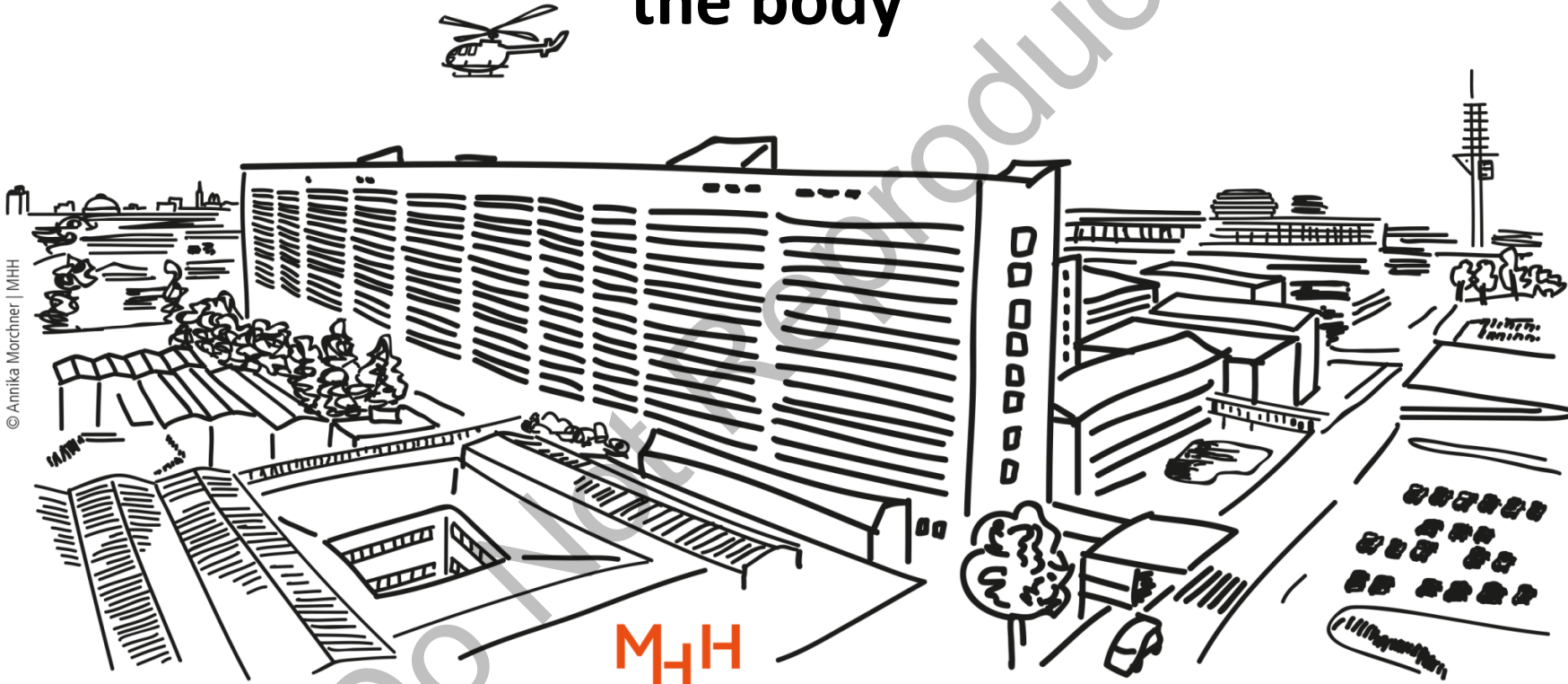


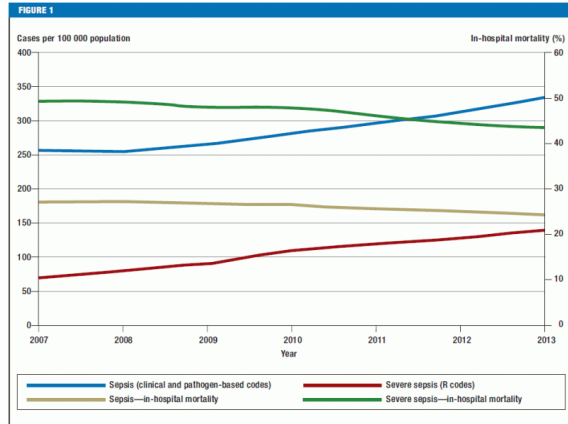
# Inflammation interactions: Understanding cross-talk in the body



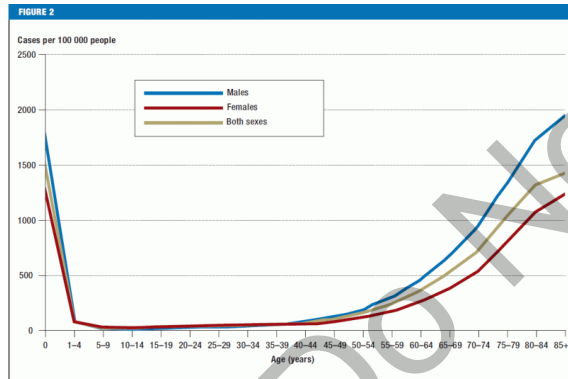
© Annika Marchner | MHH

MHH

# Septicaemia in Germany

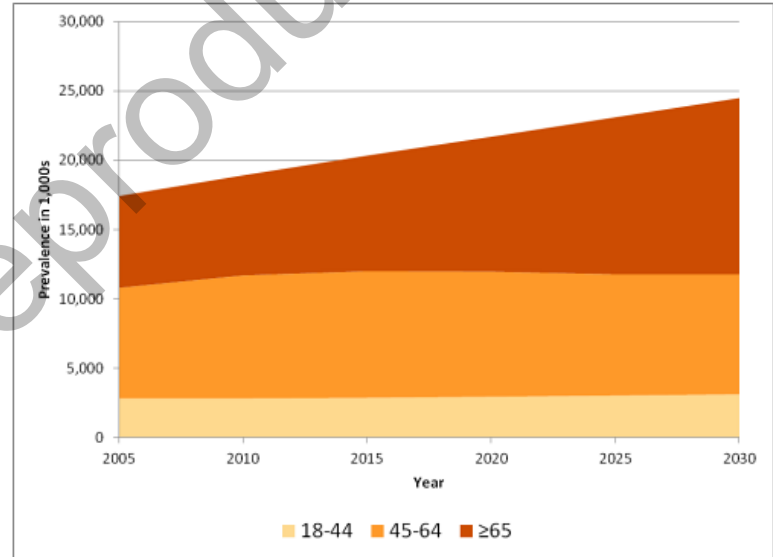


Incidence rate per 100 000 population, standardized to the German population structure in 2010, and in-hospital mortality of sepsis and severe sepsis (including septic shock) in Germany, 2007–2013



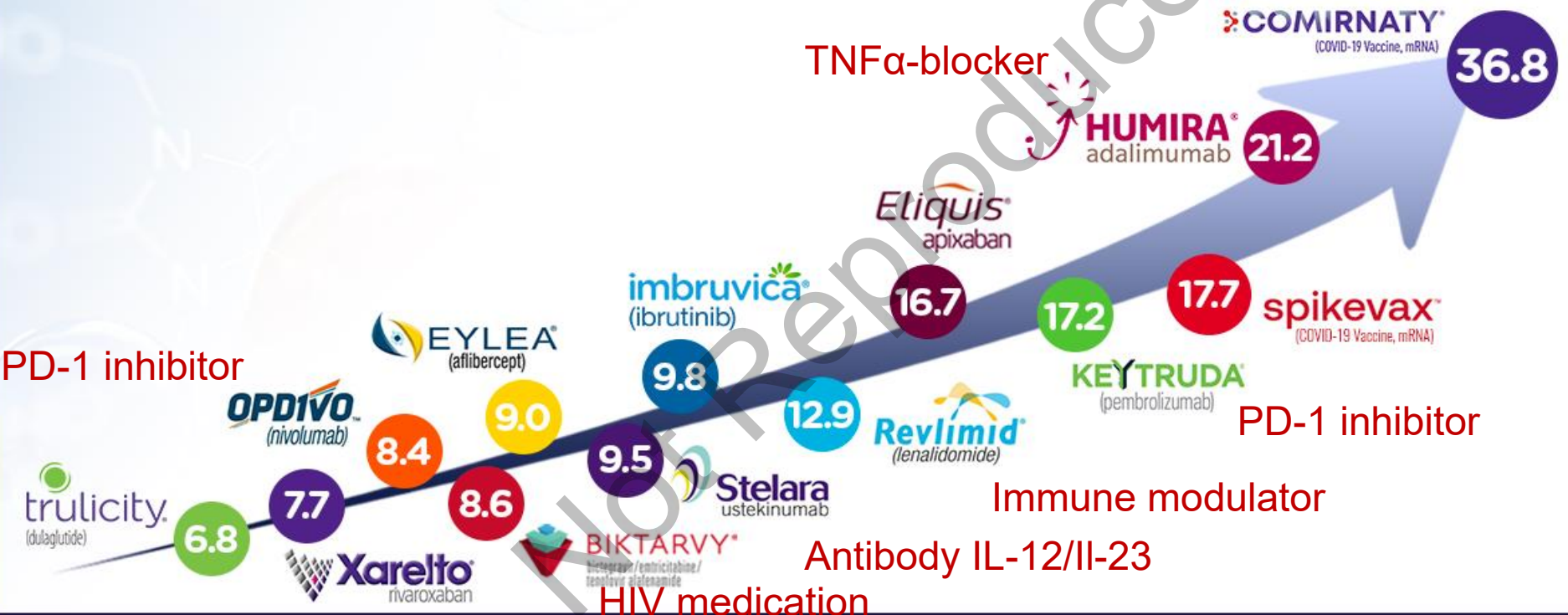
In-hospital incidence of sepsis per 100 000 persons per year, by age group and sex, in the period 2007–2013 (clinical and pathogen-based sepsis codes)

# Prevalence of Rheumatoid Arthritis



[http://www.cdc.gov/arthritis/data\\_statistics/disabilities-limitations.htm](http://www.cdc.gov/arthritis/data_statistics/disabilities-limitations.htm)

# TOP PHARMA DRUGS BY SALES IN 2021 (USD Bn)



# Spectrum of Inflammatory Disorders

Acute Infections

COVID-19

Cardiovascular Disease

Atherosclerosis

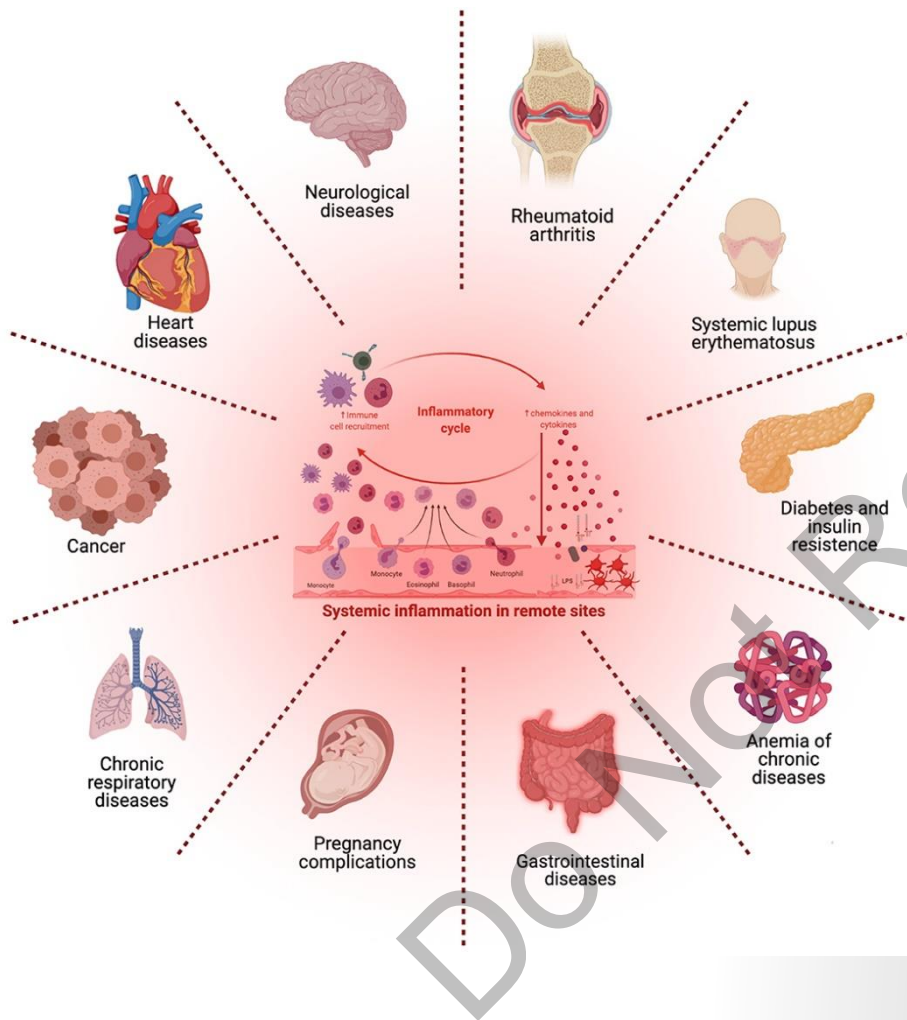
AMI

Chronic Infections

Neoplastic Disease

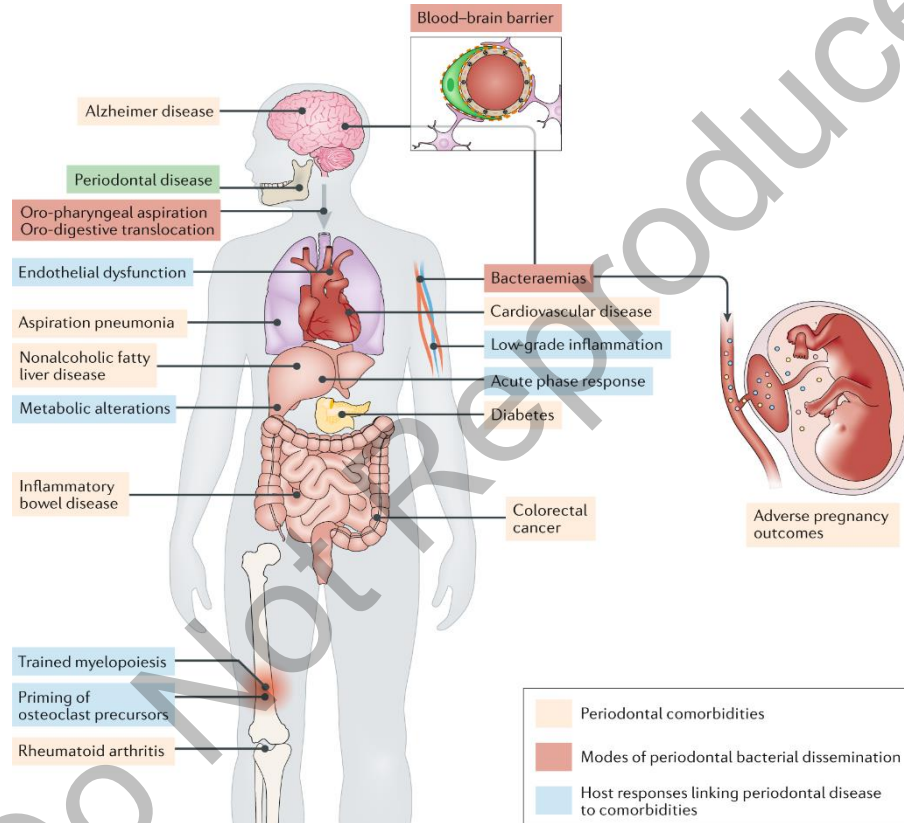
Rheumatic Disease

Adipositas



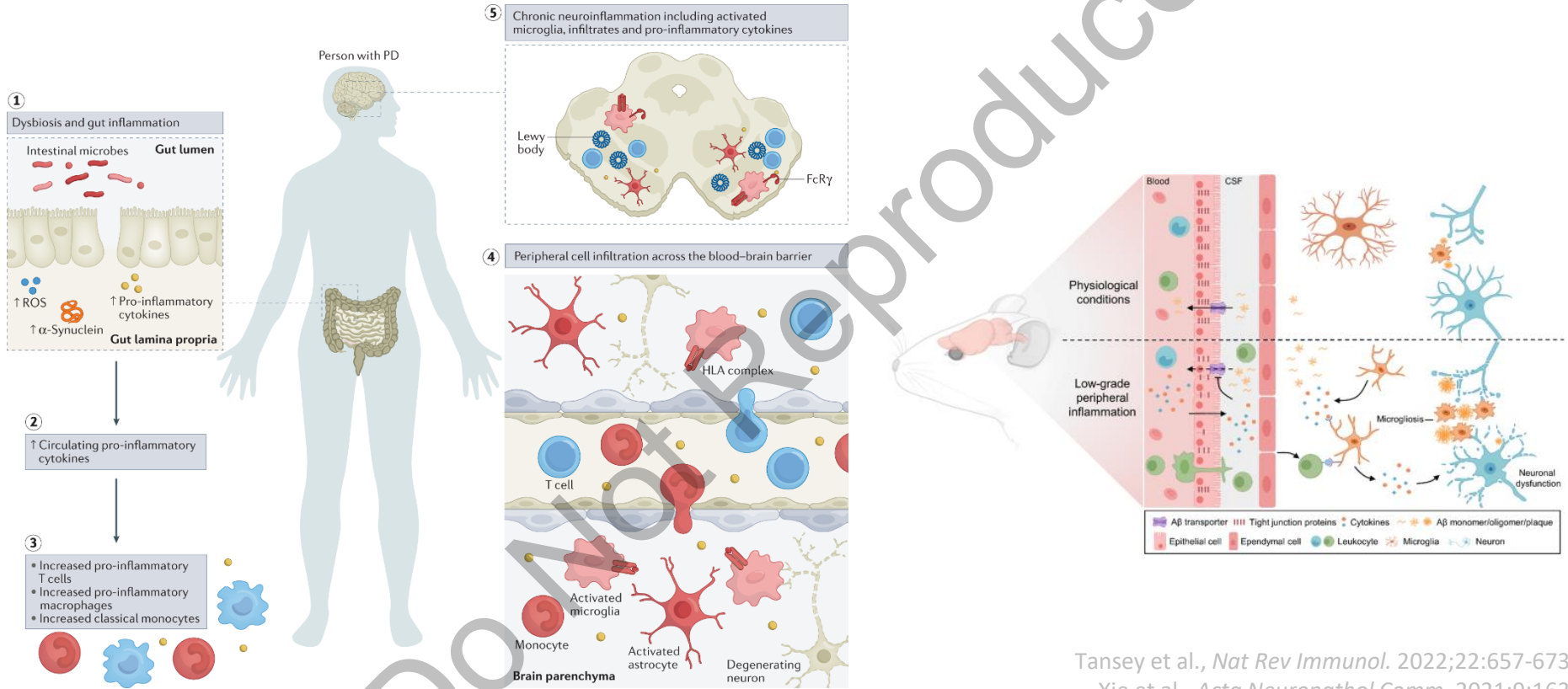
- **Inflammation**: response to damage to tissues and cells by pathogens, noxious stimuli (such as chemicals, or physical injury).
- **Local inflammation** may develop into a **systemic** condition characterized by unresolved hyper-inflammation, disruption of the innate and adaptive immune system, and other system-wide alterations.
- This may **cause**, or **aggravate** other **diseases** associated with elevated morbidity/mortality.

# Inflammation interactions in infectious disease



Hajishengallis et al., *Nat. Rev. Immunol.* 2021;21:426-440.

# Inflammation interactions in neurodegenerative disease



Tansey et al., *Nat Rev Immunol.* 2022;22:657-673.

Xie et al., *Acta Neuropathol Comm.* 2021;9:163.

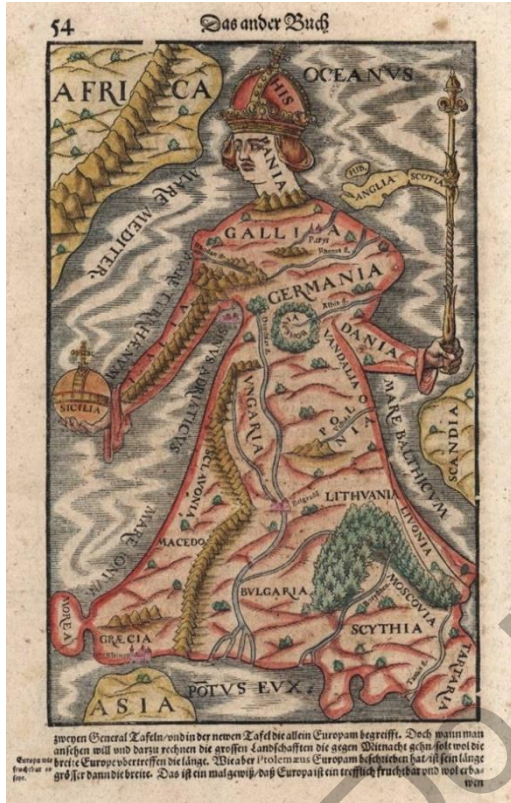
# Europa Regina



Sebastian Münster, *Cosmographia* 1544

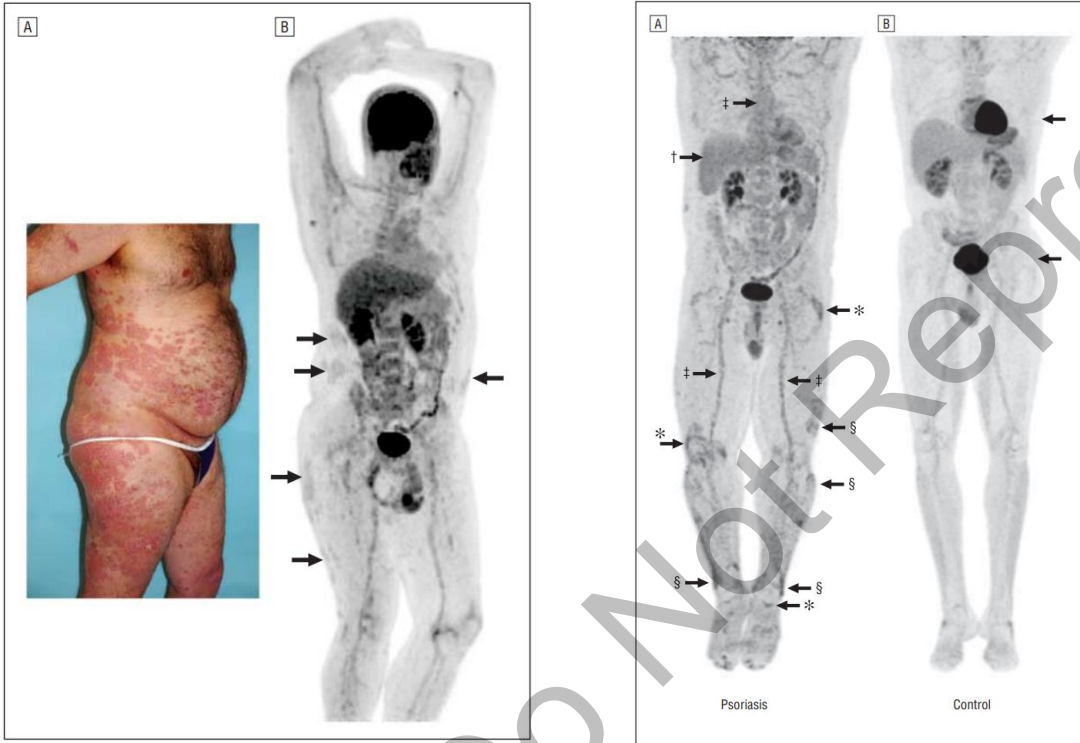


# Mapping Systemic Inflammation



- PET: Total-body imaging
- $^{18}\text{F}$ -fluorodeoxyglucose (FDG): broad spectrum of **infectious** and **non-infectious inflammatory** diseases

# Systemic Inflammation in Psoriasis

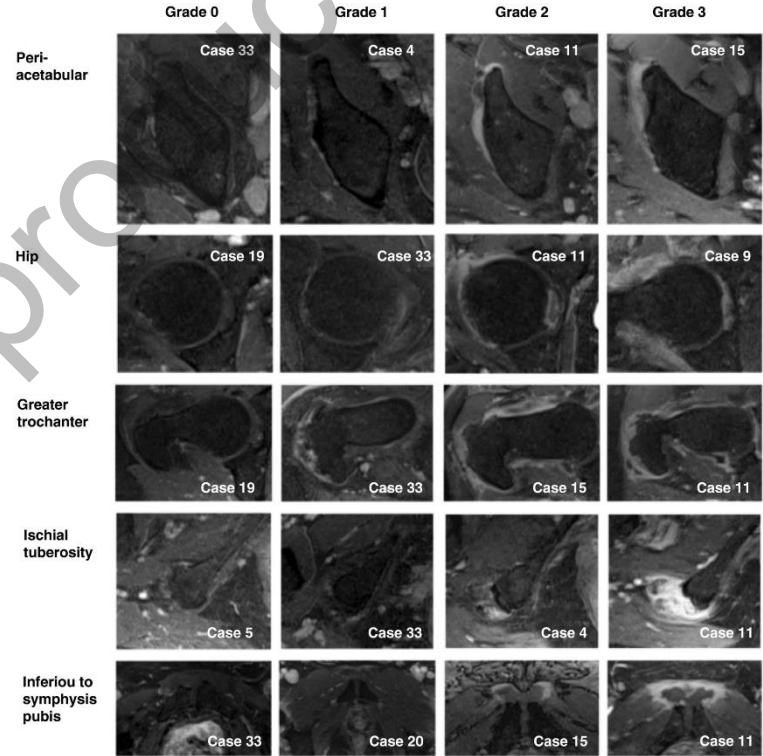


Region	Vascular Inflammation, SUV, Mean (SD) <sup>a</sup>		
	Patients With Psoriasis	Controls	P Value <sup>b</sup>
Ascending aorta	1.56 (0.16)	1.49 (0.08)	.02
Aortic arch	1.45 (0.15)	1.38 (0.14)	.09
Descending thoracic aorta	1.54 (0.16)	1.43 (0.14)	<.001
Suprarenal abdominal aorta	1.46 (0.20)	1.37 (0.09)	.002
Infrarenal abdominal aorta	1.40 (0.22)	1.29 (0.15)	<.001

Mehta et al., *Arch Dermatol.* 2011;147:1031-1039.

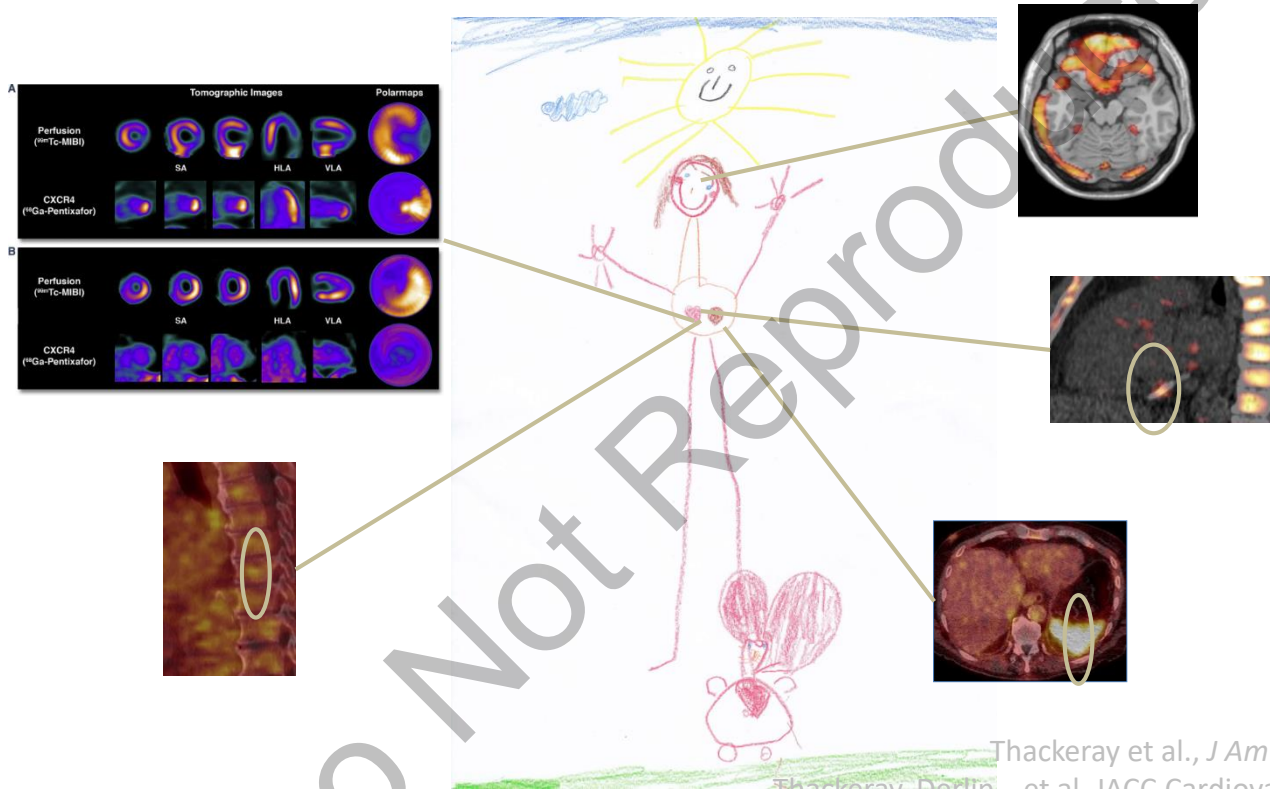
# Mapping Inflammation in Rheumatic Diseases

Case	GC response	Extracapsular	Spine		Shldr	Around the shoulder				Hips	Around the pelvis						Knees	Small jts																						
			perifacetial lumbar spine	sacro-iliac joints	right glenohumeral joint	left glenohumeral joint	right subacromial bursa	left subacromial bursa	right subdeltoid bursa	left subdeltoid bursa	right subcoracoid bursa	left subcoracoid bursa	right subscapularis tendon	left subscapularis tendon	right long head biceps tendon	left long head biceps tendon	right hip	left hip	right periacetabular	left periacetabular	right greater trochanter	left greater trochanter	right ischial tuberosity	left ischial tuberosity	right obturator	left obturator	around symphysis pubis	right iliopsoas	left iliopsoas	right gluteus medius fascia	left gluteus medius fascia	right anterior inferior iliac spine	left anterior inferior iliac spine	right knee extracapsular	left knee extracapsular	right knee joint	left knee joint	metacarpophalangeal joints	feet	hand tendons
<b>Patients presenting with Rheumatoid Arthritis:</b>																																								
27	No	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	0		
31	No	No	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
24	No	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17	No	No	0	0	2	2	0	0	1	1	2	0	0	1	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	
3	No	No	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	No	No	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	1	
13	No	No	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	
30	No	No	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	
7	No	No	0	0	1	1	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	
26	No	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	
16	No	No	0	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	
1	No	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
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10	Yes	No	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	No	No	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	
<b>Patients presenting with Polymyalgia Rheumatica:</b>																																								
6	Complete	Yes	0	0	2	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	1	
9	Incomplete	Yes	2	0	2	2	0	0	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0
22	Complete	Yes	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Complete	Yes	1	0	1	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	Yes	Yes	2	0	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8	Complete	Yes	0	1	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	Complete	Yes	2	0	1	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
35	Complete	Yes	0	0	2	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28	Complete	Yes	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18	Complete	Yes	1	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	
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4	Complete	Yes	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	No	No	2	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
33	No	No	0	1	2	2	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
34	Incomplete	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29	Complete	No	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
23	Incomplete	No	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19	Incomplete	No	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



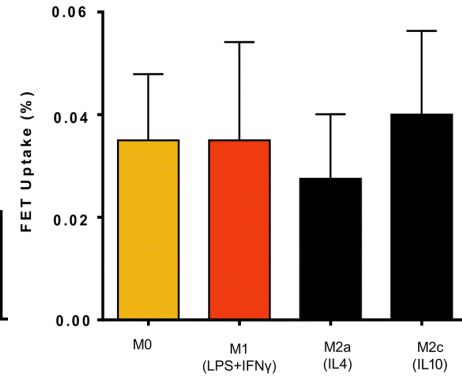
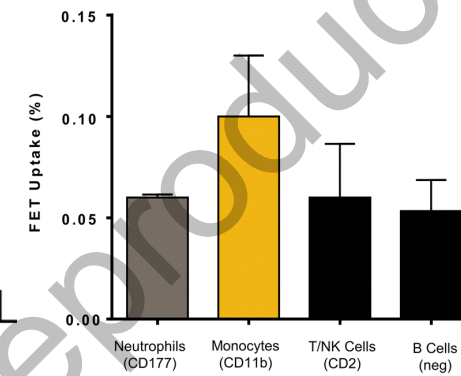
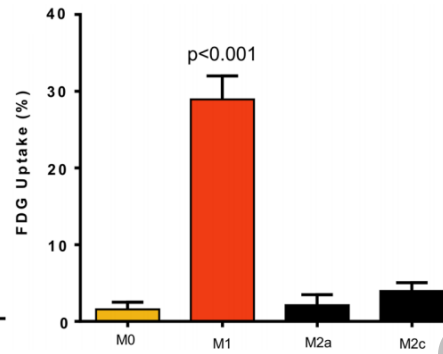
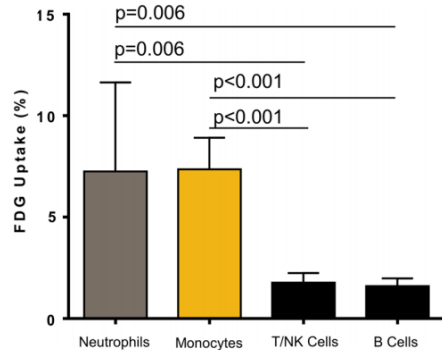
Mackie et al., *Ann Rheum Dis.* 2015;74:2188-2192.

# Systems Analysis: Organ Crosstalk

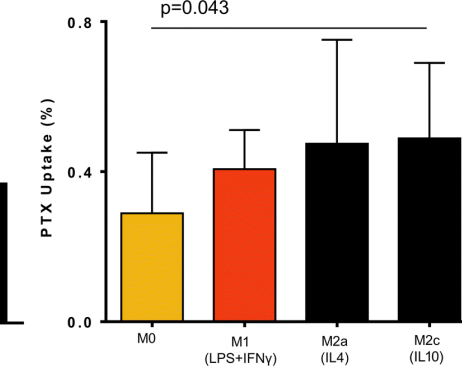
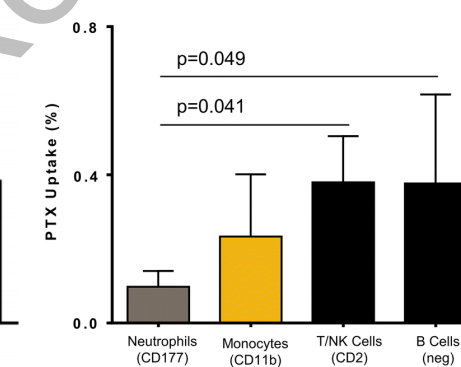
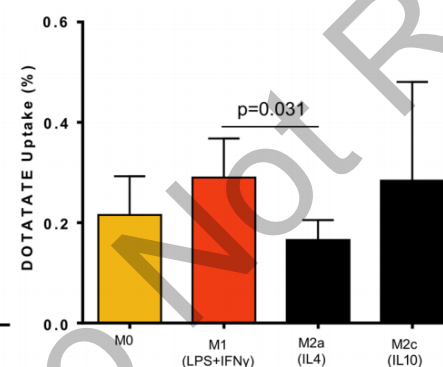
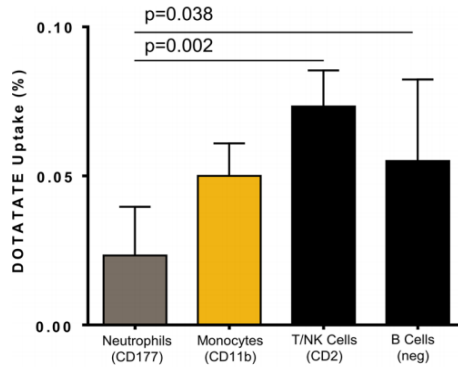


# Dissecting Target Leukocyte Subpopulations

Metabolism

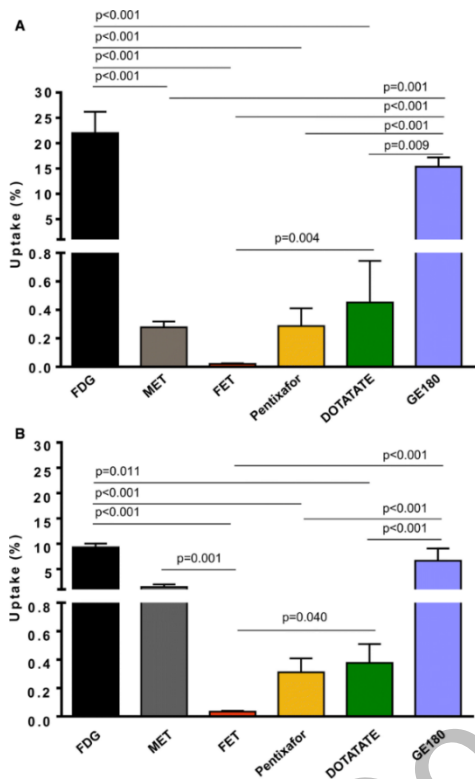


Receptors



Borchert et al., *J Nucl Cardiol.* 2021;28:1636-1645.

# Uptake of *Inflammatory* Radiotracers not Limited to Immune Cells



**Table 1.** Cell types expressing SDF-1 and CXCR4 in the context of spinal cord injury

Cell types	Expression of SDF-1	Expression of CXCR4
Dorsal corticospinal tract	[6]	[7]
Meninges	[6]	n.d.
Reactive astrocytes	[8–10]	[7]
Monocytes/macrophages	[6, 111]	[6]
Endothelial cells	[82]	n.d.
Endothelial progenitor cells	n.d.	[82]
Pericytes	n.d.	[88, 90]
Radial glia-like cells in the subpial layer of the spinal cord	[8]	[8]
Neural progenitor cells	n.d.	[23–25]
Ependymal layer of the central canal	n.d.	[6, 7]
Oligodendrocyte precursor cells	n.d.	[24]
Mesenchymal stem cells	[43]	[51]
Cancer cells	n.d.	[103, 106]

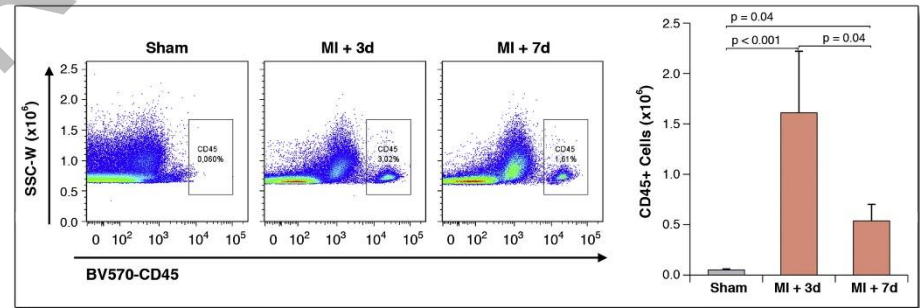
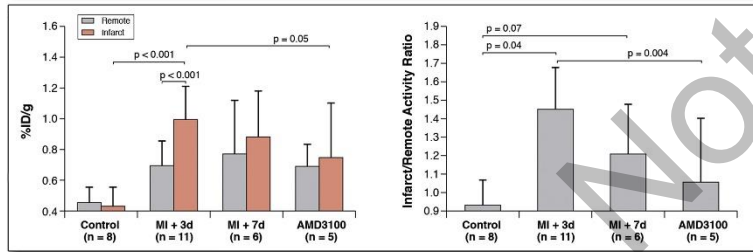
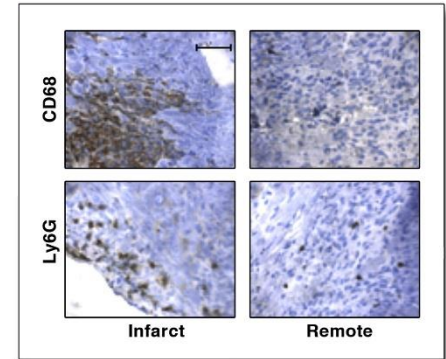
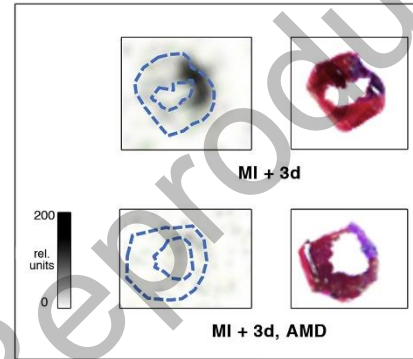
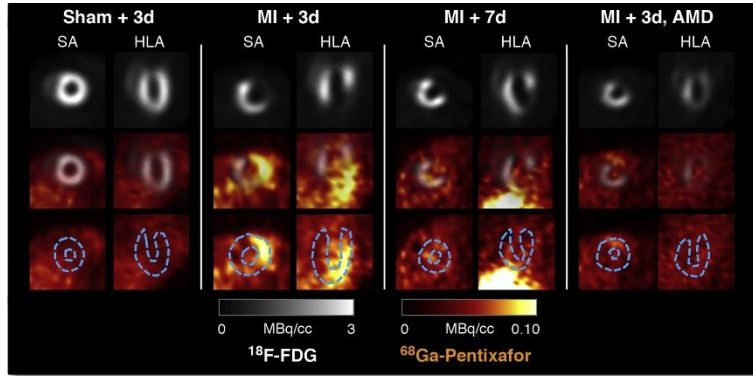
Numbers in brackets indicate references.  
Abbreviations: n.d., not determined; SDF-1, stromal cell-derived factor 1.

Borchert et al., *J Nucl Cardiol.* 2021;28:1636-1645.

Jaerve et al., *Stem Cells Transl Med.* 2012;1: 732-739.



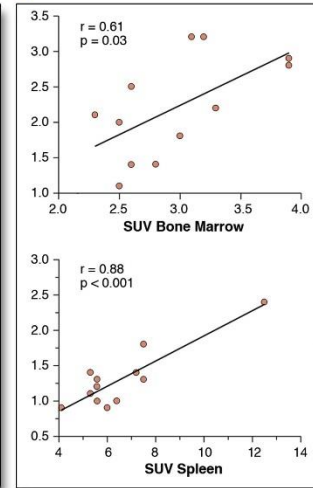
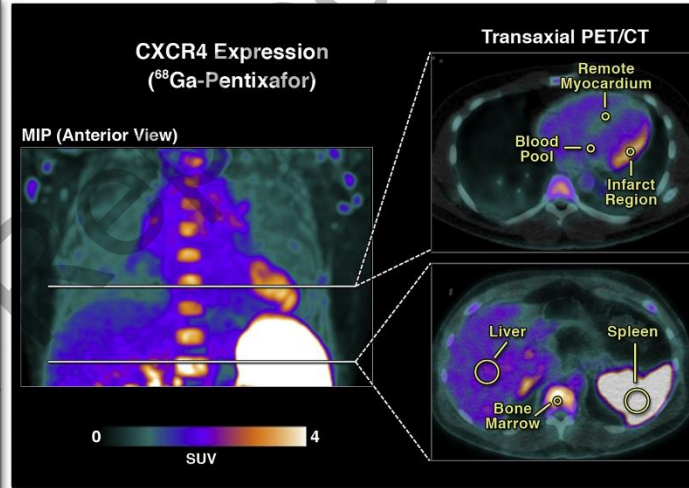
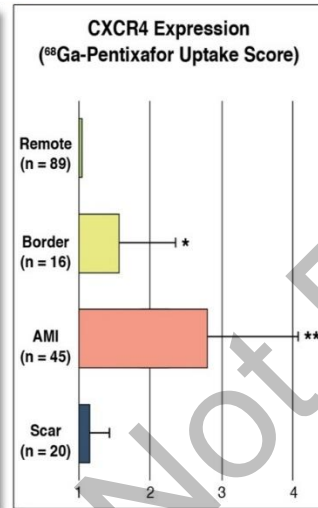
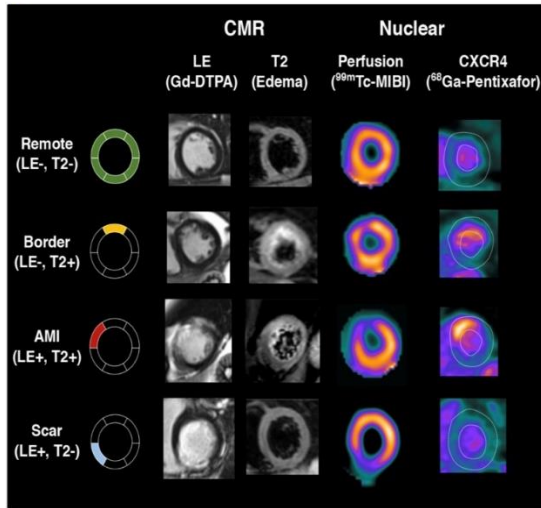
# Imaging Chemokine Receptor CXCR4 after AMI



Thackeray, Derlin... et al., *JACC Cardiovasc Imaging*. 2015;8:1417-1426.



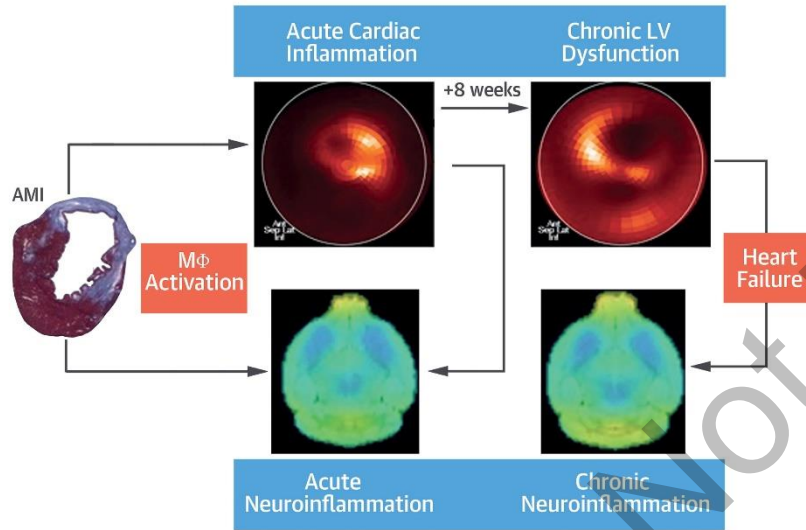
# Imaging Chemokine Receptor CXCR4 after AMI



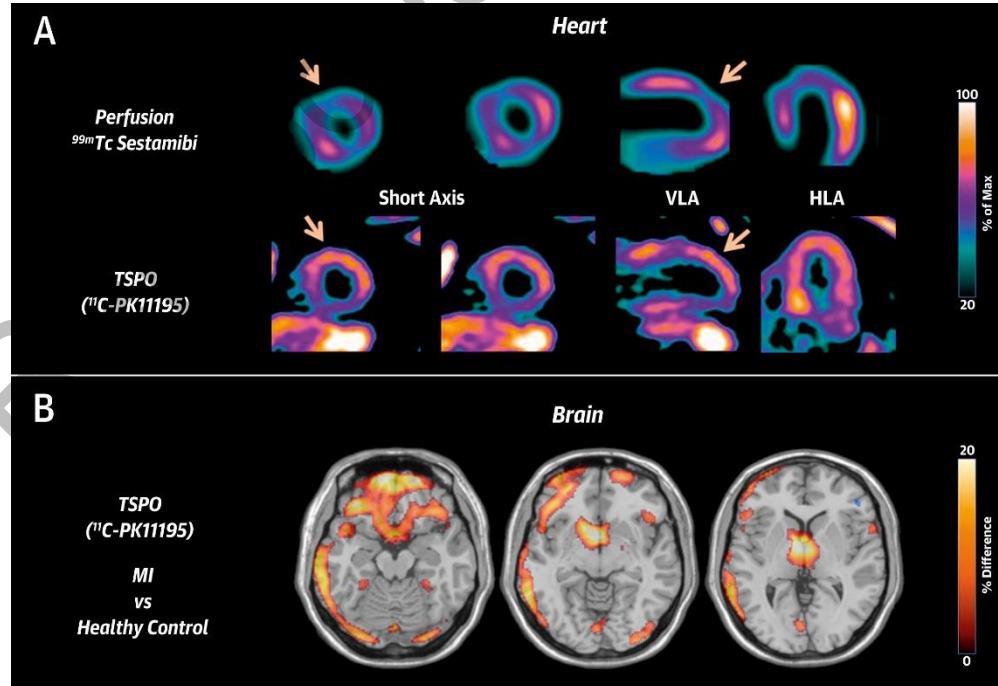
Thackeray, Derlin... et al., *JACC Cardiovasc Imaging*. 2015;8:1417-1426.

# Systems Analysis: Organ Crosstalk

**CENTRAL ILLUSTRATION: Serial Imaging Demonstrating Concurrent Elevation of TSPO in the Heart and Brain After Acute MI and in Chronic Heart Failure**

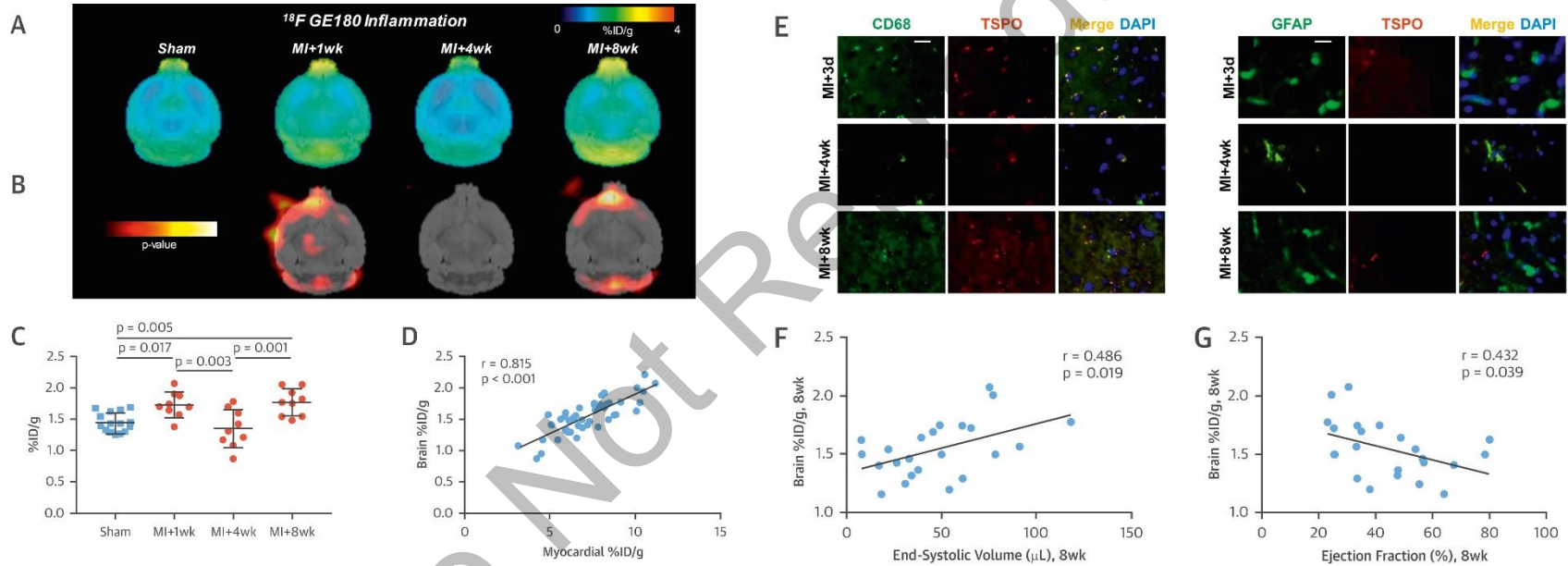


Thackeray, J.T. et al. *J Am Coll Cardiol.* 2018;71(3):263-75.



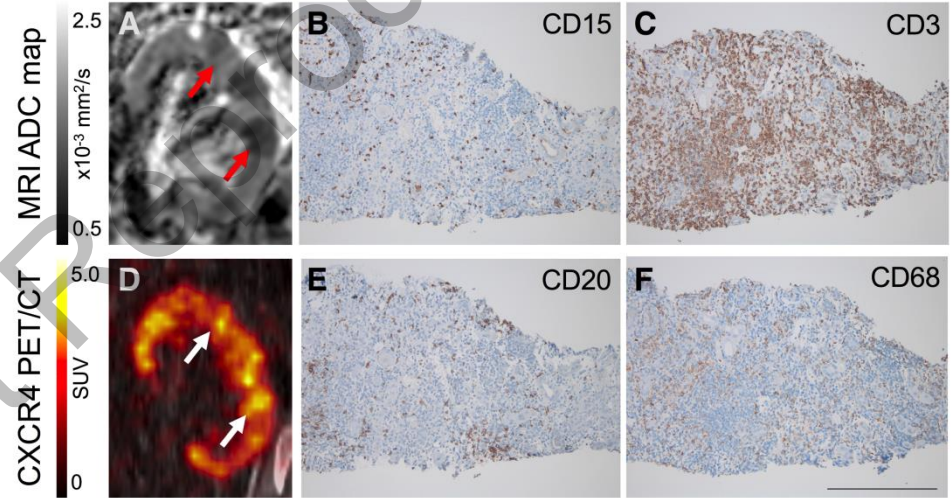
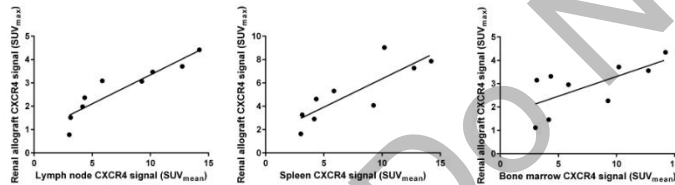
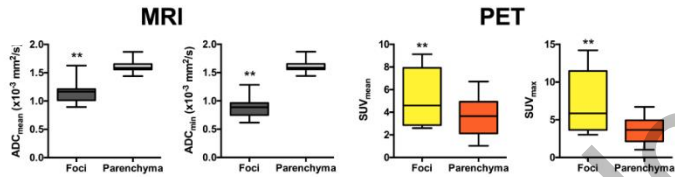
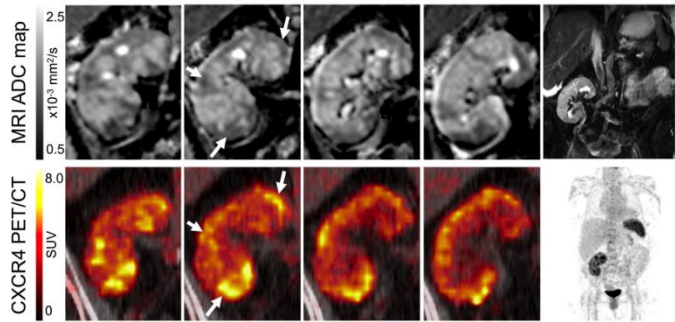
Thackeray et al., *J Am Coll Cardiol.* 2018;71;263-275.

# Serial Neuroinflammation Imaging After MI



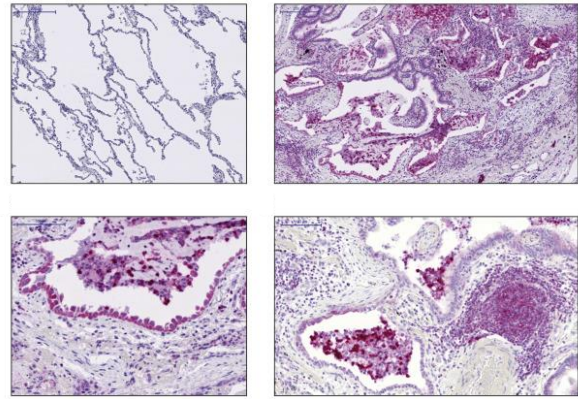
Thackeray et al., *J Am Coll Cardiol.* 2018;71;263-275.

# Integrating CXCR4-directed PET and MRI for characterizing allograft pyelonephritis

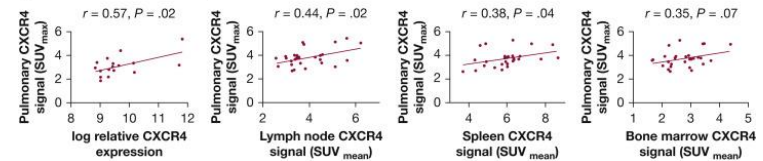
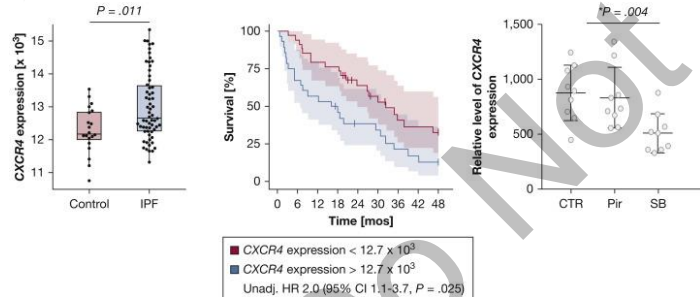
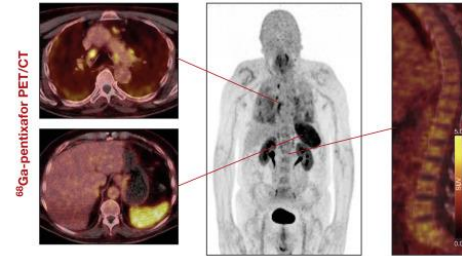
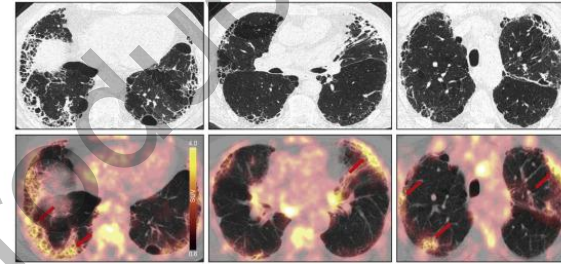


Derlin et al., *J Nucl Med.* 2017;58;1831-1837.

# Imaging of CXCR4 Expression in Pulmonary Fibrosis

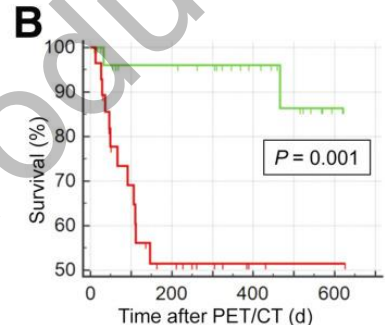
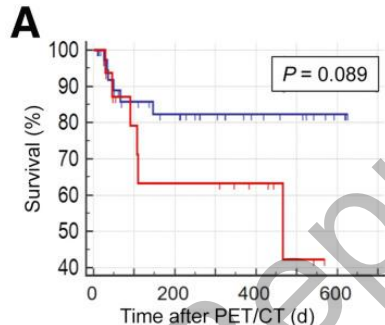
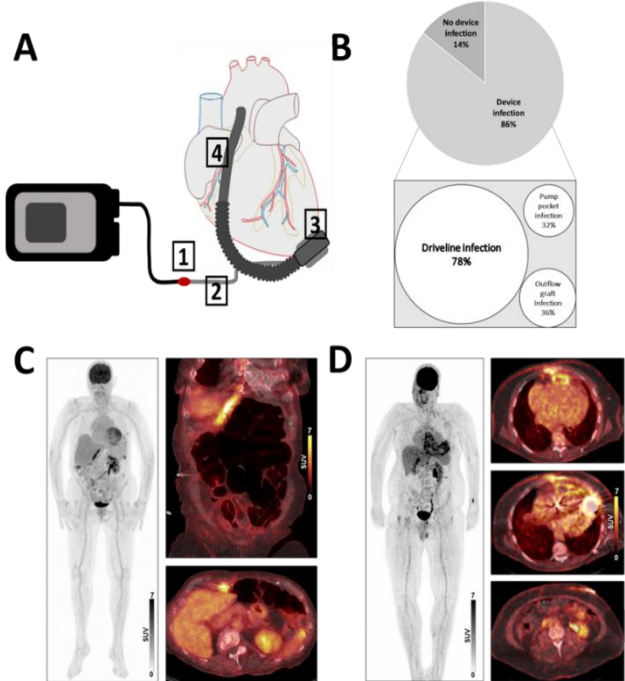


Pulmonary and systemic CXCR4 expression



Derlin et al., *Chest*. 2021;159;1094-1106.

# $^{18}\text{F}$ -FDG PET/CT in Left-Ventricular Assist Device Infection



Number at risk:

**1-2 Components**

	0	200	400	600			
1-2 Components	41	27	23	17	10	8	3

**3-4 Components**

	0	200	400	600			
3-4 Components	29	21	21	19	13	9	2

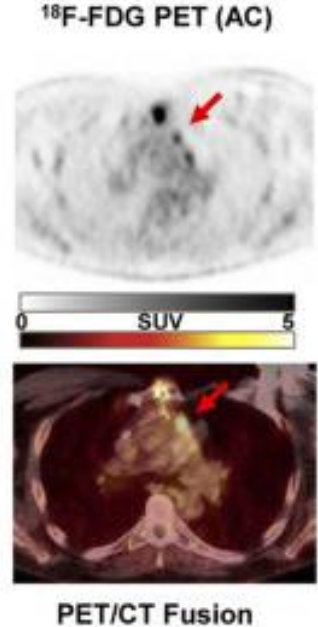
Number at risk:

**Peak SUV <2.5**

	0	200	400	600			
Peak SUV <2.5	29	21	21	19	13	9	2

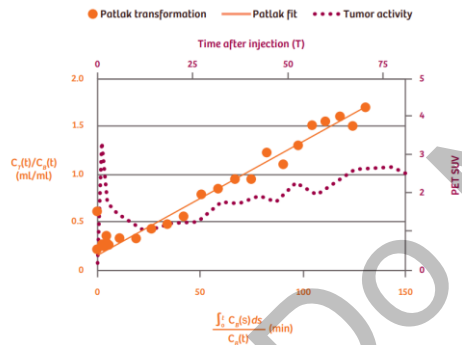
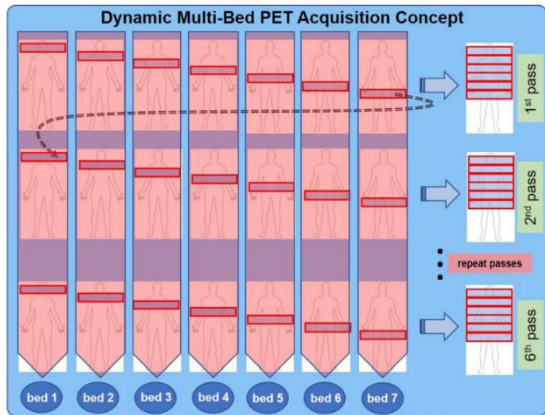
**Peak SUV >2.5**

	0	200	400	600			
Peak SUV >2.5	28	16	10	6	2	1	1

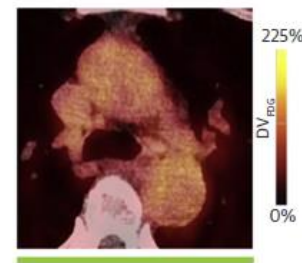
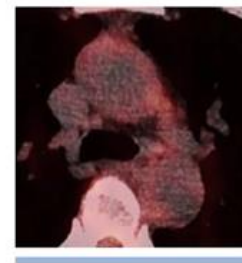
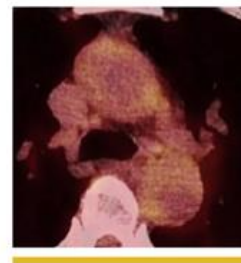
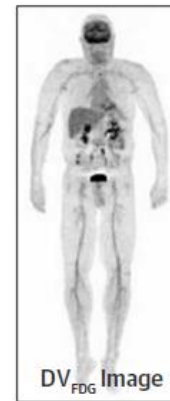
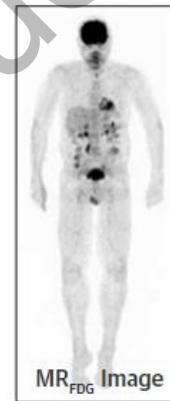


Extent of infection and lymph node signal are associated with outcome

# Parametric Imaging Using Dynamic Whole-Body PET



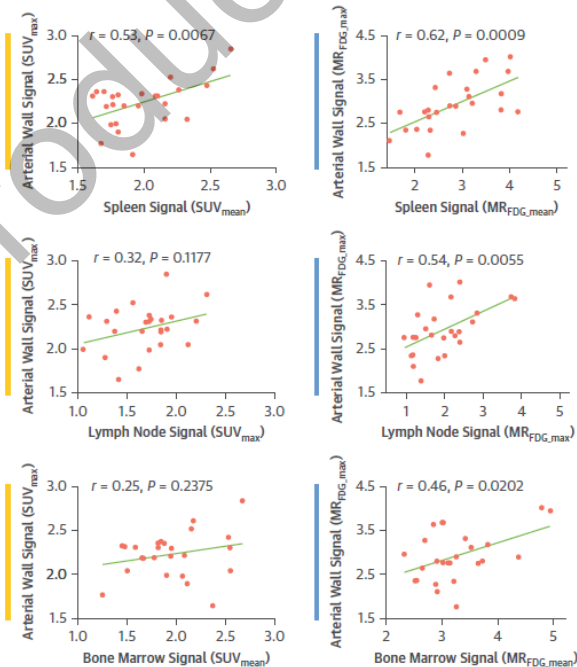
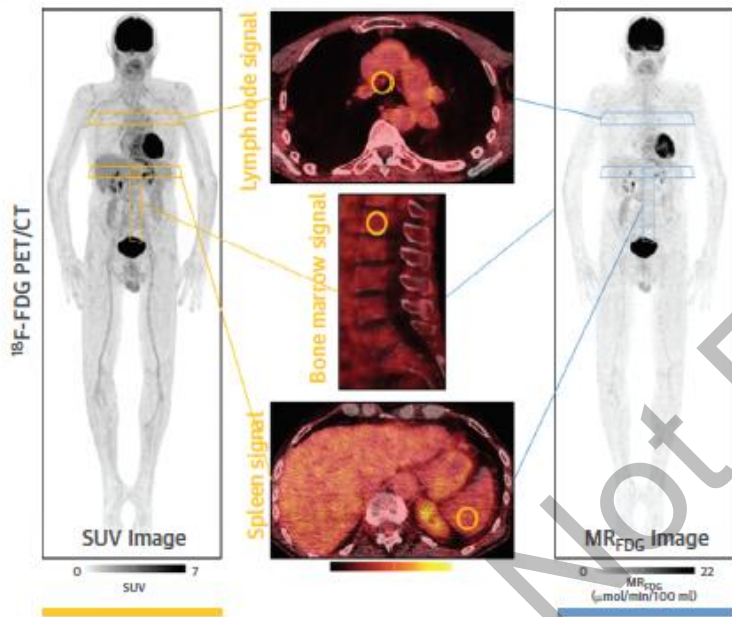
Parametric Whole-Body PET



Derlin et al., *J Am Coll Cardiol.* 2022;15;2098-2108.

# Parametric Imaging Using Dynamic Whole-Body PET

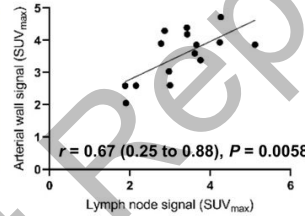
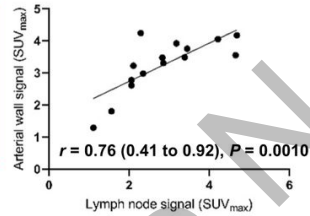
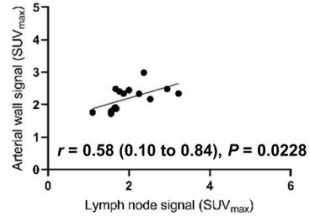
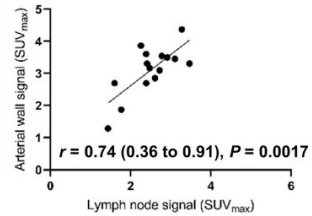
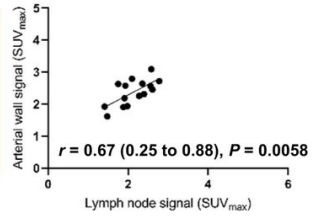
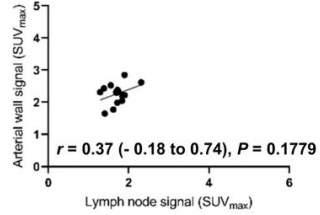
A



Derlin et al., *J Am Coll Cardiol.* 2022;15;2098-2108.



# Exploring Vessel Wall Biology In Vivo by Total-Body PET



1.5 h p.i.

3 h p.i.

12 h p.i.

Arterial wall signal vs	Spleen signal (SUV <sub>mean</sub> )			Bone marrow signal (SUV <sub>mean</sub> )			<i>r</i>
	<i>r</i>	95% CI	<i>P</i>	<i>r</i>	95% CI	<i>P</i>	
Conventional PET	0.65	0.20 to 0.87	<b>0.009</b>	0.31	-0.24 to 0.71	0.2657	0.37
Standard-dose TB PET 1.5h p.i.	0.79	0.46 to 0.93	<b>0.0005</b>	0.39	-0.16 to 0.75	0.1551	0.67
Standard-dose TB PET 3h p.i.	0.71	0.31 to 0.90	<b>0.0029</b>	0.25	-0.31 to 0.67	0.3789	0.58
Standard-dose TB PET 12h p.i.	0.52	0.01 to 0.82	<b>0.0465</b>	0.23	-0.33 to 0.66	0.4181	0.67
Ultra-low-dose TB PET 1.5h p.i.	0.67	0.23 to 0.88	<b>0.0068</b>	0.25	-0.30 to 0.68	0.3610	0.74
Ultra-low-dose TB PET 3h p.i.	0.80	0.48 to 0.93	<b>0.0004</b>	0.16	-0.39 to 0.62	0.5809	0.76

*CI* – confidence interval; *PET* – positron emission tomography; *p.i.* – post injection; *SUV* – standardized uptake value; *TB* – total-body

Derlin et al., *J Nucl Med.* 2023;64;416-422.

# Summary

## Nuclear Inflammation **Imaging** using **PET**

- is helpful in **infection** and (sterile) **inflammation**.
- grows because of increasing clinical need (e.g., rheumatologic disease, prosthetic infection).
- allows for identification of **organ crosstalk** throughout the body in **systemic inflammation**.
- **Total-body PET** will improve **quantification** of systemic interactions (e.g., parametric imaging).

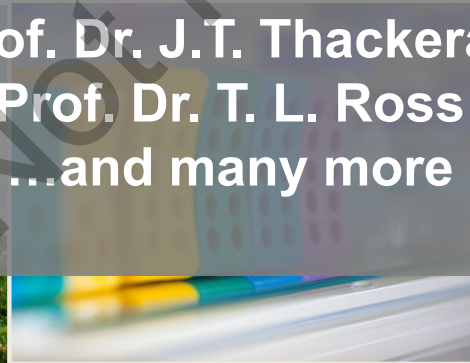
Clinical Use

Research



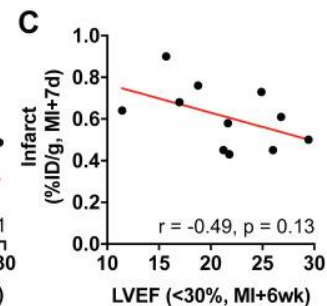
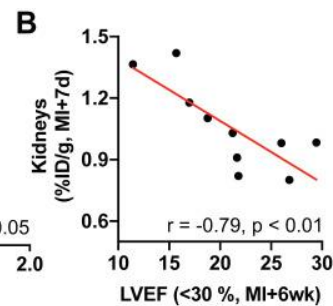
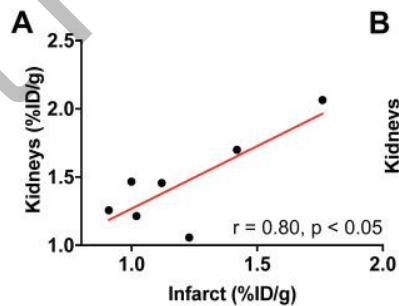
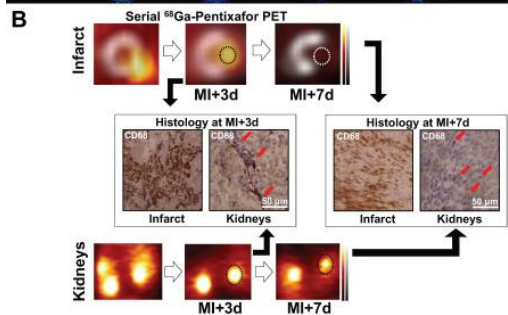
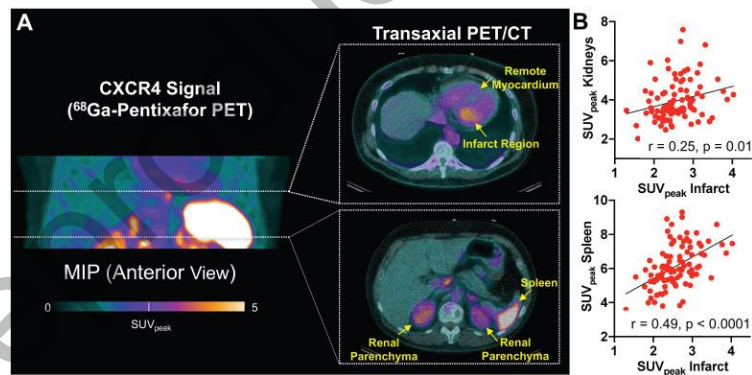
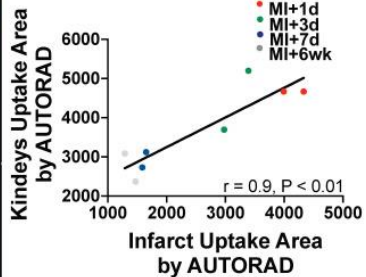
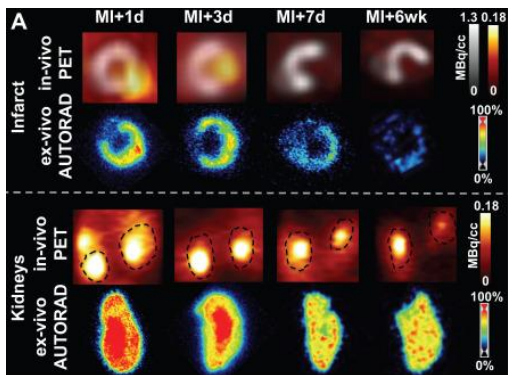
Nuclear Medicine  
Prof. F. M. Bengel  
Prof. Dr. T. Derlin

Prof. Dr. J.T. Thackeray  
Prof. Dr. T. L. Ross  
...and many more



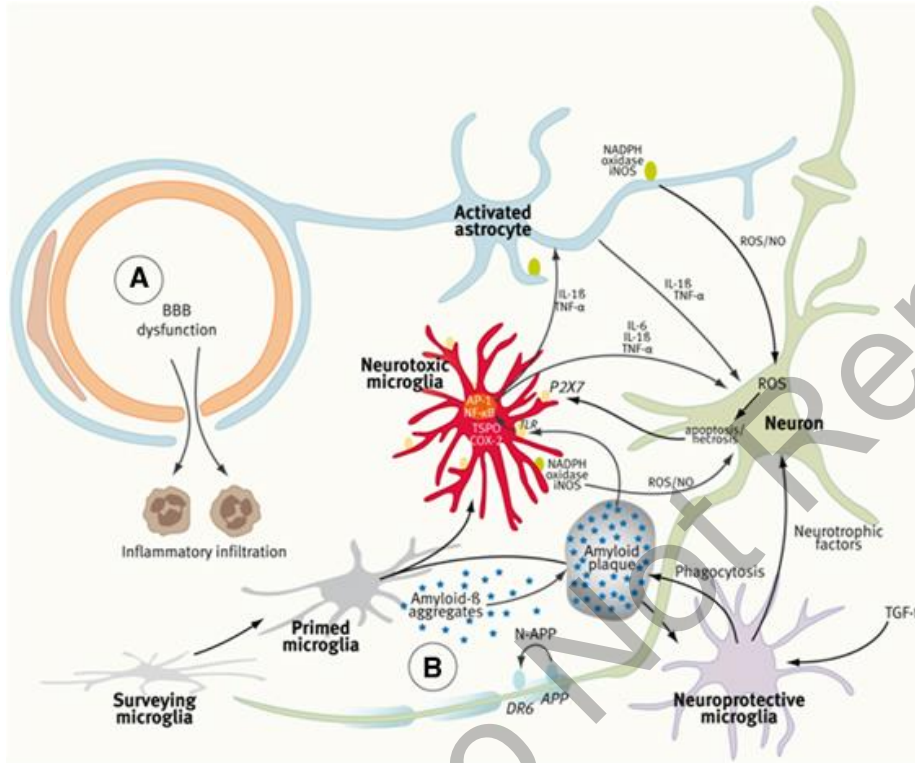
Do Not Reproduce

# Inflammation Crosstalk along Cardio-Renal Axis after AMI

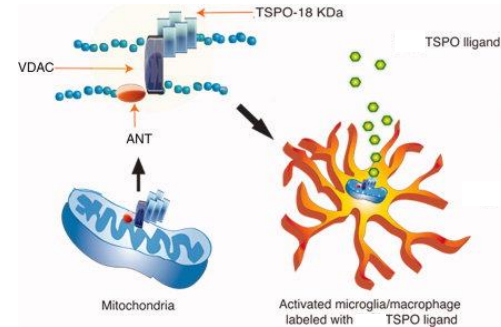
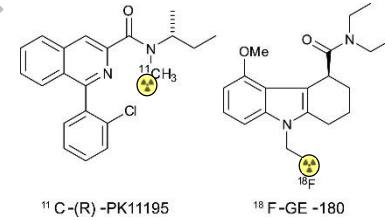


Werner et al., *Theranostics*. 2021;11;7984-7994.

# Neuroinflammation: Microglia

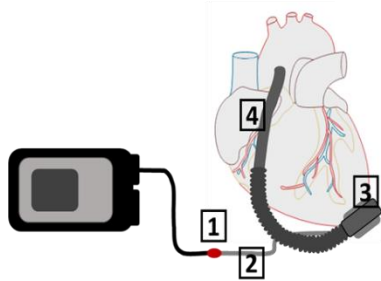


Target: TSP0  
(microglia/macrophages)

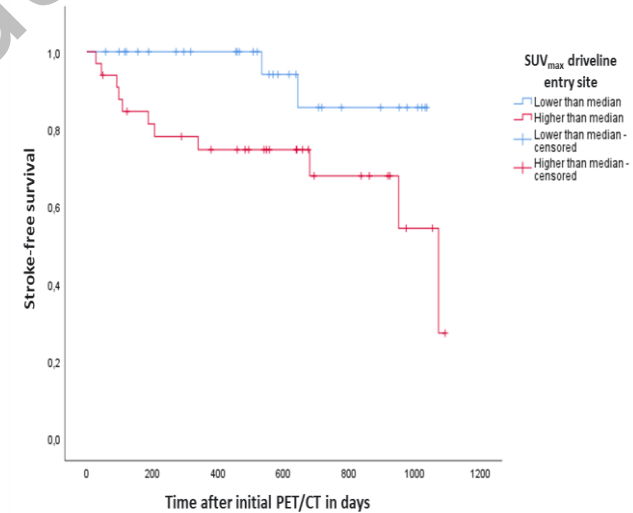


Jacobs et al., *J Cerebr Blood Flow Metab.* 2012;32:1393-1415.

# <sup>18</sup>F-FDG PET/CT in Left-Ventricular Assist Device Infection

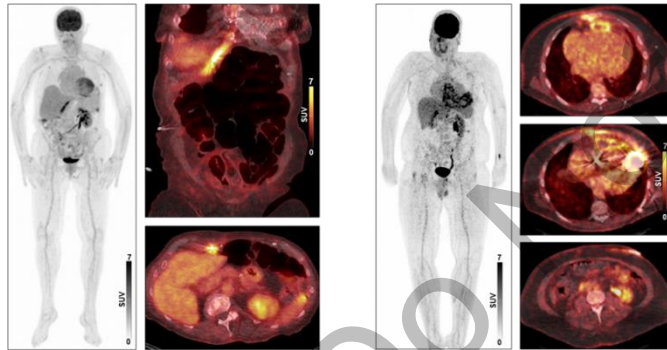


CRP	p = 0.09 r = 1.00	p = 0.09 r = 0.16	p = 0.19 r = -0.12	p = 0.02 r = 0.22	p = 0.02 r = 0.22	p = 0.00 r = 0.27	p = 0.07 r = 0.17	p = 0.40 r = -0.08	p = 0.05 r = 0.19	p = 0.00 r = 0.27
WBC	p = 0.09 r = 0.16	p = 0.09 r = 1.00	p = 0.21 r = -0.12	p = 0.33 r = 0.09	p = 0.06 r = 0.18	p = 0.69 r = -0.04	p = 0.72 r = 0.04	p = 0.51 r = -0.06	p = 0.09 r = 0.16	p = 0.43 r = 0.08
SUVmax thVSL	p = 0.19 r = -0.12	p = 0.21 r = -0.12	p = 0.00 r = -1.00	p = 0.00 r = -0.46	p = 0.00 r = 0.32	p = 0.00 r = 0.00	p = 0.98 r = 0.13	p = 0.15 r = 0.32	p = 0.00 r = 0.20	p = 0.03 r = 0.13
SUVmean SPL	p = 0.02 r = 0.22	p = 0.33 r = 0.09	p = 0.00 r = 0.46	p = 0.00 r = -1.00	p = 0.00 r = 0.49	p = 0.01 r = 0.24	p = 0.15 r = 0.14	p = 0.03 r = 0.20	p = 0.01 r = 0.25	p = 0.04 r = 0.19
SUVmean BM	p = 0.02 r = 0.22	p = 0.06 r = 0.18	p = 0.00 r = 0.32	p = 0.00 r = 0.49	p = 0.00 r = 0.16	p = 0.09 r = 0.16	p = 0.47 r = 0.07	p = 0.03 r = 0.20	p = 0.06 r = 0.17	p = 0.49 r = 0.06
SUVmax MLNs	p = 0.00 r = 0.27	p = 0.69 r = -0.04	p = 0.98 r = 0.00	p = 0.01 r = 0.24	p = 0.09 r = 0.16	p = 0.00 r = 1.00	p = 0.38 r = 0.08	p = 0.89 r = 0.01	p = 0.00 r = 0.33	p = 0.01 r = 0.24
SUVmax sCDL	p = 0.07 r = 0.17	p = 0.72 r = 0.04	p = 0.16 r = 0.13	p = 0.15 r = 0.14	p = 0.07 r = 0.07	p = 0.38 r = 0.08	p = 0.00 r = 0.51	p = 0.00 r = 0.01	p = 0.02 r = 0.22	p = 0.07 r = 0.17
SUVmax DLCS	p = 0.40 r = -0.06	p = 0.51 r = -0.06	p = 0.00 r = 0.32	p = 0.03 r = 0.20	p = 0.03 r = 0.20	p = 0.89 r = 0.01	p = 0.00 r = 0.51	p = 0.00 r = 1.00	p = 0.00 r = 0.16	p = 0.42 r = -0.06
SUVmax OG	p = 0.05 r = 0.19	p = 0.69 r = 0.16	p = 0.03 r = 0.20	p = 0.01 r = 0.25	p = 0.06 r = 0.17	p = 0.00 r = 0.33	p = 0.02 r = 0.22	p = 0.08 r = 0.16	p = 0.00 r = 1.00	p = 0.00 r = 0.44
SUVmax PP	p = 0.00 r = 0.27	p = 0.43 r = 0.08	p = 0.16 r = 0.13	p = 0.04 r = 0.19	p = 0.49 r = 0.06	p = 0.01 r = 0.24	p = 0.07 r = 0.17	p = 0.42 r = -0.08	p = 0.00 r = 0.44	p = 0.00 r = 1.00



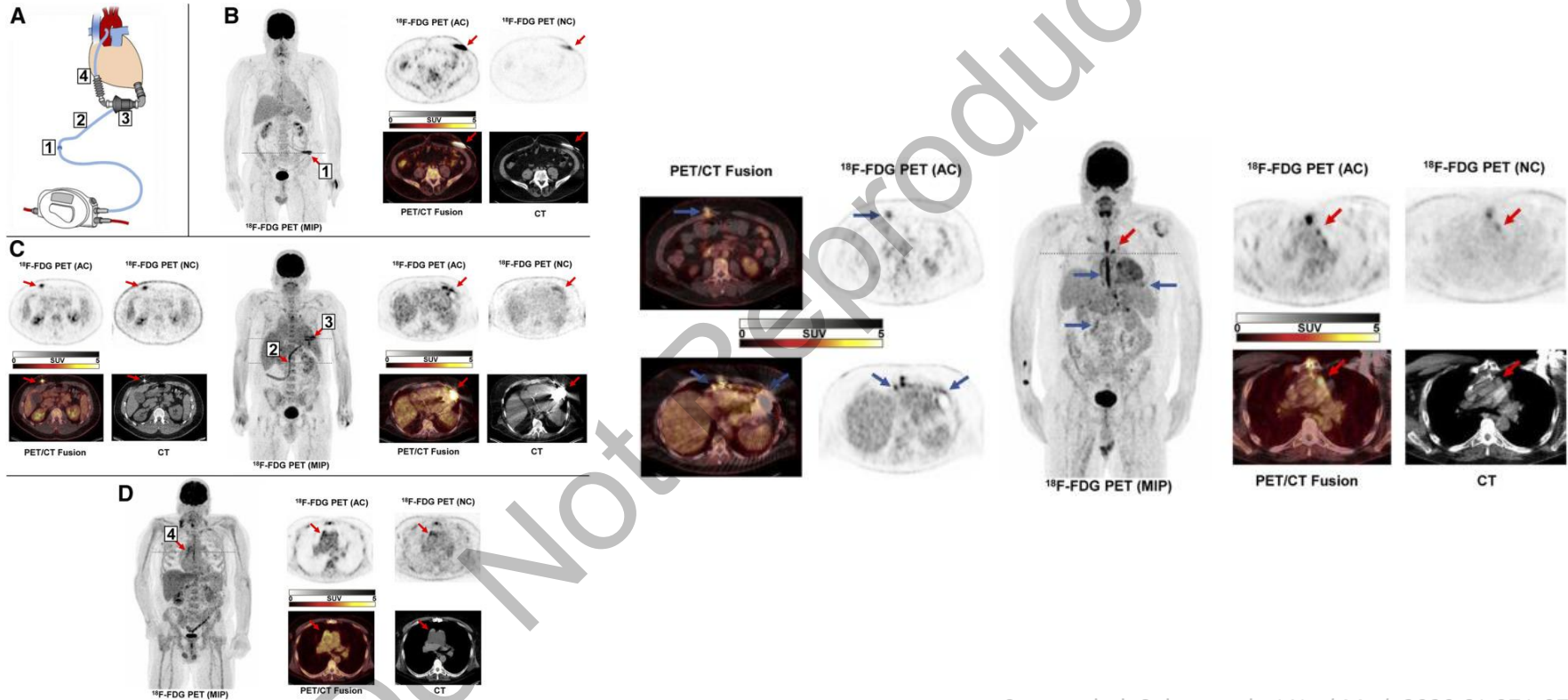
Number at risk (Number censored)

Higher than median	33 (0)	25 (2)	21 (4)	15 (10)	9 (15)	3 (20)	0 (22)
Lower than median	31 (0)	25 (6)	22 (9)	13 (17)	7 (22)	4 (25)	0 (29)



Hupe et al., *Scie Rep.* 2023; in press

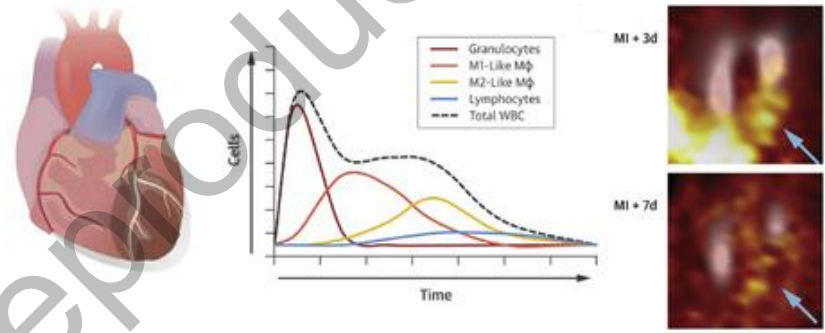
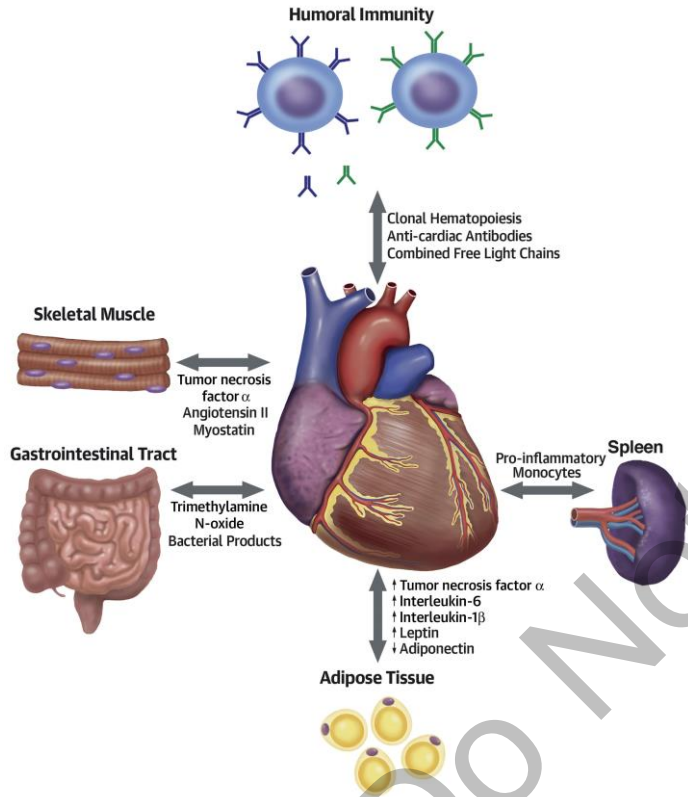
# $^{18}\text{F}$ -FDG PET/CT in Left-Ventricular Assist Device Infection



Sommerlath Sohns et al., *J Nucl Med.* 2020;61;971-976.



# Inflammation interactions in cardiovascular disease



CARDIOMYOCYTES	GRANULOCYTES	Ly6C <sup>HIGH</sup> M1-Like M $\phi$	Ly6C <sup>LOW</sup> M2-Like M $\phi$	ANGIOGENESIS
FDG	FDG CXCR4 Cell labeling	FDG MET SSTR2 CXCR4 TSPO RGD Cell labeling	Mannose CXCR4 SSTR2 RGD Cell labeling	RGD

Murphy et al., *J Am Coll Cardiol.* 2020;75;1324-1340.

Thackeray et al., *J Am Coll Cardiol.* 2018;75;1340-1355.

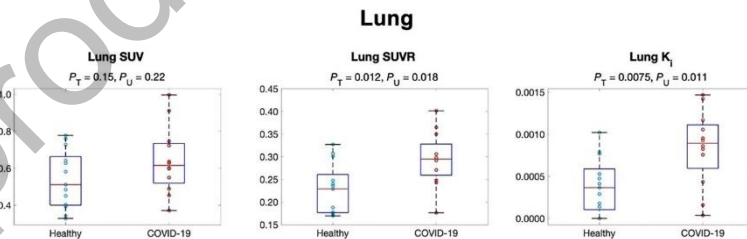
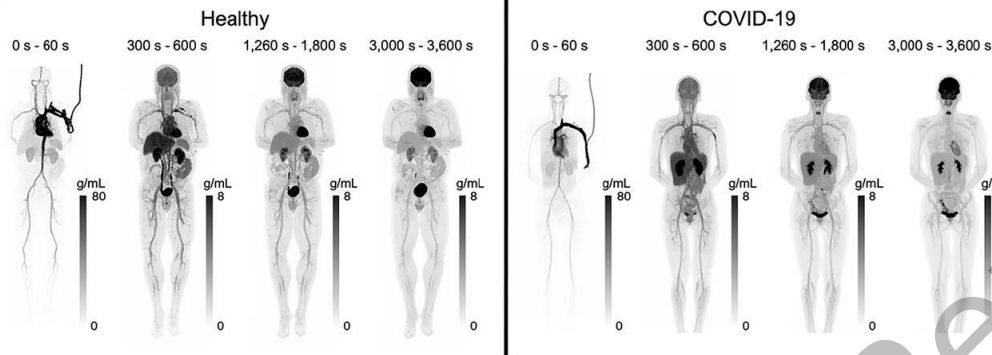
# Inflammation and Infection:

## *Things to Consider*

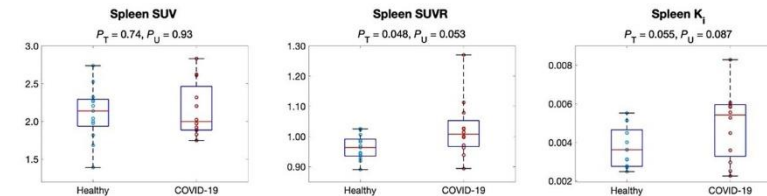
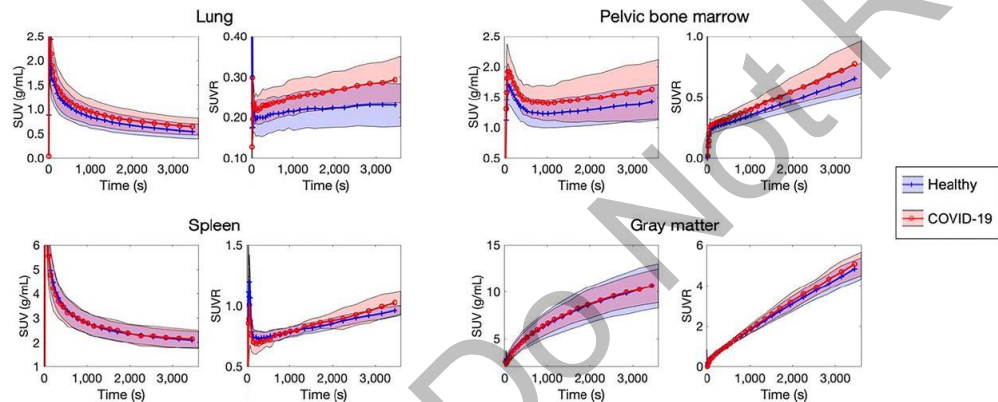
- Life expectancy increasing
- Prevalence of immunocompromized states increasing (cancer survivors, diabetes, HIV, transplant recipients)
- Success of implants / prostheses
- Environmental factors (lung disease)
- Bacterial resistance

# Total-Body Multiparametric PET Quantification of FDG Delivery and Metabolism

A

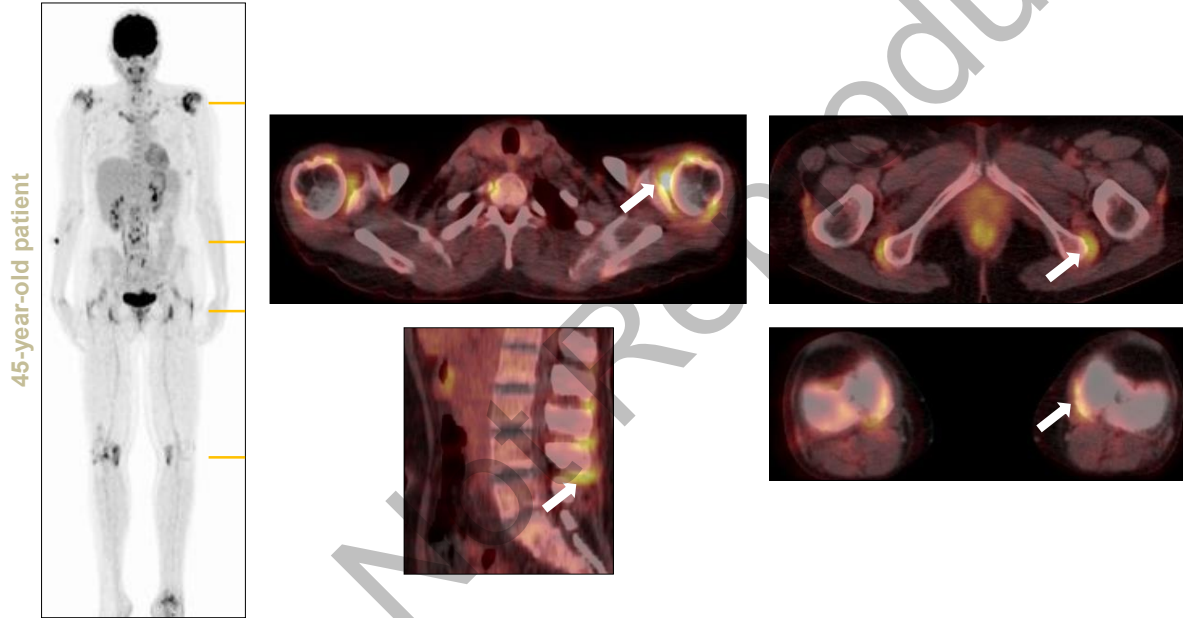


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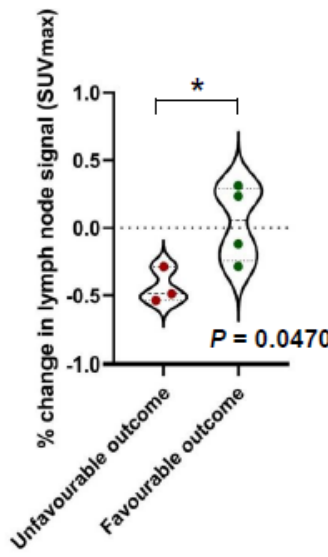
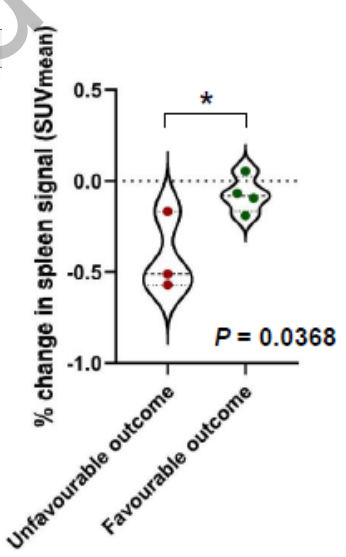
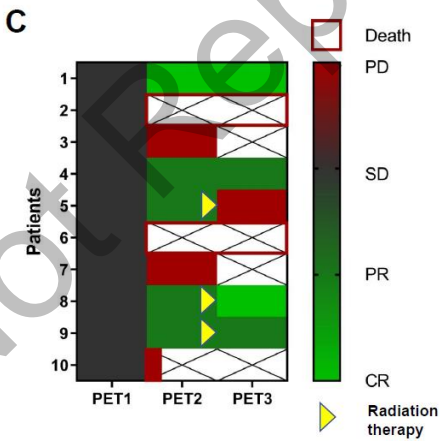
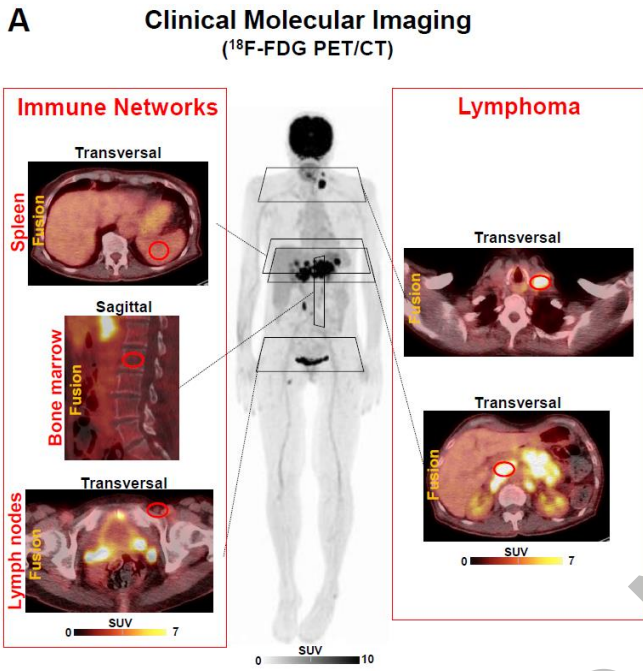


Wang et al., *J Nucl Med.* 2023.

# Mapping Inflammation in Rheumatic Diseases



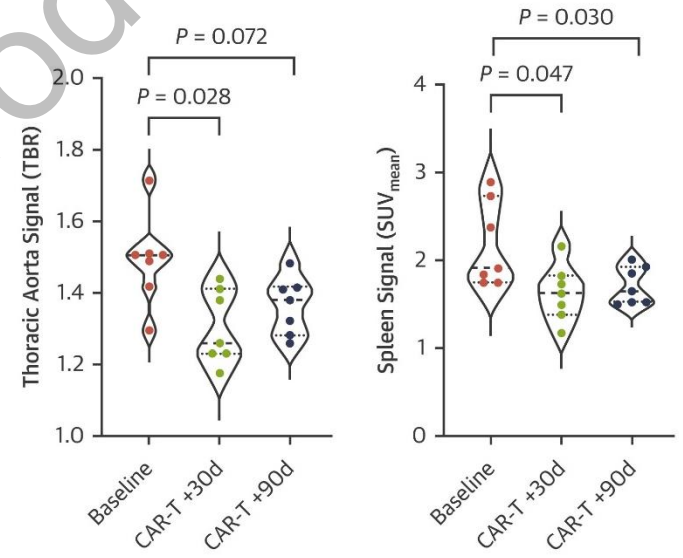
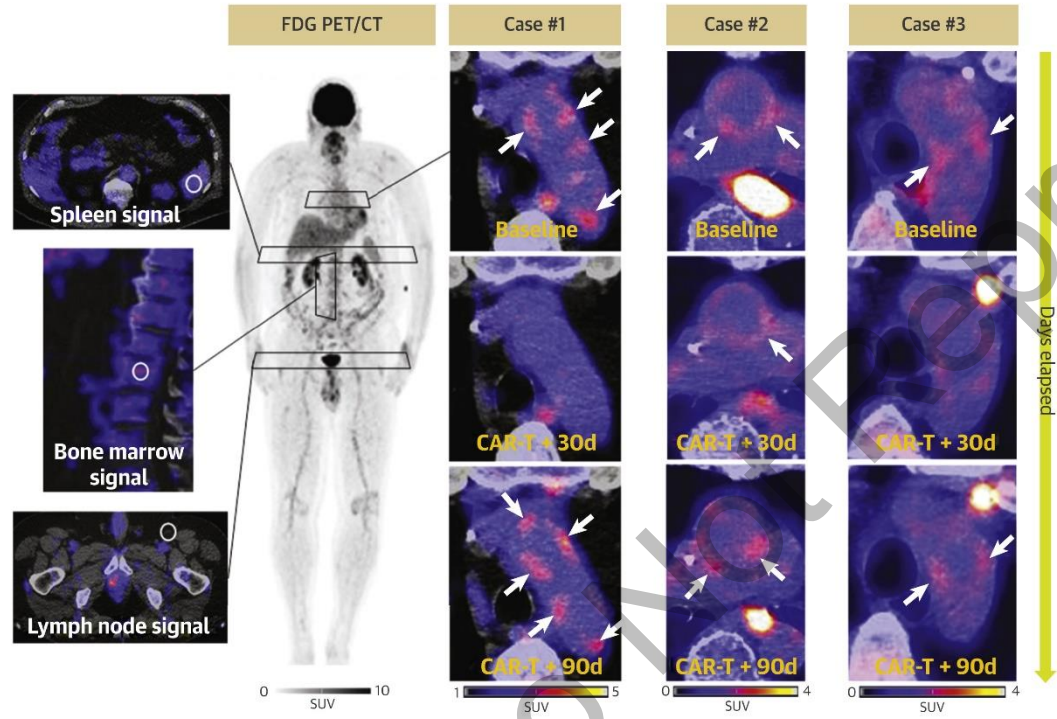
# Off-Target Lymphoid Organs in CD19-Targeting CAR-T-Cell Therapy



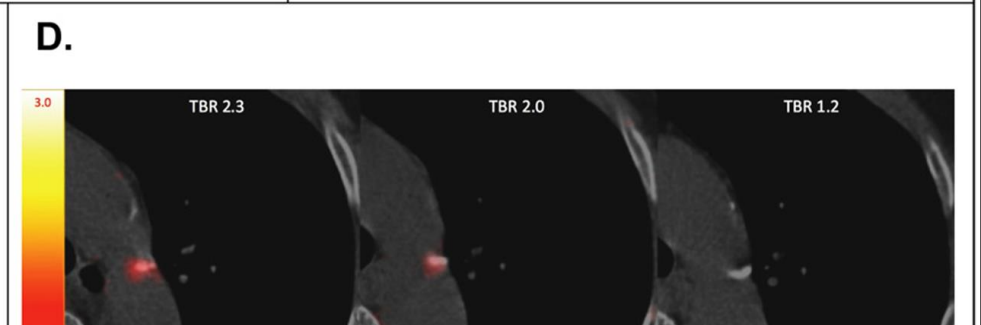
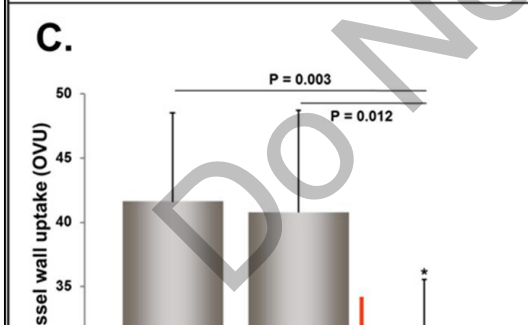
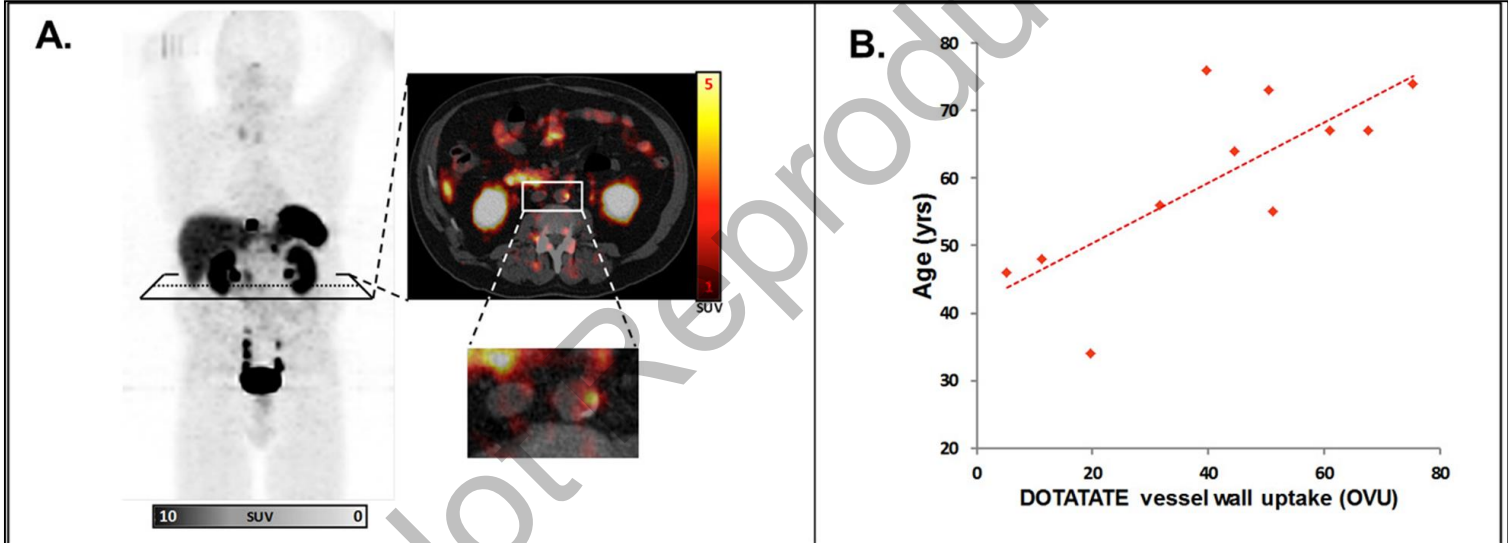
Derlin et al., *Ann Nucl Med.* 2021;35;132-138.

# CD19-Targeted Immunotherapy Attenuates Vessel Wall Inflammation

A

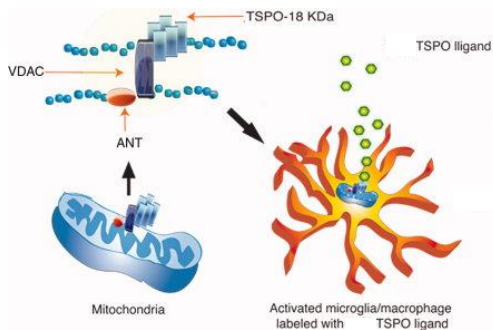
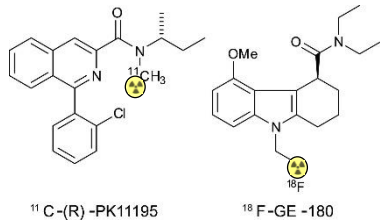


Derlin et al., *JACC Cardiovasc Imaging*. 2021;14;1864-1866.

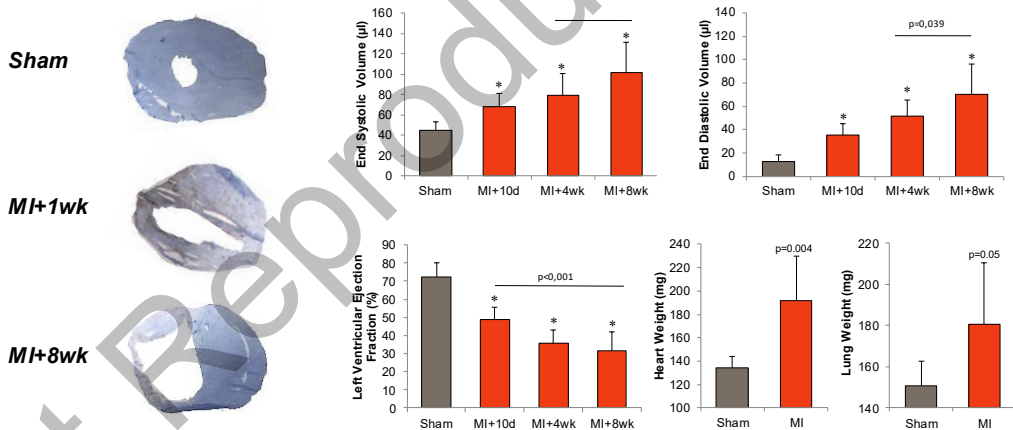


# Cardiac Damage is Associated with Neuroinflammation

Target: TSPO  
(microglia/macrophages)



In a mouse model of post-infarct left ventricular remodeling:



TSPO-targeted PET shows early post-infarct inflammation, and late (non-inflammatory) mitochondrial impairment.

Thackeray et al., *J Am Coll Cardiol.* 2018;71;263-275.