Fondation Cognacq-Jay
HÔPITAL FORCILLES

Study of the association between peripheral muscle function and quality of life in subjects with obesity.

OVALIA

Version n°2 of 17/02/2022

Protocol code number	RCB ID NO.	PPC NUMBER	CNIL or MR number	No. Clinical Trial
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Interventional research involving humans with minimal risk and minimal burden (Type 2 HIPR)

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PROTOCOL VERSION HISTORY

Version	Date	Reason for the change
2	**17/02/2022**	**Requests for changes to the PPC**

RESEARCH SUMMARY

Manager	Forcilles Hospital-Cognacq-Jay Foundation
Person who directs and monitors the research	Andreia GOMES LOPES
Title	Study of the association of peripheral muscle function and quality of life in obese subjects.
Acronym	OVALIA
Protocol version	n°2 of 17/02/2022
Rationale / context	Assessment of health status and physical function is fundamental in patients with obesity, as they play an important role among the various factors influencing quality of life in this population (1). Several studies have shown an association between high BMI values and a significant deterioration in quality of life, especially in women (1). Excess body fat in obese patients seems to be responsible for muscle atrophy. This causal link is probably related to dysfunctions in adipose tissue, leading to a decrease in the expression of proteins responsible for muscle contraction (2). Recent literature highlights an alteration in quality of life, particularly in obese and elderly subjects, for which changes in muscle function are partly responsible. Changes in muscle function can be assessed by simple, rapid and non-invasive tools. They could allow the identification of obese subjects at risk of at risk of muscle atrophy, stratify the risk, and propose the implementation of a prophylactic intervention or an early management.
Main Objective	The main objective of this study is to evaluate the association between structural alteration of the quadriceps and quality of life in obese patients.
Secondary objectives	Secondary objectives are to assess: - The association between quadriceps thickness and quality of life; - The association between grip strength and quality of life; - The association between quadriceps strength of the quadriceps and quality of life;

	- The association between quadriceps strength and ultrasound measurements of the quadriceps.
Research Diagram	Prospective, monocentric, interventional cohort study with minimal risks and constraints falling within the scope of article L.1121-1 of the Public Health Code.
Inclusion criteria	- Obese patient (BMI > 30) consulting a Nutrition Day Hospital (HDJ); - Patient at least 18 years of age at the time of inclusion; - Affiliation with a social security system or beneficiary of such a system ; - Oral, free, informed and express consent of the patient.
Non-inclusion criteria	- Patient refusal to participate in the study; - Known pregnancy; - State of Consciousness Incompatible with Obtaining Consent; - Person subject to a safeguard of justice measure ; - Patient under guardianship or curatorship.
Primary endpoint	The primary endpoint was the association between femoral rectus muscle echogenicity and the SF-36 quality of life score.
Secondary endpoints	The secondary evaluation criteria will be: - The association between ultrasound thickness of the femoral rectus and the SF-36 quality of life score; - The association between grip strength measured by the handgrip and the SF-36 quality of life score; - The association between quadriceps Voluntary Maximum Strength (VMS) on dynamometry and SF-36 quality of life score; - The association between quadriceps FMV with dynamometry and ultrasound measurements of the rectus femoris (thickness, echogenicity, and cross-sectional area).
Intervention	Patients will be clinically assessed for muscle function: FMV and handgrip. A muscle ultrasound and a quality of life score will also be performed in the included patients.
Number of subjects needed	84

Expected number of centers	1
Duration of the research	9 months
Statistical analysis of the data	Statistics will be primarily descriptive and will be based on means (+/- standard deviation) or medians [minimum-maximum] depending on the distribution of quantitative variables. Qualitative variables will be described in terms of numbers and percentages. Univariate comparisons will use the usual statistical tests after verification of the distribution of the variables (Chi2 or Fisher's test, t-test, anova or their non-parametric equivalents Wilcoxon and Kruskal-Wallis tests). Tests will be performed at the 5% significance level. The 95% confidence intervals will be provided for each estimate. Measures of association between categorical variables will be performed using the Chi-square or Fisher test depending on the distribution of the data. Calculations will be done using SPSS v21 IBM and R software (version 3.6.1, www.R-project.org).
Expected benefits	This study will evaluate the association between peripheral muscle function and quality of life impairment in obese patients hospitalized in HDJ Nutrition. These results will confirm the association between muscle status and quality of life in obese patients, which is not yet clear in the scientific literature. If necessary, these results will make it possible to propose non-invasive and inexpensive tools to screen for muscle damage in this patient population. This screening could allow to propose early management programs.
Source of funding	Forcilles Hospital-Cognacq-Jay Foundation
Independent Supervisory Committee planned	No

LIST OF ABBREVIATIONS

AVQ's	Activities of daily living
GMF	Maximum voluntary force
HDJ	Day Hospital
BMI	Body mass index
mCSA	"Muscle Cross-Sectional Area
WHO	World Health Organization

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1 Rationale for the research

1.1 Obesity, a global public health issue

Obesity is a disease characterized by an excessive and abnormal accumulation of body fat, associated with adverse health effects. Obesity has become a global public health problem and is responsible, according to the World Health Organization (WHO), for at least 2.8 million deaths (3) and is recognized as the fifth leading cause of death in the world. The number of obesity cases has almost tripled since 1975.

In France, obesity affects 17% of adults and, among children, 16% of boys and 18% of girls (4). In parallel with the progression of obesity at the global level, the WHO declared in 2014 the risk of the accumulation of diseases, including the coexistence of undernutrition and obesity.

Obesity is a disease of multifactorial origin, linked to nutritional alterations, genetic, psychological, socio-economic factors and more sedentary behaviors (4) (5). The prevalence of obesity continues to increase in all age groups and in all socioeconomic groups. It is a major risk factor for a range of diseases, including type 2 diabetes, cardiovascular disease and certain types of cancer (6). People with obesity also have impaired health-related quality of life and higher mortality compared to healthy people (7). Excess adipose tissue has implications for physical disability, including changes in gait pattern and/or decreased functional capacity (8). These repercussions may be of peripheral muscular origin, with consequences for mobility and independence in activities of daily living (ADL's) (9).

1.2 Functional consequences of obesity

1.2.1 Quality of life

The impact of obesity on quality of life has been assessed by several studies. According to the WHO, quality of life is how individuals perceive their position in life, in the context of the culture and value system in which they live and in relation to their goals, expectations, norms and concerns. It is a broad concept, incorporating in complex ways a person's physical health, psychological state, degree of independence, social relationships, personal beliefs, and relationship with important elements of the environment (10) (11).

The assessment of health status and physical function is fundamental in patients with obesity, as they play a major role among the various factors that will influence their quality of life (1). Several studies have shown an association between high BMI values and a significant deterioration in quality of life, especially in women, mainly related to an increase in pain. In

addition, people with obesity have been identified as being more likely to suffer from depression and/or mood disorders (1).
According to Kim et al. (2020) patients with obesity with or without a metabolic disorder have health alterations including mental problems and decreased quality of life (12). In younger obese subjects we also observe a decrease in quality of life compared to normal weight subjects, where muscle capacity may be a potential factor associated with impaired quality of life (13).

1.2.2 Peripheral muscle damage

Obese individuals have greater muscle mass and higher muscle strength than non-obese individuals. However, this increase in muscle strength is not proportional to the increase in total body mass, so that body weight-adjusted strength is lower in obese individuals than in nonobese adults (14). The increase in muscle mass in obese individuals results from the increased load imposed by body weight, which acts as a chronic stimulus to muscle tissue (15). Contrary to the benefits of resistance exercise, excess body fat does not appear to be a sufficient load stimulus to alleviate the functional consequences of obesity (difficulty walking, cycling, standing from a chair) (16).
In addition, a decrease in the specific force of the muscle is observed in obese subjects, i.e. a decrease in the force related to the sectional area. There is therefore probably a structural alteration of the muscle in the obese patient, which has not yet been well described in the literature (17). The quantity of muscle fibers decreases and is replaced by infiltration of adipose and fibrous tissue. (17). This replacement of skeletal muscle fibers decreases muscle quality and increases density, thus altering its function. The reduction in muscle mass relative to fat mass, results in a relative loss of muscle strength available to support and move body weight (17). In elderly subjects with obesity the amount of fat mass is strongly and negatively correlated with leg extension strength ($r = -0.825$) (18)with a negative impact on physical functioning and quality of life (19).
Moreover, an alteration in muscle contractile proteins coexists or occurs in a second stage in obese subjects, which can lead to muscle atrophy. Indeed, the expression of inflammation factors (IL-6 and IL-1b) by adipocytes leads to a decrease in the expression of genes coding for muscle contraction proteins, including troponin, titin and myosin (20).
The association between lower limb function, including walking ability, and health-related quality of life has been studied in young subjects with obesity, finding that a decrease in this ability correlates with impaired quality of life (13).

1.3 Ultrasound of the peripheral muscle

Muscle ultrasound measurements have become increasingly used as a noninvasive method to determine muscle characteristics (21). Muscle characteristics, particularly muscle size and quality, have been shown to be related to muscle strength and power as well as cardiovascular performance. Ultrasound can also measure muscle echogenicity. The echogenicity of a B-mode (2D) ultrasound image is expressed by a gray scale (22). On an ultrasound image, the muscle bundles are hypoechoic areas, whereas the aponeuroses are hyperechoic. In the case of atrophied muscles, represented by hyperechoic structures, there is a decrease in the ability of ultrasound to penetrate deep into the tissue (23). Thus, the replacement of skeletal muscle fibers by fatty infiltrates decreases muscle quality and increases its density, thus increasing the echogenicity of ultrasound images (17). Muscle thickness is used to estimate the degree of atrophy (24). Ultrasound thickness of the rectus femoris has been shown to be strongly correlated with muscle cross-sectional area (mCSA) (25). More recently, mCSA has been described as strongly correlated with muscle function. Accurate assessment of mCSA may be a tool for predicting strength, muscle power, overall health, and quality of life (21). It would appear that measurement of muscle echogenicity of the rectus femoris would be more valid for assessing muscle quality. According to Wilhelm et al. (2014) there is an inverse relationship between quadriceps echogenicity and functional capacity, suggesting that the accumulation of non-contractile elements within the muscle may be a mechanism related to non-neurological muscle loss (9).

In the obese subject, ultrasound allows for improved analysis of muscle tissue by assessing the amount of muscle tissue versus non-muscle tissue (22).

Loss of muscle strength combined with excessive body weight significantly impairs the ability to perform activities necessary for independence in daily living and proper body function (16). Choi et al (2015) showed that people with obesity, especially older individuals, are at increased risk for falls and functional decline (26). Thus, there is a decrease in exercise tolerance in subjects with obesity, the origin of which is multifactorial. The relative loss of muscle strength leads to greater fatigue during exercise and significantly limits the ability to perform the activities necessary to ensure independence in daily life (16). Peripheral muscle function requires the use of different assessment tools. Muscle capacity assessment tools, such as dynamometry or ultrasound, can be used to evaluate the different aspects of muscle function impacted by obesity (27).

2 Originality of the research

Excess body fat in obese patients appears to be responsible for muscle atrophy. This causal link is probably related to dysfunctions in adipose tissue, leading to a decrease in the expression of proteins responsible for muscle contraction (2). The recent literature highlights an alteration in quality of life, particularly in obese and elderly subjects, for which changes in muscle function would be partly responsible. In the general population of patients with obesity, especially adults and active people, this association has never been described and its mechanisms remain to be confirmed.

Changes in muscle function, and its association with impaired quality of life, can be assessed by simple, rapid and non-invasive tools. This will allow the identification of obese subjects at risk of muscle risk of muscle atrophy, stratify the risk, and implement prophylactic intervention or early management.

3 Research hypothesis

We hypothesize that impaired peripheral muscle function is associated with impaired quality of life in subjects with obesity.

4 Objective

4.1 Main objective

The main objective of this study is to evaluate the association between structural alteration of the quadriceps and quality of life in obese patients.

4.2 Secondary objectives

Secondary objectives are to assess:

- The association between quadriceps thickness and quality of life;
- The association between grip strength and quality of life;
- The association between quadriceps strength and quality of life;
- The association between quadriceps strength and ultrasound measurements of the quadriceps.

5 Judging criteria

5.1 Primary endpoint

The primary end point was the association between femoral rectus muscle echogenicity and the SF-36 quality-of-life score (**Appendix 1**).

5.2 Secondary endpoint

Secondary endpoints will be:

- The association between ultrasound thickness of the femoral rectus and the SF-36 quality of life score;
- The association between grip strength measured by the hand-grip and the SF-36 quality of life score;
- The association between quadriceps Voluntary Maximum Strength (VMS) on dynamometry and SF-36 quality of life score;
- The association between quadriceps FMV at dynamometry and ultrasound measurements of the rectus femoris (thickness, echogenicity, and mCSA).

5.3 Inclusion criteria

Patients with the following criteria will be included:

- Hospitalized in day hospital (HDJ) Nutrition;
- Obese patient (BMI > 30);
- Patient at least 18 years of age at the time of inclusion;
- Affiliation with a social security system or beneficiary of such a system ;
- Oral, free, informed and express consent of the patient.

5.4 Non-inclusion criteria

Patients with the following criteria will not be included:

- Patient refusal to participate in the study;
- Known pregnancy;
- Patient whose state of consciousness is not compatible with obtaining consent;
- Person subject to a safeguard of justice measure ;
- Patient under guardianship or curatorship.

5.5 Recruitment procedures

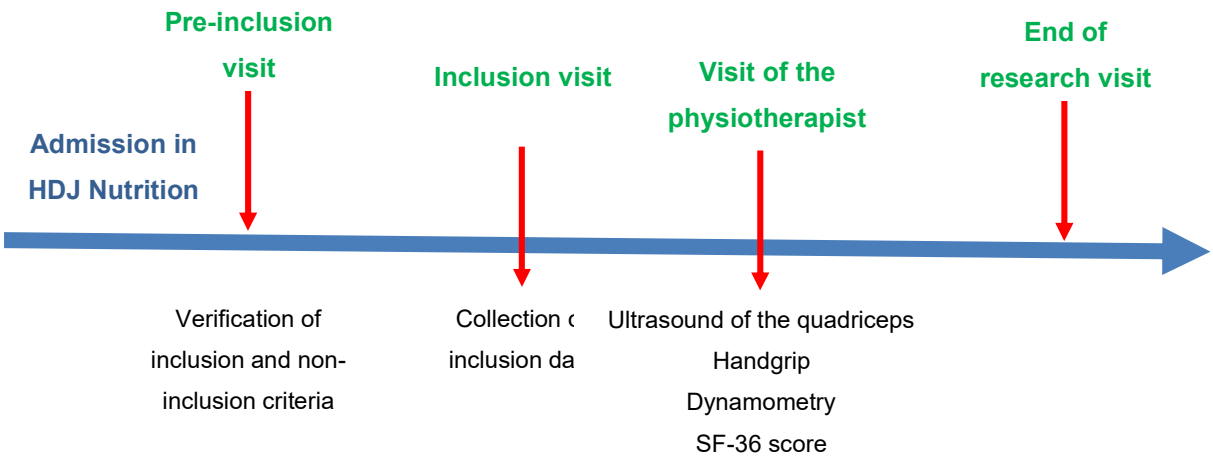
Patients will be recruited prospectively and consecutively in the HDJ Nutrition of the Forcilles Hospital. The physiotherapist or the investigating physician working in HDJ identifies the patients at their admission.

6 Research design

6.1 Type of study

This is a prospective, monocentric, interventional cohort study with minimal risks and constraints falling within the scope of article L.1121-1 of the Public Health Code. The research will be conducted in accordance with the protocol.

6.2 Research diagram



6.3 Provisional research schedule

The duration of recruitment will be 9 months with a follow-up of patients for one day, for a total estimated duration of the study of 9 months:

- Submission to PPC: January 2022
- Start of inclusions: March 2022
- Duration of the inclusion period: 9 months
- Duration of participation of each patient: 1 day
- End of inclusions: January 2023
- Total duration of the research: 9 months
- Communication in congresses: Scientific days of the AFERO, other scientific congresses
- Publication: international journal with review committee.

6.4 Location of the study

The study will take place in the HDJ Nutrition of the Forcilles Hospital.

7 Description of the usual care in HDJ Nutrition

7.1 Description of the usual course of care

A total of 4 patients are admitted every Monday of the week and the last Thursday of the month. Patients are hospitalized for one day. The day begins with the reception of the patient by the nurse and continues with :

- A dietary consultation;
- A psychological consultation;
- Medical consultation;
- A consultation by the physiotherapist;
- A cardiological consultation.

After the various consultations, a summary meeting is held with the doctor, nurse, physiotherapist, psychologist and dietician. This meeting allows us to define the therapeutic strategy that will be proposed to the patient.

At the end of this meeting, the nurse receives the patient in consultation and informs him of the therapeutic proposals. Finally, the patient is received by the doctor in charge who gives him the hospitalization report. All the examinations and consultations are carried out within the usual framework of the HDJ Nutrition and are systematically prescribed by the doctor in charge.

7.2 Standard evaluation procedures

7.2.1 Hand Grip Force

The maximum grip force of both hands will be measured with the portable hydraulic dynamometer JAMAR® (*Sammons Preston Rolyan Nottinghamshire, UK*) (**Appendix 2**). The dynamometer is adapted to each patient: adjustment of the hand allowing the flexion of the metacarpophalangeal joints. The grip force is obtained in kilograms (kg).

The evaluation protocol consists of three maximum voluntary isometric contractions to be held for 5 seconds, with a minimum rest period of 60 seconds. The highest value will be used to determine the maximum grip strength. The patient is placed in a seated position, with the back against the back of the chair and the feet flat on the floor. The arm position is standardized with the shoulder in adduction and neutral rotation, the elbow bent at 90°. The forearm is placed in a neutral position and rests on the support surface. The hand is aligned with the forearm.

Specific verbal instructions and encouragement are given to the patient.

7.2.2 Maximum Voluntary Force (MVF) of the quadriceps

The FMV of the quadriceps will be measured using the MicroFet 2 dynamometer® (**Appendix 3**). The patient is positioned in a seated position with the hip and knee flexed to 90 degrees. The dynamometer is positioned on the anterior surface of the ankle. The patient is asked to extend the knee to the maximum. Three maneuvers will be performed, with 30 seconds of rest

between each. The maximum value of the 3 measurements, which vary by less than 10%, will be retained.

8 Evaluation procedures added by research

8.1 Muscle ultrasound

8.1.1 Operator training

Ultrasound measurements are performed by one of the investigating physical therapists. The physiotherapist is authorized to perform ultrasound subject to training (Avis du Conseil National de l'Ordre des Masseurs-Kinésithérapeutes (2015)). The training of the operator corresponds to the following:

- 3 days of theoretical and practical training;
- Over 100 ultrasounds supervised by an experienced practitioner;

Similarly, all the physiotherapists performing the ultrasound scans are already involved in other research projects using lung, diaphragm and peripheral muscle ultrasound: https://clinicaltrials.gov/ct2/show/NCT02474797, https://clinicaltrials.gov/ct2/show/NCT02881814, https://clinicaltrials.gov/ct2/show/NCT04373811 and https://clinicaltrials.gov/ct2/show/NCT04800783.

8.1.2 Realization of the measurement

A linear probe will be used to measure the thickness, echogenicity and cross-sectional area of the rectus femoris, according to the procedure described in **Appendix 4**. The patient is placed in the supine position (as strict as possible), with the lower limbs in extension and in a neutral rotation position. The probe is placed on the anterior aspect of the thigh, 2/3 of the distance between the anterior superior iliac spine and the upper edge of the patella, in line with the femur.

In the transverse plane, the distance between the upper and lower fascia of the muscle body will be measured, directly on a frozen image. The thickness of the rectus femoris will be measured on the right side at rest, without patient participation. The average of 3 measurements is used to improve the reliability of the measurement.

The cross-sectional area (CSA) will also be measured. Still in the transverse plane, the cross-sectional area of the rectus femoris is measured using the "caliper" function to trace the limits of the rectus femoris and measure its area. On the same frozen image, echogenicity will be measured using the Image J software® using the entire muscle surface.

The pennation angle of the femoral rectus will also be measured in a longitudinal plane.

8.2 Quality of Life Scale

The SF-36 Quality of Life Questionnaire assesses health status independent of causative pathology, gender, age, and treatment. This scale can be administered as a self- or hetero-questionnaire, and requires only 5 to 10 minutes. Its 36 items assess 8 dimensions (**Appendix 1**):

- Limitations due to physical condition;
- Physical pain;
- Perceived health;
- Vitality;
- Life and relationship with others;
- Limitations due to physical condition;
- Mental health.

A sub-score for each component can be calculated, ranging from 0 to 100. The calculation is done according to an established algorithm.

9 Conduct of the research

9.1 Pre-inclusion visit

9.1.1 Verification of inclusion and non-inclusion criteria

At the time of admission of a patient in HDJ obesity, one of the investigators of the study verifies the presence of the inclusion criteria and the absence of the non-inclusion criteria in the computerized file of the patient.

9.1.2 Patient information and consent

When all the criteria allow the inclusion of the patient, the investigator informs the patient of the purpose of the study during the reception with the nurse. The investigator provides the patient with all the information described in the information note (**Appendix 5**) and, if necessary, obtains the patient's free, informed and express oral consent. This consent will be recorded in the patient's computerized medical record.

9.2 Inclusion visit

The inclusion visit takes place during the consultation with the physical therapist. The following data will be collected:

- Age, weight, height, BMI, gender (male/female);
- Adipose tissue distribution profile (visceral or subcutaneous);
- Reason for hospitalization: education, weight loss, assessment;
- History: chronic respiratory disease (COPD, Asthma, pulmonary fibrosis), diabetes, hypertension, stroke, coronary artery disease, heart surgery, heart failure, cancer under treatment, smoking (active, weaned, none), alcohol, liver cirrhosis, immunosuppression (corticosteroids, HIV, chemotherapy, other), renal failure ;
- Cardiovascular risk factors;
- Biological markers (albumin, pre-albumin, CRP, glycated hemoglobin);
- Autonomy Score (ADL Score, **Appendix 6**);
- Depression and anxiety questionnaire (HAD, **Appendix 7**).

9.3 Visit of the physiotherapist

The physical therapist visit takes place after the inclusion visit. The following measurements will be performed:

- Peripheral muscle ultrasound measurements:
    - Femoral rectus thickness;
    - Cross-sectional area of the femoral rectus;
    - Echogenicity;
    - Pennation angle.
- Grip force;
- Quadriceps FMV;
- Quality of Life Questionnaire (SF-36).

9.4 End of research visit

This visit takes place during the end-of-day consultation. It is carried out by the doctor in charge of the unit, who gives the patient the hospitalization report and ensures the transcription of the information in the research observation book.

9.5 Summary table

	Pre-inclusion	Inclusion	Visit of the physiotherapist	End of research visit
Information for the patient or family member	✓			
Collection of basic data (age, sex, BMI, medical history, etc.)		✓		
Collection of the reason for admission		✓		
Collection of information relating to medical care		✓		
GMF and handgrip			✓	
Ultrasound examination			✓	
SF - 36			✓	
Finalization of the CRF				✓

10 Statistical aspects

10.1 Calculation of the study size

Two groups of patients will be identified within our obesity patient population: a group of patients with low quality of life and a group with high quality of life. The median SF-36 quality of life score will be used to differentiate these 2 groups.
The echogenicity of the rectus femoris will be compared between these 2 groups, in order to evaluate the association between the muscular alteration of the rectus femoris by measuring echogenicity and the quality of life.
To our knowledge, no publication has evaluated the echogenicity of the rectus femoris in a population of obese patients. In the literature, an echogenicity of the rectus femoris of 120.9 ± 15.4 was found in a population of elderly patients (25). Given the presence of common pathophysiological mechanisms and similar sonographic characteristics (thickness and mCSA) in muscle damage between the elderly and obese patients, we hypothesize that the echogenicity of the rectus femoris in obese patients is similar to that in the elderly patient group with low quality of life.
In the absence of clinically relevant echogenicity difference data, we pragmatically expect a difference of at least 10 points (based on the alteration in muscle echogenicity of the resuscitation patient in 7 days (28).
Thus, with a risk $\alpha = 0.05$ and a power of 90%, the number of subjects needed, for a two-sided test is 42 patients per group, or 84 in total.

10.2 General aspects

Statistics will be primarily descriptive and will be based on means (+/- standard deviation) or medians [minimum-maximum] depending on the distribution of quantitative variables. Qualitative variables will be described in terms of numbers and percentages. Univariate comparisons will use the usual statistical tests after verification of the distribution of the variables (Chi2 or Fisher's test, t-test, anova or their non-parametric equivalents Wilcoxon and Kruskal-Wallis tests).
The risk of low quality of life in the presence of impaired muscle function will be described by Odd-Ratios.
Tests will be performed at the 5% significance level. The 95% confidence intervals will be provided for each estimate.
Calculations will be done using SPSS v21 IBM and R software (version 3.6.1, www.R-project.org).

11 Expected results in terms of scientific and professional advances

This study will evaluate the association between peripheral muscle function and quality of life impairment in obese patients hospitalized in HDJ Nutrition.
The results of this study will confirm the association of muscle status on quality of life in obese patients, which is not yet clearly established in the scientific literature. If applicable, these results will make it possible to propose non-invasive and inexpensive predictive tools to screen for muscle damage in this patient population. This screening could make it possible to propose early management programs, such as exercise re-training or the introduction of adapted physical activity.

12 Expected benefits and risks for patients

12.1 Minimal risks and constraints added by the research

The risks and constraints for the patient will only be the extra time spent by the patient on the ultrasound and the quality of life assessment questionnaire. Ultrasound is a non-invasive, non-irradiating and totally painless tool.

12.2 Expected benefits for the patient

The use of non-invasive tests of muscle function could allow early identification of obese subjects whose impairment of muscle function could be associated with a poorer quality of life. This could allow us to propose an adapted therapeutic strategy, such as the implementation of an exercise training program, adapted physical activity or therapeutic education.

13 Feasibility

The patients are included in the HDJ Nutrition of the Forcilles Hospital. The whole of care, treatments, examinations and samples being carried out within the framework of their therapeutic and diagnostic management, the conditions relating to the human, material and technical means are ensured. However, if an incident were to occur, the patients would benefit from all the human and technical means of the hospital to guarantee their safety, in

accordance with the rules of hygiene and safety in force and in the respect of the integrity of the patient.
In addition, the medical and paramedical teams involved in this study have experience in clinical research, as they have already participated in other clinical trials.
Taking into account the inclusion and non-inclusion criteria, possible refusals of patients to participate in the research, potential exclusions and the recruitment experience, we estimate a minimum recruitment capacity of 50% of patients admitted to HDJ Obesity, i.e. 10 patients in 9 months.

14 Ethical and regulatory aspects

The Forcilles-Fondation Cognacq-Jay hospital promoter and the person(s) directing and supervising the research undertake that this research will be carried out in compliance with law n°2004-806 of August 9, 2004 relating to public health policy and the regulatory provisions in force (articles L.1121-1, L.1121-2 and L.1121-3 of the Public Health Code. The data recorded during this research will be subject to computerized processing in compliance with Law No. 78-17 of January 6, 1978 on information technology, files and freedoms, as amended by Law No. 2018-493 of June 20, 2018 (Decree No. 2018-687 of August 1, 2018) and Order No. 2018-1125 of December 12, 2018.
The research will be conducted in accordance with this protocol.

14.1 Role of the promoter

The research commission of the Forcilles-Fondation Cognacq-Jay hospital, promoter of this research, submits the file to the opinion of the concerned Committee for the Protection of Persons (CPP) (CPP Sud-Méditerranée I) whose opinion will be notified in the information note intended for the persons concerned.
The natural or legal person who initiates this research, ensures its management and verifies that its financing is provided for, is called the sponsor.

14.2 Submission to PPC

This research will be submitted to a Committee for the Protection of Persons, which will be drawn by lot in the framework of the "Jardé Law" (Article L.1121-4 of the Public Health Code, Decree No. 2016-1537 of November 16, 2016, which went into effect on November 18, 2016).

The opinion of the above-mentioned committee is notified in the information note intended for the persons concerned. A copy of this opinion and a summary of the research will be sent to the ANSM.

14.3 Data protection

This research is subject to the law n°78-17 of January 6, 1978 relating to data processing, files and freedoms modified by the law n° 2018-493 of June 20, 2018 (decree n° 2018-687 of August 1, 2018). Information on the rights of persons participating in this research (right of access and rectification, right to object to the transmission of data covered by professional secrecy likely to be used in the context of this research) is included in the information note intended for the patient.

A reference methodology specific to the processing of personal data operated within the framework of biomedical research defined by Law 2004-806 of August 9, 2004 as falling within the scope of Articles L.1121-1 et seq. of the Public Health Code was updated by the CNIL in May 2018 (Deliberation No. 2018-153 of May 3, 2018) following the publication of European Regulation No. 2016/679 (General Data Protection Regulation). This methodology allows a simplified declaration procedure when the nature of the data collected in the research is compatible with the list provided by the CNIL in its reference document. This study is part of the MR001 reference methodology to which the Forcilles-Fondation Cognacq-Jay hospital has committed to comply.

14.4 Insurance

The Sponsor takes out insurance covering its own civil liability and that of all participants involved in the research, regardless of the nature of the relationship between the participants and the Sponsor (article L.1121-10 of the Public Health Code). The sponsor also ensures the compensation of the harmful consequences of the research for the person who takes part in it and for his or her beneficiaries, unless it can prove that the damage is not attributable to its fault or to that of any other party involved, without being able to invoke the act of a third party or the voluntary withdrawal of the person who had initially agreed to take part in the research. When the sponsor is not liable, the victims may be compensated under the conditions set out in article L.1142-3.

The Forcilles-Fondation Cognacq-Jay hospital has taken out insurance under contract n°163607 guaranteeing its civil liability as well as that of any intervening party with the company SHAM for the entire duration of the research, in accordance with article L.1121-10 of the Public Health Code.

14.5 Substantial change to the protocol

The investigator or coordinator informs the Forcilles-Fondation Cogacq-Jay Hospital Research Committee of any proposed modification of the protocol. Any substantial modification will be submitted by the sponsor of this research to the CPP for its opinion.

14.6 Disclosure and Express Consent

In accordance with Article L.1122-1 of the Public Health Code, the information given to persons who are to undergo research is the subject of a written document submitted in advance to the personal protection committee. The ethical opinion of the CPP Sud-Méditerranée I has been requested.

The investigator of the center proposes to the patient, or to a relative if the patient is unable to participate, to take part in the study. The investigator informs the patient orally about the study and gives him/her the information note. If the patient gives free, informed and express oral consent to participate in the protocol, the information given orally and in writing, as well as the collection of oral consent, will be recorded in the patient's medical record.

In the case where a relative of the patient has given consent, as soon as possible, the patient will be informed of this research and asked for oral consent for the possible continuation of the research.

Patients are free to participate or withdraw from the study at any time in accordance with Article 21 of the GDPR. Data collected until the patient withdraws consent will be used unless specifically requested by the patient. The withdrawal of consent by the patient and the agreement to use or not the previously collected data will be traced in the patient's medical record.

When the research is completed, the individual may be informed of the overall results of the research in the manner specified in the disclosure document.

14.7 Anticipated deadline for publication of results in an international journal

The deadline for the publication of the results is 15 months.

14.8 Data management

For each subject, an identification code (corresponding to the center number-inclusion number-Initial Surname-Initial First Name) will be assigned. The data collected will be confidential and coded (only the identification code will appear). The concordance table linking the assigned identification code and the participant's name will be kept by the principal investigator at each participating center in a file with limited computer access rights. The data will be entered in an Excel® file. Data processing and statistical analysis will be carried out at the Forcilles-Fondation Cognacq-Jay hospital.

The promoter is the owner of the data and no use or transmission to a third party can be made without its prior agreement.

The specific documents of a type 2 interventional research ("Loi Jardé", decree n° 2016-1537 of November 16, 2016, which went into effect on November 18, 2016) with minimal risks and constraints will be archived by all parties for 15 years after the end of the research.

This indexed archive includes:

- successive versions of the protocol (identified by version number and date);
- correspondence;
- Inclusion list or register;
- the data collection document ;
- research-specific appendices;
- the final report of the research.

The database used for the statistical analysis must also be archived by the person responsible for the analysis (paper or computer).

14.9 Human and financial resources

The Forcilles-Fondation Cognacq-Jay hospital is equipped with human, material and technical resources to carry out this research project.

14.10 Data properties

The Forcilles-Fondation Cognacq-Jay Hospital is the owner of the data and no use or transmission to a third party may be made without its prior agreement.

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16 APPENDICES

16.1 Appendix 1: SF-36 Quality of Life Score

1.- En général, diriez-vous que votre santé est : (cocher ce que vous ressentez)

Excellente __ Très bonne __ Bonne __ Satisfaisante __ Mauvaise ___

***2.- Par comparaison avec** il y a un an**, que diriez-vous sur votre santé** aujourd'hui ?*

Bien meilleure qu'il y a un an __ *Un peu meilleure qu'il y a un an __*
A peu près comme il y a un an __ *Un peu moins bonne qu'il y a un an __*
Pire qu'il y a un an __

3.- vous pourriez vous livrer aux activités suivantes le même jour. Est-ce que votre état de santé vous impose des limites dans ces activités ? Si oui, dans quelle mesure ? (entourez la flèche).

a.Activités intenses : courir, soulever des objets lourds, faire du sport.
Oui, très limité oui, plutôt limité pas limité du tout

b.Activités modérées :déplacer une table, passer l'aspirateur.
Oui, très limité oui, plutôt limité pas limité du tout

c.Soulever et transporter les achats d'alimentation.
Oui, très limité oui, plutôt limité pas limité du tout

d.Monter plusieurs étages à la suite.
Oui, très limité oui, plutôt limité pas limité du tout

e.Monter un seul étage.
Oui, très limité oui, plutôt limité pas limité du tout

f.Vous agenouiller, vous accroupir ou vous pencher très bas.
Oui, très limité oui, plutôt limité pas limité du tout

g.Marcher plus d'un kilomètre et demi.
Oui, très limité oui, plutôt limité pas limité du tout

h.Marcher plus de 500 mètres
Oui, très limité oui, plutôt limité pas limité du tout

i.Marcher seulement 100 mètres.
Oui, très limité oui, plutôt limité pas limité du tout

Tout le temps très souvent parfois peu souvent jamais

j.Prendre un bain, une douche ou vous habiller.

Oui, très limité oui, plutôt limité pas limité du tout

4.- Au cours des 4 dernières semaines, avez-vous eu l'une des difficultés suivantes au travail ou lors des activités courantes, du fait de votre santé ? (réponse : oui ou non à chaque ligne)

	oui	**non**
Limiter le temps passé au travail, ou à d'autres activités ?		
Faire moins de choses que vous ne l'espériez ?		
Trouver des limites au type de travail ou d'activités possibles ?		
Arriver à tout faire, mais au prix d'un effort		

5.- Au cours des 4 dernières semaines, avez-vous eu des difficultés suivantes au travail ou lors des activités courantes parce que vous étiez déprimé ou anxieux ? (réponse : oui ou non à chaque ligne).

	oui	**non**
Limiter le temps passé au travail, ou à d'autres activités ?		
Faire moins de choses que vous n'espériez ?		
Ces activités n'ont pas été accomplies aussi soigneusement que d'habitude ?		

6.- Au cours des 4 dernières semaines, dans quelle mesure est-ce que votre état physique ou mental ont perturbé vos relations avec la famille, les amis, les voisins ou d'autres groupes ?

Pas du tout très peu assez fortement énormément

7.- Avez-vous enduré des souffrances physiques au cours des 4 dernières semaines ?

Pas du tout très peu assez fortement énormément

8.- Au cours des 4 dernières semaines la douleur a-t-elle gêné votre travail ou vos activités usuelles ?

Pas du tout un peu modérément assez fortement énormément

9.- Ces 9 questions concernent ce qui s'est passé au cours de ces dernières 4 semaines. Pour chaque question, donnez la réponse qui se rapproche le plus de ce que vous avez ressenti. Comment vous sentiez-vous au cours de ces 4 semaines :

a. vous sentiez-vous très enthousiaste ?

Tout le temps très souvent parfois peu souvent jamais

b. étiez-vous très nerveux ?

c. étiez-vous si triste que rien ne pouvait vous égayer ?

Tout le temps | très souvent | parfois | peu souvent | jamais

d. vous sentiez-vous au calme, en paix ?

Tout le temps | très souvent | parfois | peu souvent | jamais

e. aviez-vous beaucoup d'énergie ?

Tout le temps | très souvent | parfois | peu souvent | jamais

f. étiez-vous triste et maussade ?

Tout le temps | très souvent | parfois | peu souvent | jamais

g. aviez-vous l'impression d'être épuisé(e) ?

Tout le temps | très souvent | parfois | peu souvent | jamais

h. étiez-vous quelqu'un d'heureux ?

Tout le temps | très souvent | parfois | peu souvent | jamais

i. vous êtes-vous senti fatigué(e) ?

Tout le temps | très souvent | parfois | peu souvent | jamais

10.- Au cours des 4 dernières semaines, votre état physique ou mental a-t-il gêné vos activités sociales comme des visites aux amis, à la famille, etc ?

Tout le temps | très souvent | parfois | peu souvent | jamais

11.- Ces affirmations sont-elles vraies ou fausses dans votre cas ?

a. il me semble que je tombe malade plus facilement que d'autres.

Tout à fait vrai | assez vrai | ne sais pas | plutôt faux | faux

b. ma santé est aussi bonne que celle des gens que je connais.

Tout à fait vrai | assez vrai | ne sais pas | plutôt faux | faux

c. je m'attends à ce que mon état de santé s'aggrave.

Tout à fait vrai | assez vrai | ne sais pas | plutôt faux | faux

d. mon état de santé est excellent.

Tout à fait vrai	assez vrai	ne sais pas	plutôt faux	faux

16.2 Appendix 2: Handgrip Usage Protocol

The patient will be in a seated position, on a chair with a backrest, feet on the ground.
The shoulder will be in adduction (elbow to body), without extension or flexion, and in neutral rotation. The elbow will be placed at 90° of flexion and in neutral prono-supination. The wrist should also be in neutral position. The practitioner will slightly hold the elbow and the base of the JAMAR dynamometer® in order to avoid positioning changes. The grip force measurement will include 3 measurements on each limb, alternating with a rest (1 minute: time to note the score of the measurement and to quietly settle the person in the position for the next measurement).

The dominant hand will be chosen by the participant by answering the following question: "Are you right or left handed?

The instructions are: "Lean back against the backrest. Take the handle in your hand, keep your elbow close to your body and your forearm straight in front of you" and progressively tighten the handle over 2 to 3 seconds to reach a maximum tightening that you must also maintain for 2 to 3 seconds, without moving the other joints (wrist, elbow and shoulder).
Encouragement will be given to the person during the clamping seconds to motivate the patient as much as possible: "Go ahead and clamp, clamp... hard, HARD! TIGHT! ...and you release". It will be noted if a pain appears and limits the grip.

16.3 Appendix 3: Maximum Voluntary Force (MVF) of the quadriceps

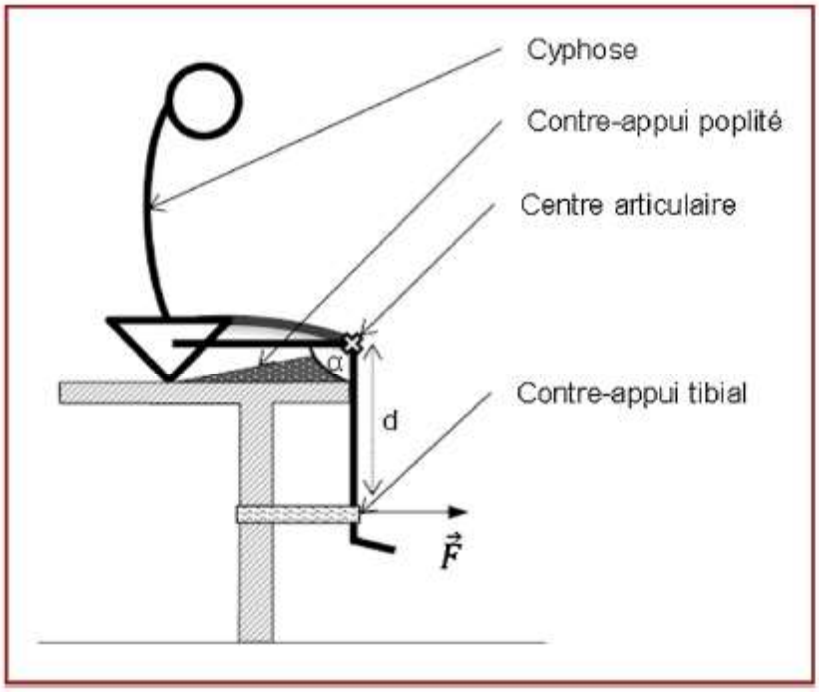

Figure 4. Représentation schématique des conditions de réalisation de la mesure de la force maximale volontaire isométrique du quadriceps et calcul du moment de force produit. Lors de la réalisation contraction maximale volontaire du quadriceps, le patient génère une force *F* appliquée sur le contre-appui tibial (sangle ou dynamomètre). Le moment de force (Nm) produit par le patient vaut *F* (N) × d (m) × sinα soit *F* (N) × d (m) avec sin 90° = 1. α : angle de flexion du genou (90°) ; d : distance du centre articulaire du genou au point d'application de la force.

Bachasson et al. Ambulatory measurement of isometric maximum voluntary quadriceps force in COPD patients, Rev Mal Respir, 2014

Predicted Quadriceps force (Nm)	
Q Right	FMV(Nm)= 66.37 - (0.87 x age) + (46.09 x Sex [0 if female, 1 if male]) + (1.21 x weight (Kg)).
Q Left	FMV(Nm)= 78 - (0.87 x age) + (49.70 x Sex [0 if female, 1 if male]) + (0.96 x weight (Kg)).

Hogrel. JY et al. Development of a French isometric strength normative database for adults using quantitative muscle testing. Arch Phys Med Rehabil, 2007

16.4 Appendix 4: Muscle ultrasound procedure

A linear probe will be used for the measurements. A set of predefined settings of the gain and depth parameters will be used for all measurements.

Patient positioning

The patient is installed in dorsal decubitus (as strict as possible), with the lower limbs in extension and neutral position of rotation.

Placement of the probe

The probe is placed in contact with the skin via an ultrasound gel. The pressure exerted with the probe is perpendicular to the plane of the bed, in line with the femur and must be as low as possible to obtain a representative image of the muscle. Excessive pressure will cause deformation of the subcutaneous tissues and therefore of the muscle. There are two ways of orienting the probe: in the transverse or sagittal plane.

Measurements on the quadriceps

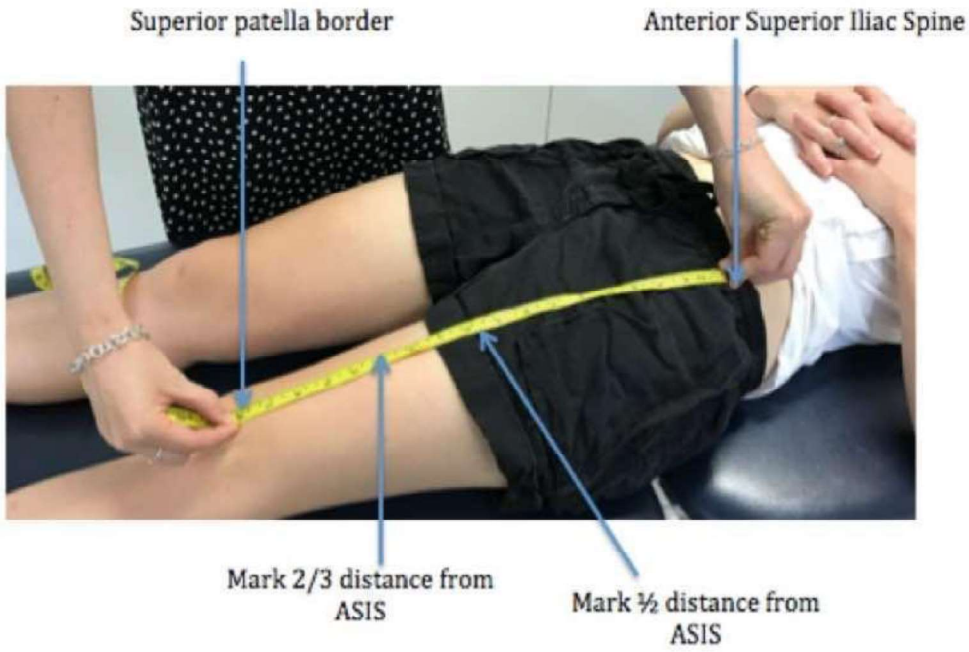

Figure 1

The probe is placed on the anterior aspect of the thigh, 2/3 of the way from the anterior superior iliac spine to the upper edge of the patella, plumb with the femur (**Figure 1)** (39). The muscle chiefs studied were the rectus femoris and the vastus intermedius.

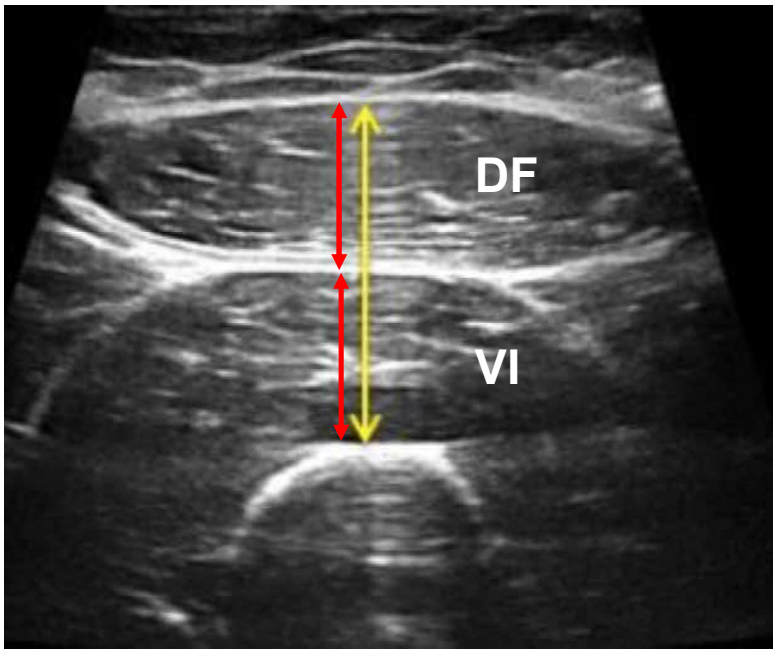

Figure 2

Muscle thickness

In the transverse plane, measurement of the distance between the upper and lower fascias of the muscle body (Figure 2). It is measured directly on a frozen image. The thickness of the rectus femoris (DF) and the vastus intermedius (VI) will be measured on the right. The average of 3 measurements will be taken.

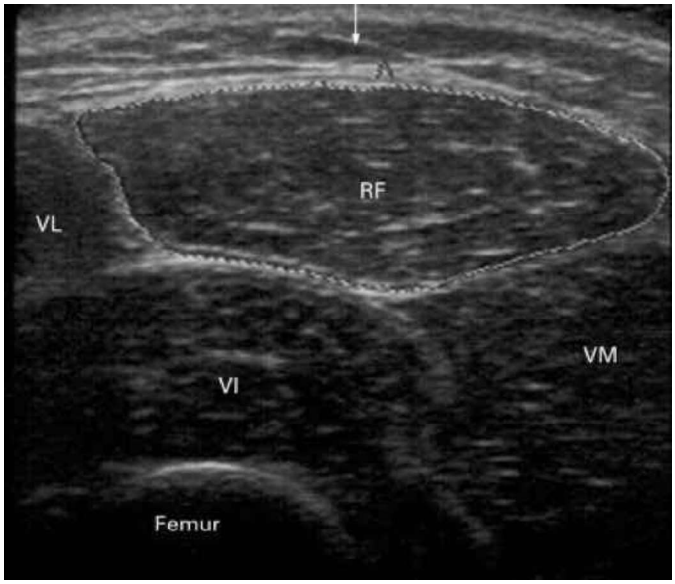

Figure 3

Cross-Sectional Area (CSA):

Still in the transverse plane, measure the cross-sectional area of the rectus femoris using the caliper to delineate the boundaries of the rectus femoris (Figure 3).

Pennation angle

Place the probe along the axis of the muscle. The angulation of the muscle fibers in relation to the underlying fascia becomes visible (pennation of the fibers (Figure 4). The angle between a muscle fiber and the underlying fascia will be measured only on the rectus femoris:

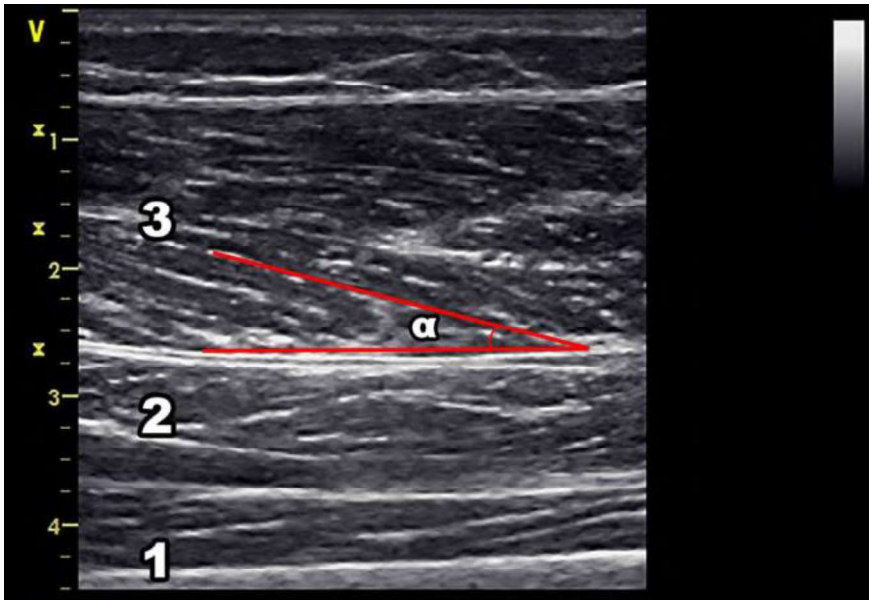

Figure 4

Echogenicity

Save the image used to measure the thickness and cross-sectional area. In the Image J software, delimit a 1 cm area^2 and analyze the variations of the gray levels. The software provides a histogram with a global value of the grey level going from 0 to 255 - 0 corresponding to black and 255 to white (28).

Patient information note

OVALIA

""Study of the association between peripheral muscle function and quality of life in subjects with obesity""

RCB ID : 2021-A03248-33

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Madam, Sir,

Dr. ....., investigator of the study, practicing in the Diabetes-Obesity Department of the Forcilles-Fondation Cognacq-Jay Hospital, invites you to participate in this research.

Your decision to participate is entirely free and voluntary.

Please read the information below carefully, ask any questions you may have, and take as much time as you wish to reflect on your decision to participate in this research.

You are hospitalized in a nutrition day hospital as part of the assessment of your pathology. Your state of health requires the evaluation of your muscular condition in order to adapt your medical and paramedical care.

What is the purpose of this research?

The objective of this research is to evaluate the association between the muscle function of the quadriceps (thigh muscle) and your quality of life. The results of this study will allow us to confirm the association of muscle status on quality of life, which is not yet clearly established in the scientific literature. If applicable, these results will make it possible to propose non-invasive and inexpensive predictive tools to screen for muscle damage. This screening could make it possible to propose early management programs, such as exercise re-training or the introduction of adapted physical activity.

How does this research work?

As part of your hospitalization in the department, we propose to study the state of your muscle function by performing an ultrasound of your thigh muscle and asking you questions via a standardized quality of life evaluation questionnaire.

The ultrasound examination is painless, non-invasive and risk-free. It is performed by the physiotherapist, using the ultrasound machine, an ultrasound probe and gelled water. It lasts about 10 minutes.

The quality assessment questionnaire consists of 11 questions and takes about 10 minutes to complete.

This research visit will take place only once, in one of the consultation rooms of the Nutrition Day Hospital at Forcilles Hospital, for a total of 20 minutes.

Your constraints in this research?

The constraints of this research consist in passing 1 ultrasound and 1 questionnaire, over a maximum total duration of 20mn.

Possible adverse effects

Since your participation in this protocol does not involve any treatment other than that which is currently recommended or any other modification of the conventional management adapted to your health condition, no adverse effects are expected.

- **No additional treatment will be administered**
- **No additional blood tests will be required**.

The ultrasound will be performed transcutaneously, i.e. by placing the probe on your skin. The examination is therefore non-invasive and completely painless.

Your participation in this research will not incur any additional costs compared to those you would have had in the usual follow-up of your disease.

What are the expected benefits of this research?

The use of non-invasive tests of muscle function could allow early identification of obese subjects whose impairment of muscle function could be associated with a poorer quality of life. This could allow us to propose an adapted therapeutic strategy, such as the implementation of an exercise training program, adapted physical activity or therapeutic education.

What are the requirements to participate in this study?

In order to participate in this research, you must be affiliated with or benefit from a social security plan. However, your participation in this research will not generate any additional costs for you compared to those incurred in the usual care.

What data is collected for research?

The medical data collected during this study will be processed in a computerized, coded and confidential manner. The main data collected will be anthropometric data (age, weight, height, etc.), related to medical history, nutritional status, biological check-ups, and the results of medical check-ups. No information bearing your name will be provided to anyone except the physician in charge of the study and authorized personnel. All data collected will be confidential and coded and analyzed in the clinical research office of the Forcilles-Fondation Cognacq-Jay Hospital, the sponsor of the research. The identification list (correspondence between your study code and your identity) will be kept strictly confidential.

In accordance with current regulations, the data will be kept until the final research report is produced and then archived for 15 years.

The person responsible for processing the data is the promoter, Hôpital Forcilles-Fondation Cognacq-Jay, route de Servon 77150 Férolles-Attilly.

Legal basis for data processing

The processing of data is based on the legitimate interests of the controller, Article 6 paragraph 1 point f, read in conjunction with the necessity of processing for scientific research purposes, Article 9 paragraph 2 point j, of the European Regulation No. 2016/679 (General Data Protection Regulation, GDPR).

What are your rights?

Your participation in this research is **completely free and voluntary**. You have the right not to participate in this research.

You cannot be included in an interventional research protocol with minimal risks and constraints without having been informed beforehand. Your doctor must provide you with all the necessary explanations concerning this research, which must comply with the provisions of Article 13 of European Regulation No. 2016/679 (General Data Protection Regulation, GDPR). In accordance with article L.1122-1 of the Public Health Code, the entire research file has been submitted to the Comité de Protection des Personnes Sud-Méditerranée I which issued a favorable opinion on xx/xx/xxxx.

The Forcilles-Fondation Cognacq-Jay hospital has taken out insurance under contract no. 163607 guaranteeing its civil liability and that of all those involved with the company SHAM.

You can stop your participation in the research at any time without justification. This will not affect the quality of the care and treatment provided to you or your relationship with your doctor. The data collected until you withdraw your consent will be used unless you expressly request it. Indeed, in accordance with Article 17 of the RGPD, you have the right to request the deletion of your data already collected. The withdrawal of your consent and the agreement to use or not your previously collected data will be traced in your medical file.

In accordance with the provisions of Articles 15 and 16 of Regulation (EU) 2016/679 of 27 April 2016 (General Data Protection Regulation), you have a right of access, rectification, deletion of these or a limitation of processing. You can find out more about your rights by visiting the CNIL website page https://www.cnil.fr/fr/reglement-europeen-protection-donnees/chapitre3. In accordance with the provisions of Article 21 of the RGPD, you also have the right to object to the transmission of data likely to be used in this research and to be processed. Your request must be addressed to the Data Protection Officer of the Cognacq-Jay Foundation, either by e-mail to dpo@cognacq-jay.fr or by post to the following address: Hôpital Forcilles-Fondation Cognacq-Jay, Délégué à la Protection des Données, route de Servon 77150 Férolles-Attilly. You also have the right to lodge a complaint with the Commission Nationale de l'Informatique et des Libertés - CNIL (French personal data control authority, website: www.cnil.fr).

In application of the provisions of article L. 1111-7 of the Public Health Code, you may also access all of your medical data directly or through a doctor of your choice.

Your medical file will remain confidential and can only be consulted under the responsibility of the doctor in charge of your treatment, as well as by the health authorities and by persons duly mandated by the Forcilles-Fondation Cognacq-Jay hospital for research and subject to professional secrecy.

If, after having read all this information and discussed all aspects with the doctor in charge of the research, you have had sufficient time to think about your decision and you decide to participate in this research, the research information and your oral consent will be notified and dated in your medical record.

The agreement to participate in this research is free and voluntary.
You may refuse or withdraw your consent at any time without explanation or prejudice.

Any questions?

Dr. _____ (tel. _____) is at your disposal for any additional information you may require before and during the research.

Dr. _____, the study investigator, certifies that he has obtained the patient's oral consent and recorded it in his medical record. Date of consent collection: ____ / _____ / _____ Investigator's signature:

16.5 Appendix 6: Katz ADL (Activities in Daily Living) Scale

Items	Valeurs	Résultat
Hygiène corporelle		
Autonomie	1	
Aide partielle	0,5	
Dépendant	0	
Habillage		
Autonomie pour le choix des vêtements et l'habillage	1	
Autonomie pour le choix des vêtements et l'habillage, mais a besoin d'aide pour se chausser	0,5	
Dépendant	0	
Aller aux toilettes		
Autonomie pour aller aux toilettes, se déshabiller et se rhabiller ensuite	1	
Doit être accompagné ou a besoin d'aide pour se déshabiller ou se rhabiller	0,5	
Ne peut aller aux toilettes seul	0	
Locomotion		
Autonomie	1	
A besoin d'aide	0,5	
Grabataire	0	
Continence		
Continent	1	
Incontinence occasionnelle	0,5	
Incontinent	0	
Repas		
Mange seul	1	

16.6 Appendix 7: Hospital Anxiety and Depression Scale

1) Anxiety

I feel tense or irritated.

0 Never.
1 From time to time.
2 Often.
3 Most of the time.

I have a feeling of fear as if something horrible is going to happen to me.

0 Not at all.
1 A little, but that doesn't worry me.
2 Yes, but it's not too bad.
3 Yes, very clearly.

I'm worried.

0 Very occasionally.
1 Occasionally.
2 Quite often.
3 Very often.

I can sit quietly doing nothing and feel relaxed.

0 Yes, no matter what.
1 Yes, in general.
2 Rarely.
3 Never.

I have feelings of fear and a knot in my stomach.

0 Never.
1 Sometimes.
2 Quite often.
3 Very often.

I'm restless and can't stand still.

0 Not at all.
1 Not so much.
2 A little.
3 Yes, that's exactly the case.

I have sudden feelings of panic.

0 Never.
1 Not very often.
2 Quite often.
3 Very often.

2) Depression

I enjoy the same things I used to.

0 Yes, just as much.
1 Not so much.
2 Just a little.
3 Almost no more.

I laugh easily and see the good side of things.

0 As much as in the past.
1 Not as much as before.
2 Really less than before.
3 Not at all.

I am in a good mood.

0 Most of the time.
1 Quite often.
2 Rarely.
3 Never.

I feel like I'm running in slow motion.

0 Never.
1 Sometimes.
2 Very often.
3 Almost always.

I'm no longer interested in my appearance.

0 I pay as much attention to it as I did in the past.
1 I may not pay as much attention to it anymore.
2 I don't pay as much attention to it as I should.
3 Not at all.

I look forward to doing some things.

0 As much as before.
1 A little less than before.
2 Much less than before.
3 Almost never.

I can enjoy a good book or a good radio or television program.

0 Often.
1 Sometimes.
2 Rarely.
3 Very rarely.

Results:

This scale explores anxiety and depressive symptoms.

Add up the anxiety and depression sides: 21 points maximum for each.

Between 8 and 10: questionable anxiety or depression.

Above 10: definite state of anxiety or depression.

References:

Depression and anxiety-depressive syndromes, J.D.Guelfi et al, Ardix Médical.

17 List of investigators

LIST OF INVESTIGATORS			
FIRST NAME, LAST NAME	**ROLE**	**FUNCTION**	**CONTACT INFORMATION**
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