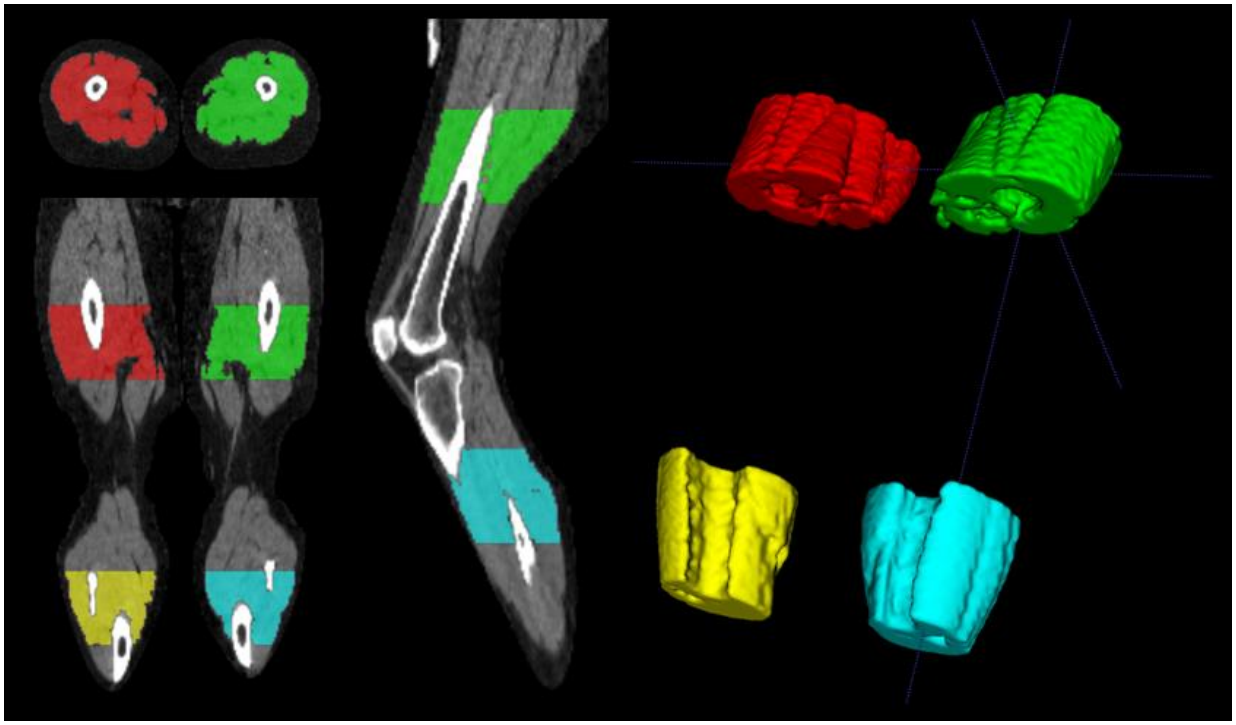
1. Supplementary tables and figures

Supplementary Figure 1: Region of interest (ROI) definition in the thighs and calves using ITK-SNAP.(Yushkevich et al., 2006)



Left top = axial cross section at the level of the thigh. Left bottom = coronal section showing ROIs in the thigh and calf musculature. Middle = sagittal section showing ROIs in the thigh and calf musculature of the left leg. Right = 3D reconstruction of thigh and calf ROIs. Red = right thigh. Green = left thigh. Yellow = right calf. Cyan = left calf.

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Supplementary Table 1:

Correlation of Magnetic Resonance Imaging measures of fatty infiltration and inflammation levels with [18F]florbetapir standardised uptake value ratios in cases with inclusion body myositis (n=10)

Region ([18F]florbetapir SUVR)	**MRI Fatty infiltration level** Rho (p)*	**MRI Inflammation level** Rho (p)*	**Age at scan (years)** Rho (p)*	**Disease duration (years)** Rho (p)*	**HAQ-DI** Rho (p)*	**MMT26** Rho (p)*	**IBM-FRS** Rho (p)*
Left Arm	0.33 (0.35)	-0.30 (0.40)	-	-	-	0.04 (0.91)**	-0.02 (0.96)**
Right Forearm	0.14 (0.71)	-0.49 (0.15)	-	-	-		
Left Forearm	-0.08 (0.82)	0.15 (0.67)	-	-	-		
Right thigh	0.50 (0.17)	-0.12 (0.77)	-	-	-	0.55 (0.10)**	0.43 (0.21)**
Left thigh	-0.02 (0.97)	-0.22 (0.58)	-	-	-		
Right calf	-0.02 (0.96)	**-0.73 (0.02)**	**-**	**-**	**-**		
Left calf	0.38 (0.27)	**-0.68 (0.03)**	**-**	**-**	**-**		
Overall (total-SUVR)	0.03 (0.93)	-0.52 (0.13)	-0.03 (0.93)	-0.36 (0.30)	-0.29 (0.43)	0.37 (0.29)	0.34 (0.34)

*Spearman's ranked correlation coefficient (Rho) between each imaging parameter and the corresponding [18F]florbetapir SUVRs for the same limb region.

**Subsets of MMT26 and IBM-FRS scores pertaining to relevant upper or lower limb domains.

Values in bold indicate statistically significant correlations. Disease duration refers to the interval between diagnosis and the date of participation in the study.

MRI = magnetic resonance imaging, HAQ-DI = health assessment questionnaire disability index, MMT-26 = manual muscle testing 26 score, IBM-FRS = inclusion body myositis functional rating scale, SUVR = standardised uptake value ratio (calculated using reference values derived from lumbar fat pad).

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Supplementary Table 2:

Total [18F]florbetapir SUVR stratified according to diagnostic muscle biopsy findings in ten patients with Inclusion Body Myositis

Muscle biopsy feature*	**Present**	**Median total [18F]florbetapir SUVR** (IQR)	**Absent**	**Median total [18F]florbetapir SUVR** (IQR)	**Significance** (ranksum test)
Rimmed Vacuoles	8/10 (80%)	1.45 (1.32, 2.07)	2/10 (20%)	1.55 (1.28, 1.82)	0.794
Amyloid deposits (by Congo Red)	1/10 (10%)	2.05	9/10 (90%)	1.42 (1.28, 1.82)	0.384
TDP-43 (by immunofluorescence)	6/7 (86%)	1.73 (1.37, 2.09)	1/7 (14%)	1.27	0.317
p62 (by immunofluorescence)	3/4 (75%)	1.82 (1.37, 2.44)	1/4 (25%)	1.28	0.180
Tubulofilaments (by electron microscopy)	1/1 (100%)	1.48	-	-	-

*Not all features were assessed for on every biopsy.

IQR = interquartile range. P62 = Nucleoporin p62. SUVR = standardised uptake value ratio (calculated using reference values derived from lumbar fat pad). TDP-43 = transactive response DNA binding protein 43 kDa

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2. Imaging Definitions and Atlas

In all cases, the following definitions also apply:

NA = Not applicable (e.g. amputation, surgical resection)
NI = Not interpretable (e.g. artefact prevents reasonable interpretation)

Fatty infiltration score (using T1 sequence)	
Score Modified from (Mercuri et al., 2002)	**Interpretation (volume based assessment)**
0	Normal appearance
1	Very mild involvement: Early/trace moth-eaten appearance. Scattered small areas of increased signal.
2	Mild involvement: Late moth-eaten appearance with numerous discrete areas of increased signal with beginning confluence, comprising **less than 30% of the volume of the individual muscle**
3	Moderate involvement: Late moth-eaten appearance with numerous discrete areas of increased signal with beginning confluence, comprising **30-60% of the volume of the individual muscle**
4	Severe involvement: Washed-out appearance, fuzzy appearance due to confluent areas of increased signal. Muscle still present in the periphery. **(may be interpreted as 60-99% infiltration of volume of muscle with fat)**
5	End-stage appearance: Muscle replaced by increased signal connective tissue and fat, with only a rim of fascia and neurovascular structures distinguishable. **(may be interpreted as 100% replacement of muscle with fat)**

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<table>
<tr><th colspan="4">Inflammation score (using STIR sequence)</th></tr>
<tr><td>Visual image scoring system
modified from Yao et al (Yao & Gai, 2012)</td><td><u>Extent</u>
(<u>volume</u> based assessment)</td><td colspan="2"><u>Severity</u>
(on most affected slice)</td></tr>
<tr><td>0</td><td>Normal</td><td colspan="2" rowspan="2">n/a</td></tr>
<tr><td>1</td><td>Possible disease</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Definite disease, < 30% of volume of muscle involved</td><td>A</td><td>Mild STIR hyper-intensity</td></tr>
<tr><td>B</td><td>Moderate-severe STIR hyper-intensity</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Definite disease, 30-60% of volume of muscle involved</td><td>A</td><td>Mild STIR hyper-intensity</td></tr>
<tr><td>B</td><td>Moderate-severe STIR hyper-intensity</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Definite disease, 60-99% of volume of muscle involved</td><td>A</td><td>Mild STIR hyper-intensity</td></tr>
<tr><td>B</td><td>Moderate-severe STIR hyper-intensity</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Definite disease, Entirety of muscle involved</td><td>A</td><td>Mild STIR hyper-intensity</td></tr>
<tr><td>B</td><td>Moderate-severe STIR hyper-intensity</td></tr>
<tr><td colspan="2"></td><td colspan="2">Definitions:
<u>A</u> – Patchy/slight signal hyper-intensity – definitely brighter than normal muscle
<u>B</u> – More homogenous, bright or very bright signal, quality approaching that of fluid compartments (e.g. synovial fluid).</td></tr>
</table>

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Muscle MRI scoring *pro forma*

Upper Limb

Limb	Compart-ment	Muscle	Fatty infiltration score (0-5)		Atrophy score (0-3)		Inflammation score (0-5, A/B)	
			R	L	R	L	R	L
Shoulder Girdle	-	Trapezius						
		Deltoid						
		Supraspinatus						
		Infraspinatus						
		Subscapularis						
		Pec Major						
		Pec minor						
		Serratus anterior						
Arm (muscles **not** assessed individually)	Anterior	Coracobrachialis, biceps, brachialis						
	Posterior	Triceps brachii, anconeus, articularis cubiti						
Forearm (muscles **not** assessed individually)	Anterior	Pronator teres, palmaris longus, flexor carpi radialis, flexor carpi ulnaris, flexor digitorum superficialis, pronator quadratus, flexor digitorum profundus, flexor pollicis longus						
	Posterior	Brachioradialis, extensor carpi radialis longus and brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris, Supinator, abductor pollicis longus, extensor pollicis brevis, extensor pollicis longus, extensor indicis						

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Lower Limb

Limb	Compart-ment	Muscle	Fatty infiltration score (0-5)		Atrophy score (0-3)		Inflammation score (0-5, A/B)	
			R	L	R	L	R	L
Pelvic	Hip extensors	Gluteus maximus						
		Gluteus medius						
		Gluteus minimus						
		Tensor fascia latae						
	Hip rotators / flexors	Obturator externus						
		Obturator internus						
		Pectineus						
Lower limb - Thigh	Anterior (quads)	Rectus femoris						
		Vastus medialis						
		Vastus intermedius						
		Vastus lateralis						
	Medial (adductors)	Sartorius						
		Gracilis						
		Adductor longus						
		Adductor brevis						
		Adductor magnus						
	Posterior (hamstrings)	Semi-membranosus						
		Semi-tendinosus						
		Long head biceps femoris						
		Short head biceps femoris						
Lower limb – Calf	Anterior/ Lateral	Tibialis anterior						
		Ext. digitorum and hallucis longus						
		Peroneus (fibularis) group -longus/brevis						
	Posterior	Flexor digitorum longus						
		Tibialis posterior						
		Soleus						
		Lateral gastrocnemius						
		Medial gastrocnemius						

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3. Study inclusion/exclusion criteria

Inclusion Criteria:

- Adults (>18 years)
- Able to give full informed consent
- A diagnosis of IBM or PM according to agreed diagnostic criteria (A Bohan & Peter, 1975; Anthony Bohan & Peter, 1975; Lloyd et al., 2014)

Exclusion Criteria:

- Any contraindication to MRI
- Any contraindication to amyloid-PET/CT imaging
- Pregnancy, breastfeeding or planning to become pregnant within 1 month of participating in the study
- Women of childbearing potential that do not use any form of contraception

For the PM cohort we restricted recruitment to those aged >45 years. We also retrospectively applied the ACR/EULAR (International Myositis Classification Criteria Project) IIM classification criteria to the PM group, with all cases meeting the minimum probability cut-off of 75%.(Lundberg et al., 2017)

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