bet play different roles in fragility fracture.

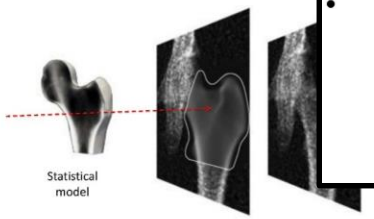
PURPOSE

Measuring the bone mineral changes in trabecular and corti proximal femur region after 24 months treatment with alendro with other anti-osteoporotic therapies.

METHODS

3D-DXA technology

The 3D-DXA technology has been developed in collaboratio Medical, DMS-APELEM, CETIR Grup Mèdic and Universidad P technology provides a 3D reconstruction of the shape and BM femur from a single DXA projection. It relies on a statistical mod BMD distribution obtained from an atlas of quantitative com (QCT) scans. The reconstruction is performed in an inten registration process that maximizes the similarity between a volumetric 3D reconstruction and the 2D-DXA image.



DXA scans

The scans were performed with a commercial densitometer GE iDXA. The acquisition the proximal femur was conducted keeping an inner inclination of the femur of 45 degrees.

3D-DXA

3D-DXA reconstruction was performed from images taken at baseline and 24-month follow-up visit. Bone changes were measured at the proximal femur region (excluding the femoral head). Bone mineral content (BMC) was measured in the cortical and trabecular bone in each 3D-DXA volumetric reconstruction. T-test was used to assess the differences between analyses at baseline and follow-up scans. The computational time to get the whole 3D reconstruction was less than 3min per DXA scan.

Variables

In this study we have selected only a few variables related to the measurement of bone mineral content in the reconstructed bone volumes (expressed in g) and volumetric mineral density (g/cm³) that may be affected due to treatment.

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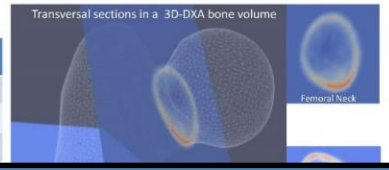
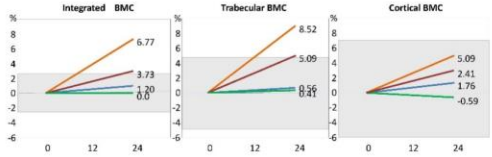
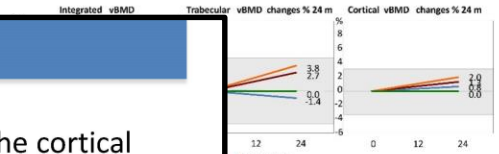
Table 1.

Variable	RMS-CV%	LSC (IC 95%)
Integrated bone BMC	1.1	2.9
Trabecular BMC	1.9	5.1
Cortical BMC	2.6	7





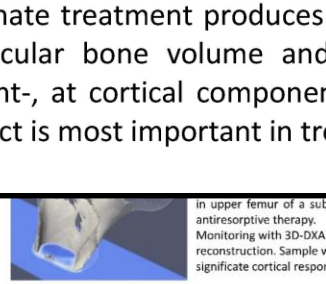


No Treatment
Vit. D
Denosumab
Alendronate

variable is shown as a shaded area in each graph.

CONCLUSION

- A new 3D-DXA technology is now available to study in 3D the cortical and trabecular bone using from routine 2D DXA images.
- Such analyses can be particularly useful in monitoring treatments. 3D-DXA highlights changes of cortical or trabecular BMC and vBMD that are unnoticed with standard measurements of aBMD.
- Alendronate treatment produces significant BMC changes especially in trabecular bone volume and also, but lower magnitude -not significant-, at cortical component of the upper third of the femur. This effect is most important in treatment with Denosumab.



in upper femur of a subject with antiresorptive therapy. Monitoring with 3D-DXA reconstruction. Sample with significate cortical response.

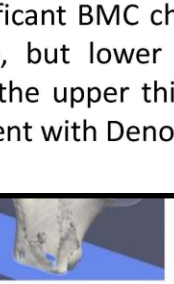


Figure 1.

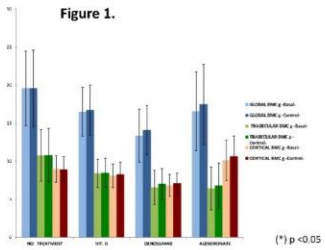
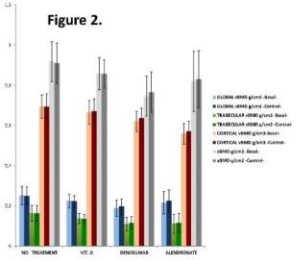
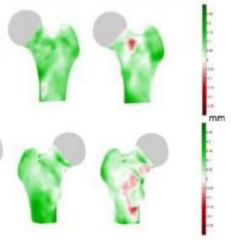


Figure 2.





Figures: Mean average of Delta of change in cortical thickness (mm) in the patients groups evaluated in this study. The green color shows where BMC increased at bone volume and the red color is upper femur zones where warns loss of BMC.

CONCLUSION

- A new 3D-DXA technology is now available to study in 3D the cortical and trabecular bone using from routine 2D DXA images.
- Such analyses can be particularly useful in monitoring treatments. 3D-DXA highlights changes of cortical or trabecular BMC and vBMD that are unnoticed with standard measurements of aBMD.
- Alendronate treatment produces significant BMC changes especially in trabecular bone volume and also, but lower magnitude -not significant-, at cortical component of the upper third of the femur. This effect is most important in treatment with Denosumab.

High intensity exercise improves indices of proximal femur strength in postmenopausal women with low to very low bone mass: Bone geometry and the LIFTMOR trial

Belinda R. Beck[1,2,3], Steven L. Watson[1,2], Lisa J. Weis[3], Amy T. Harding[1,2], Sean A. Horan[1,2], Benjamin K. Weeks[1,2]

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[2] School of Allied Health Sciences, Griffith University, Gold Coast campus, Australia
[3] The Bone Clinic, Brisbane, Australia

Background

The ability of bone to adapt to mechanical stimuli is well-known; however, the BMD response to exercise has traditionally been modest. The latter observation can be attributed in part to inadequate intensity exercise interventions, but is compounded by the inability of areal BMD to detect changes in bone morphology. As even subtle geometric adaptations can markedly increase bone strength, monitoring morphological adaptation to exercise intervention is vital to fully understand clinical efficacy. Recent development of the *3D Hip* software [1] (DMS Group, France) for the MedixDR DXA (Medilink, France) allows monitoring of morphological adaptations of the proximal femur (PF) to exercise. Our recent LIFTMOR trial demonstrated a bone-targeted, heavy progressive resistance training intervention can enhance bone mass at the spine to a greater extent than has previously been reported, however, hip BMD exhibited only a maintenance response. We hypothesised that standard areal BMD was underestimating the true response of the proximal femur to the LIFTMOR intervention and that *3D Hip* analysis could reveal additional important morphological adaptions.

Aim

The aim of the current study therefore was to determine the influence of the LIFTMOR exercise intervention on parameters of femoral neck (FN) geometry in postmenopausal women with low to very low bone mass.

Methods

Design: Randomised controlled trial
Ethics: Griffith University Human Research Ethics Committee approved protocol – AHS0714HREC
Participants: Postmenopausal women, with low to very low bone mass (LS or FN t-score ≤ -1), screened for conditions and medications that influence bone and physical function, were recruited from the community.
Intervention: 8 months, twice-weekly, 30-minute, supervised, high intensity progressive resistance training (EX)
Control: Home-based, low intensity exercise program (CON)
Measures:

- age, weight, height
- femoral neck and total hip 3D analysis[1] (DMS Group, France) of standard DXA scans of the skeletally non-dominant proximal femur (Medix DR, Medilink, France) to derive total, cortical and trabecular volumetric BMD, and cortical thickness (including FN subregions – anterior, posterior, medial and lateral).

Statistical analysis: Intention to treat, between-group comparison of 8-month change using repeated measures ANCOVA, controlling for baseline values. Significance predetermined at ≤ 0.05.

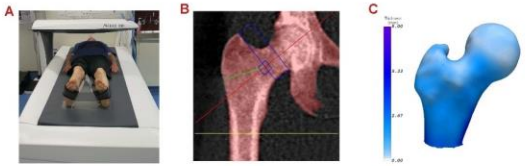


Figure 1. A. Study participant undergoing a proximal femur DXA scan, B. Image of a standard DXA scan of the proximal femur, and C. 3D reconstruction of the proximal femur from the standard DXA scan using the *3D Hip* software

Results

Twenty-eight women (64.2 ± 4.2 yrs, 160.4 ± 6.4 cm, 62.6 ± 9. 1 kg, FN T score: -2.12 ± 0.64) were examined. Despite a lack of difference between groups in vBMD change (Figure 2), EX (n=13) increased FN total cortical, and particularly FN lateral cortical thickness, compared with CON (17.7 ± 20.7% vs 4.1 ± 11.4%, p < 0.006; 29.5 ± 35.7% vs 2.3 ± 28.2%, p < 0.001, respectively) (Figure 2). There were no other between-group differences.

Table 1. Participant characteristics at baseline (n = 28)

Characteristic	EX (n = 13)	CON (n = 15)	P value
Age, yrs	64.2 ± 3.7	64.2 ± 4.7	0.985
Weight, kg	64.9 ± 8.7	60.5 ± 9.4	0.993
Height, cm	160.4 ± 7.1	160.4 ± 6.0	0.207
Femoral neck T score	-2.16 ± 0.70	-2.09 ± 0.61	0.765

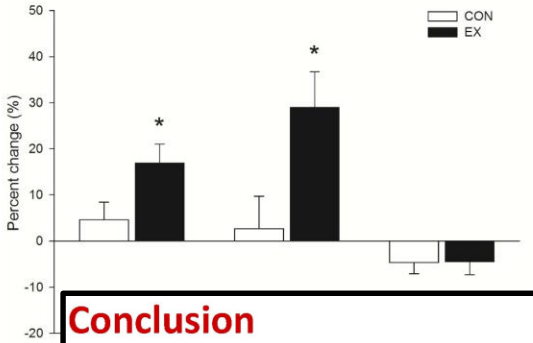


Figure 2. thickness, CON = low EX = super

Conclusi

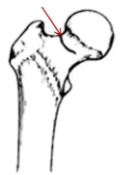
- Postme months femoral
- These p not inc most at
- As mos the nec exercise

Reference

1. Whitmarsh mineral den

Conclusion

- Postmenopausal women with low to very low bone mass engaging in 8 months of brief, targeted, heavy progressive resistance training increased femoral neck cortical thickness in the absence of BMD change.
- These preliminary findings indicate that while bone-targeted exercise may not increase BMD at the hip, a reduction in risk of hip fracture in those most at risk may be achieved by enhancing structural strength.
- As most FN fractures arise at the lateral (a.k.a. superior) border of the neck, our observation of the strongest response to the LIFTMOR exercise protocol in the lateral cortex is highly clinically significant.



S Group

Is vBMD from 3D Hip analysis of a standard proximal femur DXA scan related to aBMD at the hip?

Belinda Beck[1,2,3], Amy Harding[1,2], Benjamin Weeks[1,2], Steven Watson[1,2]

[1] School of Allied Health Sciences, Griffith University, Gold Coast, Australia, [2] Menzies Health Institute Queensland, [3] The Bone Clinic, Brisbane

Background

Traditional DXA estimates of areal BMD (aBMD) are routinely criticised for an inability to represent true volumetric BMD (vBMD), to account for bone size and morphology, or to distinguish cortical from trabecular bone. 3D Hip software (DMS Group, Mauguio, France), developed for the recently-released Stratos DR/Medix DR DXA (Medilink, France), derives proximal femoral vBMD and morphology by constructing a 3D image from a standard DXA hip scan[1] (Fig. 1). The model was developed and validated previously by comparing 30 reconstructed DXA images against a set of 85 QCT scans (Whitmarsh et al., 2010). The purpose of the current study was to determine the nature and strength of the relationship of DXA-derived hip aBMD to DXA-derived 3D hip vBMD in our lab for postmenopausal women with low bone mass.

Methods

Postmenopausal women with low femoral neck (FN) BMD (T-score <-1.0), screened for conditions and medications that influence bone and physical function, were recruited from the community. Right proximal femura were scanned (DXA, Medix DR, Medilink, France) and standard aBMD (g/cm^2) was determined for femoral neck and total hip regions. vBMD (g/cm^3) of the corresponding regions was then derived using the 3D Hip analysis software (DMS Group, France).

Analysis: Correlation analyses between aBMD and vBMD of the femoral neck and total hip, including cortical and trabecular envelopes, were conducted. Absolute differences between aBMD and vBMD of the femoral neck and total hip regions were compared by T-test analysis.

[1]A statistical model is applied to reconstruct the shape and BMD distribution of the proximal femur using an intensity based 3D-2D registration process to identify an instance of the model that maximizes the similarity between its projection and the DXA image (Whitmarsh et al., 2010).

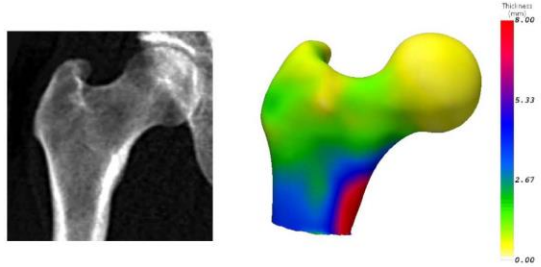


Figure 1. 3D reconstructed proximal femur from 2D DXA scan

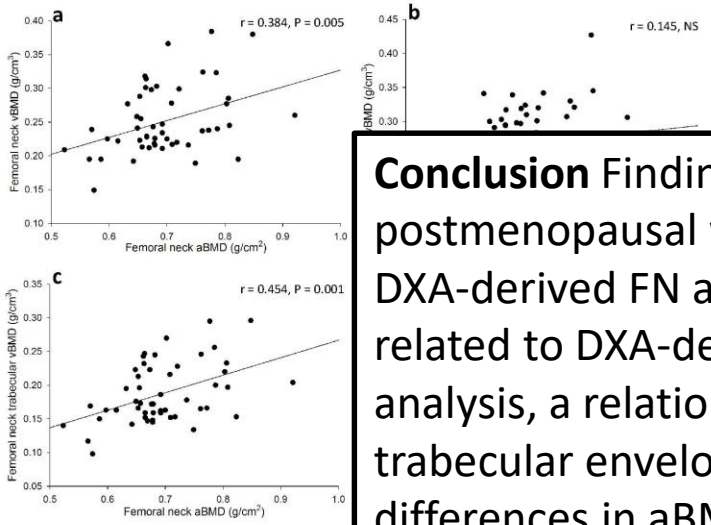


Figure 2. Correlations between DXA-d
FN aBMD and FN cortical v
vBMD, and d) total hip aBMD

Table 1. Participant characteristics (n = 51)

Parameter	
Age (yrs)	64.1 ± 4.3
Weight (kg)	63.6 ± 10.4
Height (cm)	161.6 ± 6.0
LS BMD (g/cm^2)	0.834 ± 0.115
LS T-score	-2.0 ± 0.6
FN BMD (g/cm^2)	0.695 ± 0.076
FN T-score	-1.9 ± 0.6

Results

Fifty-one postmenopausal women with low bone mass met study inclusion criteria. A moderate positive relationship was observed between FN aBMD and FN vBMD (r = 0.384, P = 0.005; Fig. 2a). FN aBMD was also positively related to FN trabecular vBMD (r = 0.454, P = 0.001; Fig. 2c), but not FN cortical vBMD (r

Conclusion Findings indicate that, for postmenopausal women with low bone mass, DXA-derived FN aBMD is moderately positively related to DXA-derived FN vBMD from 3D hip analysis, a relationship largely governed by the trabecular envelope. The marked absolute differences in aBMD in g/cm2 and 3D vBMD in g/cm3 is somewhat intuitive as a function of the statistical model, but likely compounded by subtle differences in ROIs.

Is proximal femur geometry from DXA-derived 3D analysis predictive of pQCT-derived geometry of the tibia?

Harding, Amy T [1, 2], Lambert, Conor [1, 2], Weeks, Benjamin K [1, 2], Nogueira, Rossana C [1, 2], Watson, Steven L [1, 2], Dzera, Sally F [1, 2], Beck, Belinda R [1, 2, 3]

1 Menzies Health Institute Queensland, Griffith University, Gold Coast campus, Australia
2 School of Allied Health Sciences, Griffith University, Gold Coast campus, Australia
3 The Bone Clinic, Brisbane, Australia

Background

While Dual-energy X-ray Absorptiometry (DXA) scans are the accepted osteoporosis diagnostic, their planar nature and inability to discriminate cortical from trabecular compartments are recognised limitations. Peripheral Quantitative Computed Tomography (pQCT) was developed so that bone morphology along with cortical and trabecular bone could be detected, but is limited by protracted scanning times and an inability to examine the most clinically relevant sites. The recent development of software to determine proximal femur geometry from conventional DXA images, in the form of a 3D reconstruction of the proximal femur, addresses those limitations.

Aims

The aim of the current study was to determine whether DXA-derived 3D geometry at the proximal femur is representative of pQCT-derived geometry at the tibia.

Methods

Design: Cross-sectional
Ethics: *All experimental protocols were approved by the Griffith University Human Research Ethics Committee*
Participants: Apparently healthy, able-bodied men and women, screened for conditions and medications that influence bone, were recruited from the community.
Measures:
•Anthropometrics - age, weight, height and BMI
•Standard 2D DXA scans of the skeletally non-dominant proximal femur (Medix DR, Medilink, France)
•Total, trabecular and cortical cross-sectional area and thickness at the 4% and 38% sites of the skeletally non-dominant tibia were determined using pQCT, Stratec XCT-3000, Germany)
•Standard 2D DXA scans were re-analysed using 3D Hip software (DMS Group, France) to derive femoral neck (FN) and total hip (TH) volume and cortical thickness
Statistical analysis: Regression analyses were conducted. Statistical significance was set at $P < 0.05$.

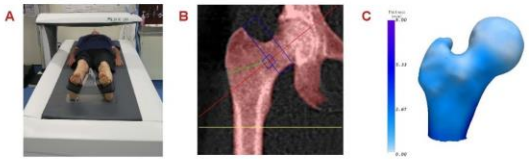


Figure 1. (A) Study participant undergoing a proximal femur DXA scan, (B) image of a standard 2D DXA scan of the proximal femur, and (C) 3D reconstruction of the proximal femur from a DXA scan using the novel software.

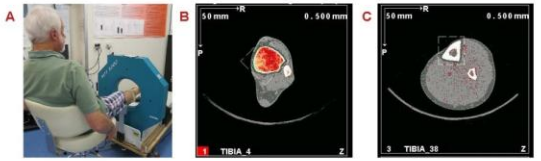


Figure 2. (A) Study participant undergoing a pQCT san of the skeletally non-dominant tibia, (B) scan of the 4% site of the tibia which contains predominantly trabecular bone, and (C) scan of the 38% site of the tibia which contains predominantly cortical bone.

Results

A total of 234 apparently health women and men were eligible for inclusion and underwent testing procedures. Participant characteristics are presented in Table 1. FN and TH total volume strongly predicted variance in total area of the 4% tibia ($R^2 = 0.53$ and $R^2 = 0.57$, $P < 0.001$, respectively). FN cortical and trabecular volume accounted for 44.5% and 49.0% of the variance in tibial 38% cortical and 4% trabecular areas, respectively ($P < 0.001$). TH cortical volume predicted 52.0% of the variance in cortical area at the 38% tibia ($P < 0.001$). Total FN cortical thickness explained 17.9% of the variance in cortical thickness at the 38% tibia ($P < 0.01$).

Table 1. Means and SD of participant characteristics

Characteristic	Women (n = 156)	Men (n = 78)	All (n = 234)
Age, years	54.4 ± 18.3	52.1 ± 20.6	53.6 ± 19.1
Weight, kg	66.5 ± 13.3	81.6 ± 13.8	71.5 ± 15.2
Height, cm	163.2 ± 6.3	176.7 ± 7.4	167.7 ± 9.2
BMI, kg/m²	24.9 ± 4.7	26.1 ± 4.2	25.3 ± 4.5

BMI, body mass index

Discussion and conclusion

Findings indicate proximal femur morphology derived from novel 3D hip analysis of standard 2D DXA scans provides a representative reflection of lower extremity bone geometry, including cortical and trabecular volume and thickness.

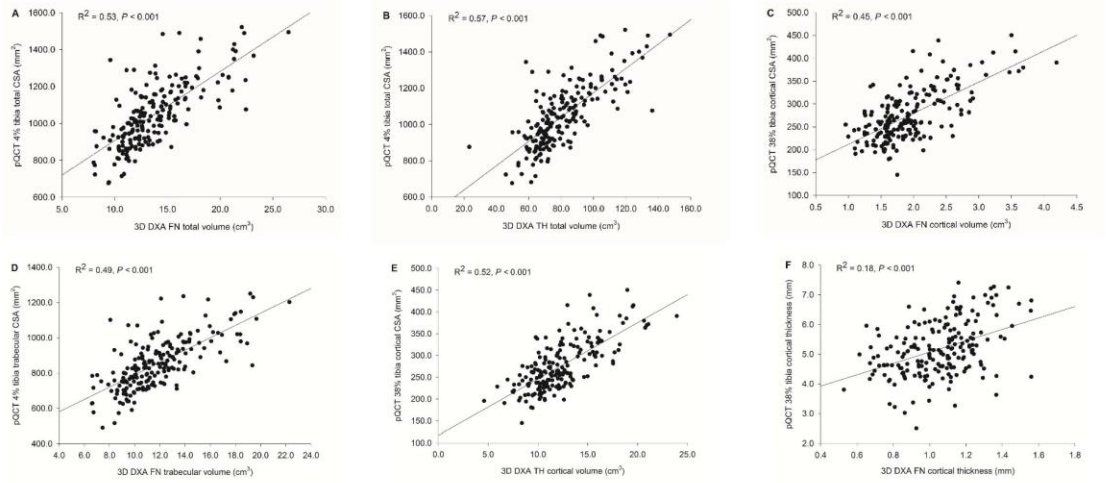


Figure 3. Relationships of DXA-derived 3D hip geometry to pQCT-derived tibial geometry. (A) FN total volume and distal tibia total CSA, (B) TH total volume and distal tibia total CSA, (C) FN cortical volume and diaphyseal cortical CSA, (D) FN trabecular volume and distal tibia trabecular CSA, (E) TH cortical volume and diaphyseal tibia cortical CSA, and (F) FN cortical thickness and tibia cortical thickness (n = 195). CSA, cross-sectional area; DXA, Dual-energy X-ray Absorptiometry; FN, femoral neck; pQCT, peripheral Quantitative Computed Tomography; TH, total hip; 3D, three dimensional.

Discussion and conclusion

Findings indicate proximal femur morphology derived from novel 3D hip analysis of standard 2D DXA scans provides a representative reflection of lower extremity bone geometry, including cortical and trabecular volume and thickness.

DMS Group

Relationship of lifetime bone-specific physical activity to proximal femur geometry from DXA-derived 3D analysis

Lambert, Conor [1, 2], Harding, Amy T [1, 2], Watson, Steven L [1, 2], Dzera, Sally F [1, 2], Nogueira, Rossana C [1, 2], Weeks, Benjamin K [1, 2] and Beck, Belinda R [1, 2, 3]

[1] Menzies Health Institute Queensland, Griffith University, Gold Coast campus, Australia
[2] School of Allied Health Sciences, Griffith University, Gold Coast campus, Australia
[3] The Bone Clinic, Brisbane, Australia

Background

It is well known that bone adapts to chronic mechanical loading, such as physical activity. The bone-specific physical activity questionnaire (BPAQ) was designed to provide an estimate of musculoskeletal loading from current and past physical activity. From standard aBMD the true influence of physical activity on bone is difficult to assess as subtle changes in bone morphology that can markedly influence bone strength cannot be detected. Recently, software was developed to determine 3D parameters of the proximal femur from standard DXA scans; including total volume, as well as cortical and trabecular parameters. While BPAQ scores have been validated for their ability to predict aBMD, their association with DXA-based measures of 3D proximal femur geometry is yet to be determined.

Aims

The aim of the current study was to determine the relationship of current (cBPAQ) and lifetime (tBPAQ) physical activity to morphometric parameters of the proximal femur from novel 3D analysis of standard DXA scans.

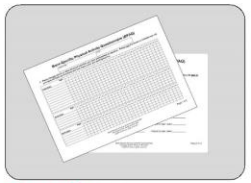


Figure 1. The BPAQ

Methods

Design

Cross-sectional

Ethics

Approved by the Griffith University Human Research Ethics Committee

Participants

Apparently healthy, able-bodied men and women, screened for conditions and medications known to influence bone, were recruited from the local community.

Measures

- Age, weight, height and BMI were recorded.
- Total (lifetime) and current (previous 12 months) physical activity was quantified with the validated BPAQ (Figure 1)
- Standard DXA scans of the skeletally non-dominant proximal femur (Medix DR, Medilink, France)
- Standard DXA scans were re-analysed using 3D Hip software (DMS Group, France) to derive femoral neck (FN) and total hip (TH) volume and cortical thickness (Figure 2)

Statistical analysis

Group tertiles based on BPAQ score were compared using one-way ANOVA. Statistical significance was set at $P < 0.05$.

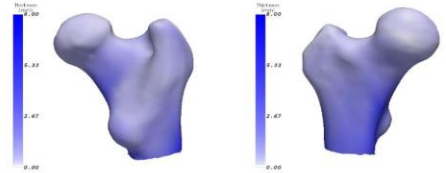


Figure 2. Example of 3D reconstruction of the proximal femur from a standard DXA scan using novel software.

Results

A total of 234 participants were recruited, of whom 33.3% were men (n=78). Participant characteristics are presented in Table 1. FN total volume (14.90 ± 3.85cm³ and XXXX vs. 12.69 ± 2.77cm³ Fig 3A) and total cortical thickness (1.11 ± 0.20mm and XXXX vs. 0.99 ± 0.19mm, p<0.001, Fig 3C) were significantly greater for the highest and middle tertile of tBPAQ compared to the lowest. Total volume was significantly different between all tertiles for TH (88.92 ± 21.60cm³ vs XXXX vs. 74.63 ± 16.55cm³, p<0.001; Fig 3B)

Table 1. Participant characteristics

Characteristics	Mean ± SD	Range
Age (years)	53.6 ± 19.1	17 – 78
Height (cm)	167.7 ± 9.3	145.0 – 192.5
Weight (kg)	71.5 ± 15.2	42.0 – 126.10
BMI (kg/m²)	25.4 ± 4.5	17.1– 40.9
cBPAQ	1.9 ± 2.9	0.0 – 19.1
tBPAQ	26.2 ± 25.6	0.15 – 235.2

For trabecular and cortical compartments participants in the highest tBPAQ tertile exhibited significantly more robust parameters of bone geometry than the lowest BPAQ tertile for trabecular volume at the FN (12.78 ± 3.38cm³ vs. 10.95 ± 2.46cm³) and TH (75.36 ± 18.66cm³ vs. 63.43 ± 14.43cm³, p<0.001), as well as cortical volume at the FN (2.14 ± 0.58cm³ vs. 1.73 ± 0.44cm³) and TH (13.57 ± 3.42cm³ vs. 11.06 ± 2.54cm³, p<0.001). Cortical volume (FN = 2.10 ± 0.62cm³ vs. 1.81 ± 0.49cm³; TH = 13.48 ± 3.35cm³ vs. 11.53 ± 2.95cm³, p<0.002), total volume (TH = 86.44 ± 22.65cm³ vs. 78.81 ± 16.67cm³, p=0.017) and total cortical thickness (FN = 1.09 ± 0.19mm vs. 1.00 ± 0.21mm, p=0.005) were significantly greater in the highest tertile of cBPAQ than the lowest.

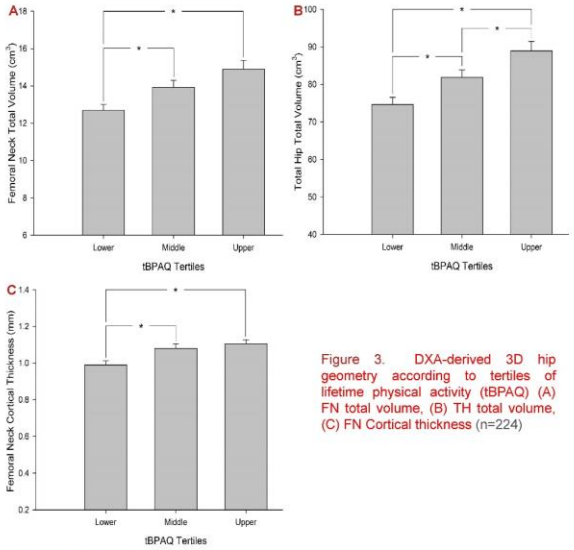


Figure 3. DXA-derived 3D hip geometry according to tertiles of lifetime physical activity (tBPAQ) (A) FN total volume, (B) TH total volume, (C) FN Cortical thickness (n=224)

Conclusion

Novel 3D analysis of DXA scans of the hip, indicate that lifetime and current physical activity is associated with more robust bone geometry at the proximal femur; in particular, bone volume and cortical thickness, an association likely to translate to greater strength and a reduced risk of fracture.

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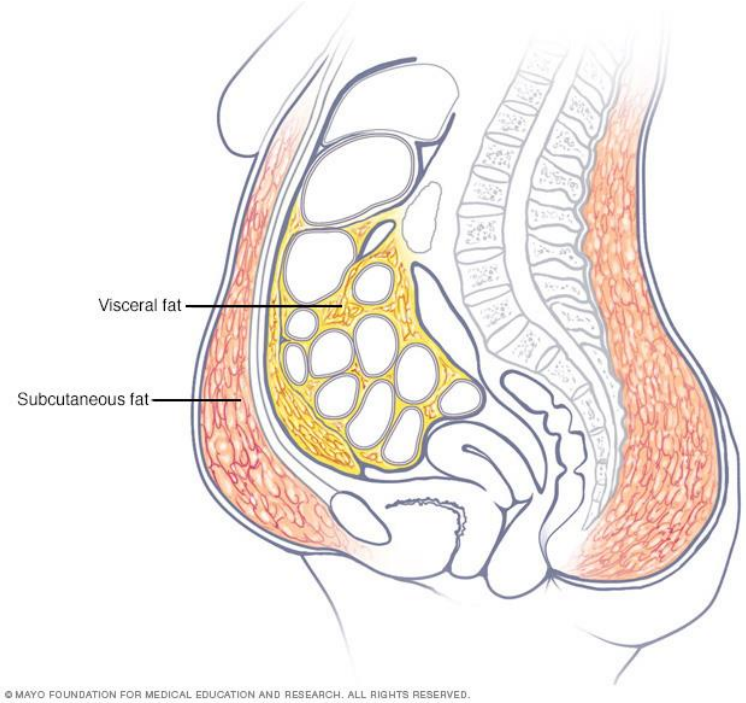
DMS Group

VISCERAL FAT

Abdominal fat is situated between L2 / L3 = visceral Fat + fat under cutaneous



The abdominal visceral fat is a factor(mailman) at risk for: the cardiac diseases, the diabetes, the breast cancer …

Visceral Fat Assessment by DXA and comparison to CT-Scanner

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1. DMS APELEM, Nîmes, France
2. CETIR Grup Mèdic, Barcelona, Spain

INTRODUCTION

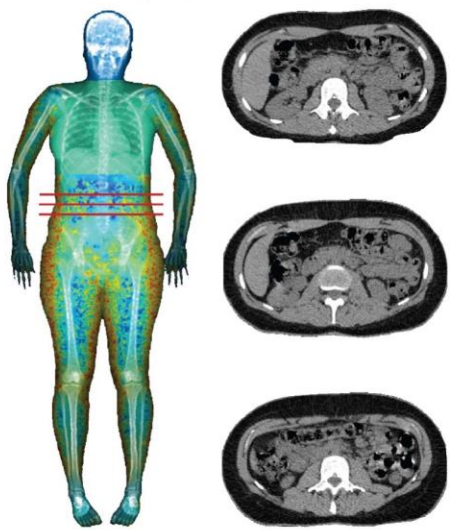
Obesity is one of the most pervasive chronic diseases and a leading cause of morbidity, disability and healthcare costs. Obesity is defined as excess adipose tissue. Body's fat distribution is complex but generally located around hips, thighs, buttocks or android area. In this last region, adipose tissues can be differentiated into subcutaneous fat and visceral fat. Subcutaneous fat is the layer of adipocytes directly located under the skin. Despite its non-aesthetic aspect, subcutaneous fat is safe for health while visceral fat is involved in cardiovascular diseases or in breast cancer in post menopaused women, thus, visceral fat estimation is a key point in their prevention.
The current clinical standard for visceral fat estimation is CT-Scanner, but, due to its high radiation dose, cannot be performed several times a year.
To ensure a better follow-up of the patients using a low radiation method, DXA is a very good alternative to CT-Scanner and gives promising results.

PURPOSE

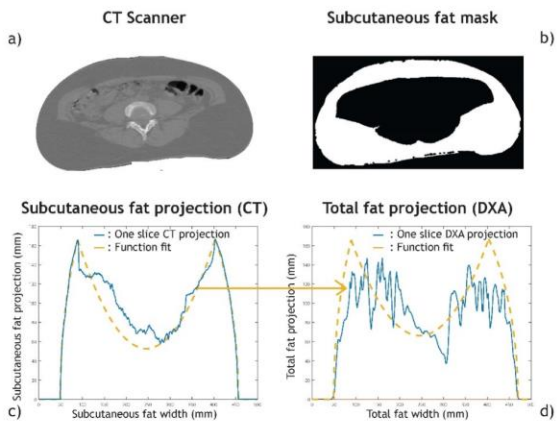
Propose and validate a new method of visceral fat estimation on DXA and compare results to the common standard: CT-Scanner.

METHODS

The algorithm provides an estimation of the shape of the subcutaneous fat using a single whole body examination. To validate this assumption we directly compare this shape to the observed subcutaneous fat shape on CT-Scanners.



DMS DXA CT-Scanner



On the figure above we show one CT scanner slice (a). On this slice, we create a mask corresponding to the subcutaneous fat (b). We project the product of the CT-scanner slice / mask on the horizontal axis, and create a function to fit this curve (resp the 2D shape). Finally we substract this function to the total fat projection (DXA) to estimate visceral fat. The best expression of this function was found using the 96 patients panel described below.
In the DXA software, the shape function is calculated using different key points, we do not need CT scanner to have an expression of this function.

DXA scans
The scans were performed with two commercial bone densitometers: Stratos DR, from Diagnostic Medical System (DMS, Mauguio, France) and GE Lunar iDXA. In both systems, a whole body acquisition was performed in standard mode.

CT scans
Lumbar-Spine CT scanners were perfomed using Gemini (Philips). CT acquisition parameters were 120 kV / 25 mAs.

PATIENTS

Stratos DR / CT-Scanners comparison

A group of 96 patients, 7 men and 88 women from CETIR (Barcelona) were included in this study.
For all these patients a CT and a whole body (DXA) were performed.

BMI: from 16.23 to 35.15 (average=24.44, standard deviation=4.37).

Stratos DR / GE Lunar iDXA comparison

A group of 58 patients, 15 men and 43 women from CETIR (Barcelona) were included in this study.
For all these patients, two DXA whole-body (DXA) were performed (one examination on each bone densitometer).

BMI: from 15.35 to 39.67 (average=25.19, standard deviation=5.27).

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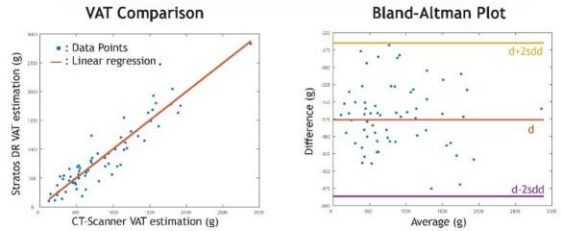
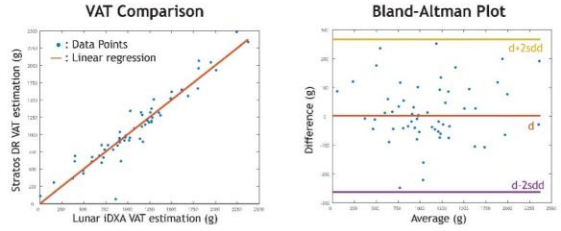
RESULTS



As shown on the figure above, VAT estimation on DXA is in good correlation with CT (R^2=0.86). In the Bland-Altman plot: no significant deviation but an average value different from zero, which can be explained by the difficulty to estimate VAT on the same area on CT and on DXA.

These results involve that our estimation of VAT on Stratos DR, is accurate enough to present Stratos DR as a good alternative to CT thanks to its low irradiating whole body examination.



As shown on the figure above, VAT estimation on Stratos DR is in good correlation with VAT estimation on Lunar iDXA (R^2=0.88). In the Bland-Altman plot: no significant deviation and a zero average value, which means no offset between Stratos DR and Lunar iDXA VAT estimation.

NB: Another study with Hopital Lapeyronie (France) shows a correlation R^2=0.85 between Stratos and Hologic QDR4500A for a 54 patients panel with BMI from 12.17 to 49.95 (average=31.55, standard deviation=10.16).

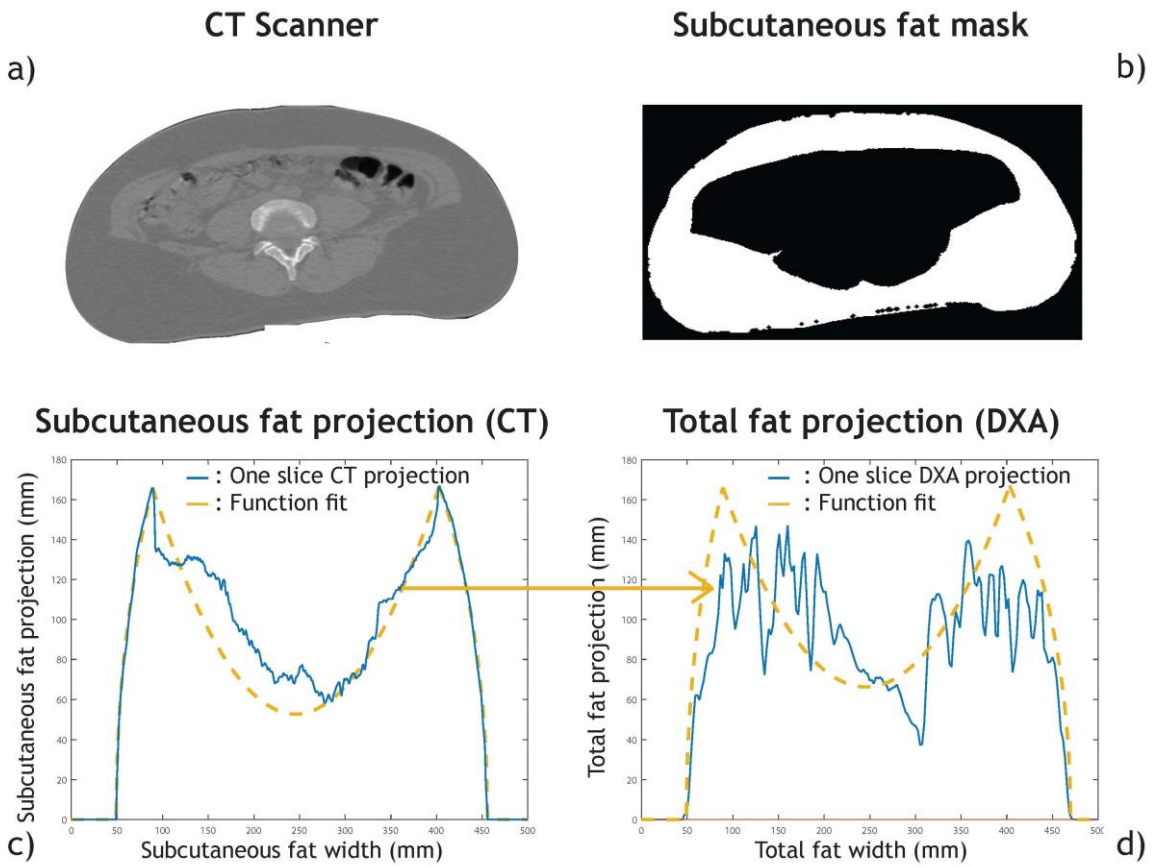
CONCLUSION

DMS developped a new algorithm to assess visceral adipose tissue in the android area.

This algorithm has a good correlation with CT Scanner which is currently the gold standard for VAT estimation.

With its low X-ray exposure, Stratos DR is a good alternative to CT scanner and can be a good alternative to CT allowing patient monitoring in diet or cardiovascular risk.

VISCERAL FAT ASSESMENT



a) On commence avec une coupe CTscan

b) Création d'un masque de la graisse sous-cutanée

c) On projette cette coupe sur l'axe horizontal et l'on créé une fonction qui correspond à cette courbe (correspondant à la forme 2D)

d) On soustrait cette fonction à la graisse totale (DXA) pour estimer la graisse viscérale

CORRÉLATION

StratosDR/CTscanner

- 96 patients
- 86% correlation

StratosDR / Lunar iDXA

- 58 patients
- 88% correlation

Stratos / Hologic QDR4500A

- 54 patients
- 85% correlation

PARAMETERS

Visceral Adipose Tissue Area (cm^2)	26.6
Visceral Adipose Tissue Mass (g)	50.4
Visceral Adipose Tissue Volume (cm^3)	53.1
Subcutaneous Adipose Tissue Area (cm^2)	63.5

cm^2 - VAT and SAT area for a mean abdominal ROI slice

g - VAT weight for the abdominal ROI

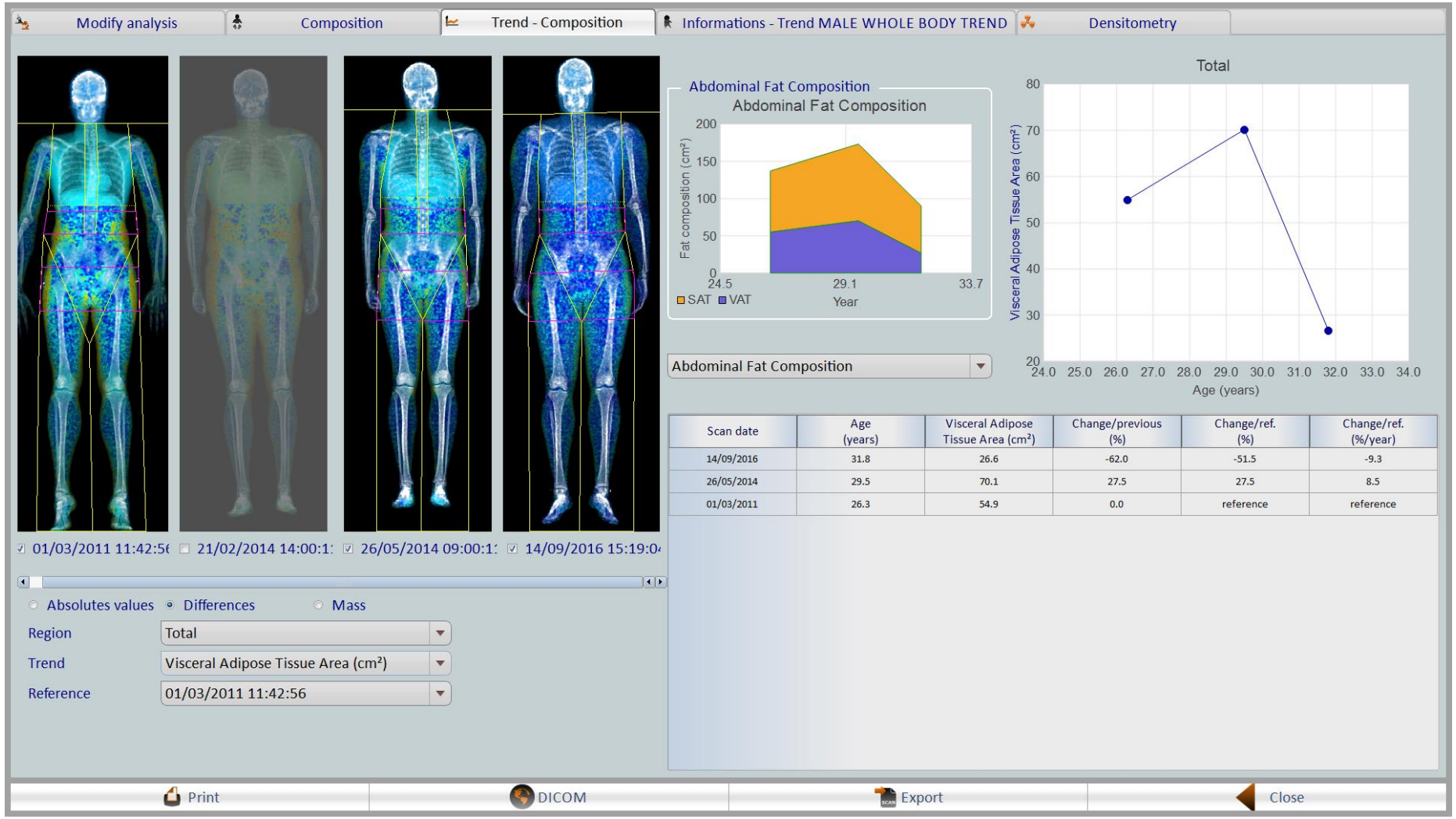
cm^3 - VAT volume for the abdominal ROI

SUBCUTANEOUS ADIPOSE TISSUE AREA

Visceral Adipose Tissue Area (cm^2)	26.6
Visceral Adipose Tissue Mass (g)	50.4
Visceral Adipose Tissue Volume (cm^3)	53.1
Subcutaneous Adipose Tissue Area (cm^2)	63.5

All the 3 first parameters are existing in our competitors datas, BUT the last one (line) the « subcutaneous Adipose Tissue Area » is unique in our range. It will bring youa nd your customer more info about the visceral fat!

PATIENT FOLLOW UP

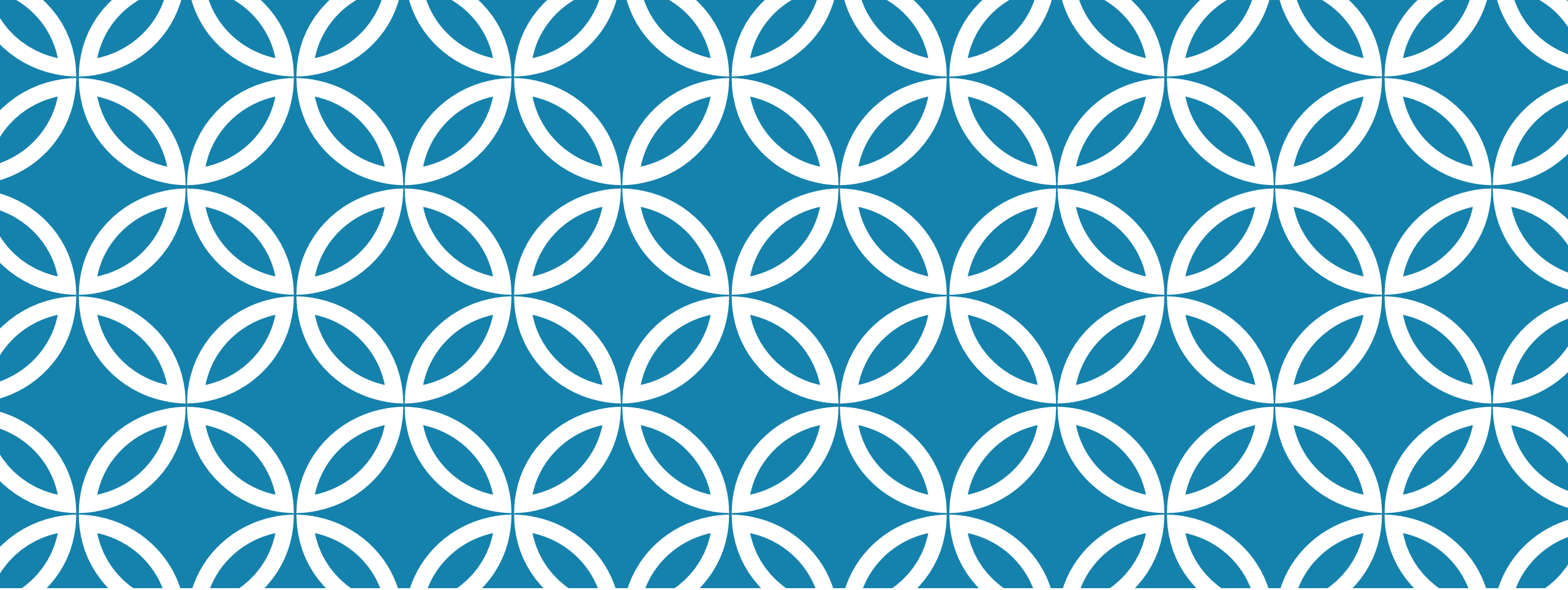


RESEARCH & DEVELOPMENT 2017

The Report of Impression Personalised!

- Patient follow up on the 3D DXA
- Automatic calculation of the 3D!
- Visceral Fat existing!

If you have other idea, please let me know!



HAPPY NEW YEAR AGAIN!