# Muscle mass loss in COVID-19; extent, impact and diagnostics

Peter Weijs[1] PhD, Nicolette Wierdsma[1] PhD RD, Sandra Stapel[1], Ad van Bodegraven[2] PhD MD, Bert Beishuizen[3], Inge Dekker[1], Robert Henke[1], Jorrit Glastra[4], Pim Moeskops[4], Hinke Kruizenga[1] PhD RD; p.weijs@amsterdamumc.nl, [1]Amsterdam University Medical Centers, [2]Zuyderland Medical Centers, [3]Medisch Spectrum Twente, [4]Quantib BV, The Netherlands

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## Description of the initiative

SARS-Co-V2 infection has caused a worldwide pandemic, with a high mortality rate and a long recovery phase for the survivors. Results of our COVOED trial1 show a high prevalence of malnutrition, risk of sarcopenia and nutritional complaints in hospital admitted COVID-19 patients, especially in patients who were admitted to the ICU. Data on long-term health effects after recovering from COVID-19 are lacking; We expect loss of muscle mass (sarcopenia, sarcopenic obesity) to have a large impact on the disease course and recovery in COVID-19 patients2. Skeletal muscle mass (SMA) and skeletal muscle index (SMI) can be longitudinally (during ICU stay and in recovery phase) analyzed from the thoracic computed tomography (CT) scans by segment analysis (T4). This is a time consuming measurement (20 minutes per scan). We want to apply for the MNI grant to:

- Determine the extent and impact of muscle mass loss (and relate to outcome) in COVID-19 patients by measuring skeletal muscle mass3 during hospital admission and in recovery phase.
- Validate the quick and easy artificial intelligence (AI) technique (Quantib) for analyzing the skeletal muscle mass and quality with CT at T4 level to make this measurement applicable in daily clinical practice.

## Planned activities & deliverables

Study design: retrospective multi-center cross-sectional controlled study in adult COVID-19 patients with CT-scans available, from 3 large Dutch hospitals (2020-2021) during hospital admission and in the recovery phase after discharge. The impact of muscle mass loss on the course of recovery (functionality, back to work, fatigue) will be measured in existing cohorts in the three hospitals.

Step 1: Validating the Quantib technique against sliceOmatic in 300 patients. Step 2: Analyzing all (N expected >2000) CT scans (hospital and recovery phase at 0, 3 and 6 months) with the Quantib technique. Step 3: Determining the extent of muscle mass loss. Step 4: determining the impact of muscle mass loss in existing cohorts.

Deliverables: Information on the extent and impact of muscle mass loss in COVID-19 patients, validation of the quick Quantib technique to be able to use CT data in clinical practice in future.

Achievements in 12/24 mo: In the first year, the CT scans are analyzed, extent of muscle mass loss in Covid-19 patients is clear and imputed in existing cohorts to determine the impact. Validity analysis of Quantib CT analysis for skeletal muscle mass is performed. Results will be published in an open access international journal (<18 months).

## Resources & enablers

Personnel, financial needs: €30.000 euro will be necessary for 0,4 fte dietitian-researcher to coordinate the research, determine muscle mass by CT-scans and perform the statistical analyses.

Success factors: These analyses will be performed in large existing COVID-19 patient cohorts. The CT scans and data on disease course and recovery will be available already in existing study databases. Moreover the research groups of Amsterdam UMC, Zuyderland MC and Medisch Spectrum Twente already work closely together and have extensive experience in the implementation and interpretation of measuring muscle mass with CT scans. Furthermore, our research group consist of multidisciplinary experts in the field: researchers, dietitians, medical doctors, physiotherapists, body composition analyze specialists and radiologist.

## Results/outcomes & expected impact

- Implementation: The results will be published in an international open access journal and will be published in understandable language for all healthcare professionals as an infographic at www.dieteticpocketguide.com as we did for the COVOED results.
- Optimal nutritional care/innovative: Knowledge about the extent and impact of muscle mass loss and -quality in COVID-19 and its comparison with muscle mass loss in other disease states is needed to determine the optimal (nutritional) intervention in COVID-19 patients. If the Quantib technique for analysing muscle mass via CT scans proves valid, it will simplify the diagnosis of this very important determinant of nutritional status.
- Influence national nutrition policy: Increased awareness on high prevalence of muscle mass loss and malnutrition in this patient group and call for action to improve nutritional care organization (in hospital and first line care).
- Transferable: Results from this study will be transferable to all patients with rapid weight loss due to acute illness.

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Research-team:

- ✓ Prof dr ir Peter Weijs, department of Nutrition and Dietetics, Amsterdam Medical Centers, Amsterdam, The Netherlands
- ✓ Dr ir Nicolette Wierdsma RD, research-dietician, department of Nutrition and Dietetics, Amsterdam Medical Centers, Amsterdam, The Netherlands
- ✓ Dr Sandra Stapel MD, intensivist, Intensive Care Unit, Amsterdam Medical Centers, Amsterdam, The Netherlands
- ✓ Dr Ad van Bodegraven MD, gastroenterologist, department of Gastroenterology, Zuyderland Medical Centers, Sittard/Heerlen/Geleen, The Netherlands
- ✓ Dr Bert Beishuizen MD, intensivist, Intensive Care Center, Medisch Spectrum Twente, Enschede, The Netherlands
- ✓ Inge Dekker MSc RD, dietician, department of Nutrition and Dietetics, Amsterdam Medical Centers, Amsterdam, The Netherlands
- ✓ Dr Robert Henke MD, radiologist, department of Radiology, Amsterdam Medical Centers, Amsterdam, The Netherlands
- ✓ Drs Jorrit Glastra, Chief Technology Officer, Quantib B.V., Rotterdam, The Netherlands
- ✓ Dr Pim Moeskops, Research & Development Engineer, Quantib B.V., Rotterdam, The Netherlands
- ✓ Dr Ir Hinke Kruizenga RD, research-dietician, department of Nutrition and Dietetics, Amsterdam Medical Centers, Amsterdam, The Netherlands

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