DISEASE SPECIFIC OVERVIEW: AHSCT in SSC

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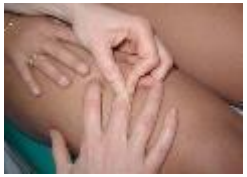
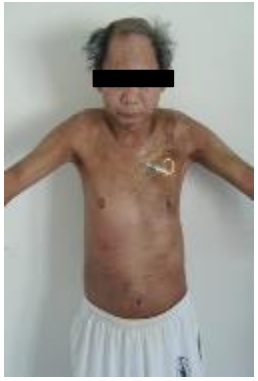
Scleroderma or Systemic Sclerosis : 1996-2018

Prevalence : **7 à 1580 / million** Incidence : **0.6 à 19 / million x 1.2 -1.8 black female**





- Scleroderma
  - Localized Scleroderma
    - Annular scleroderma
    - Linear scleroderma
    - Morphea
  - **Systemic Sclerosis**
    - Limited SSc
    - Diffuse SSc
    - SSc *sine scleroderma*
    - Overlap syndrom

EUSTAR data base

ORPHAN RARE DISEASE PLAN

EURORDIS Patients association

ADWP EBMT registry

⇒ **Better awareness / pronostic factors : PHT**

⇒ **Earlier diagnosis EULAR 2013**

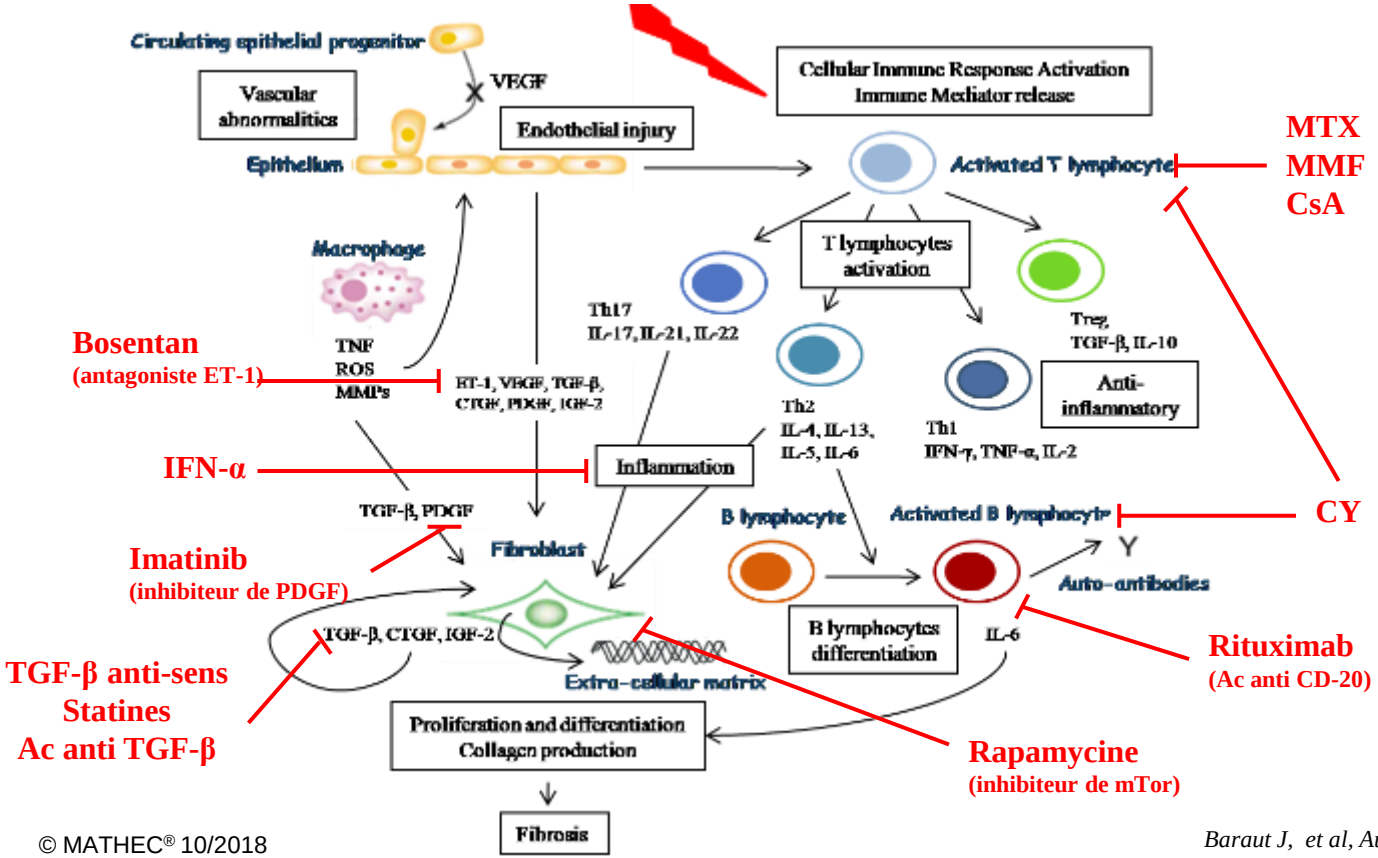
⇒ **Disease evaluation Activity criteria**

- No skin sclerosis proximal to elbows and knees
- Anti-centromere (ACA)
- CREST subgroup

- Proximal Skin sclerosis
- Early Inflammatory features
- Anti-Scl-70 or anti-RNA polymerase

- lcSSc or dcSSc
- \+ other AD features

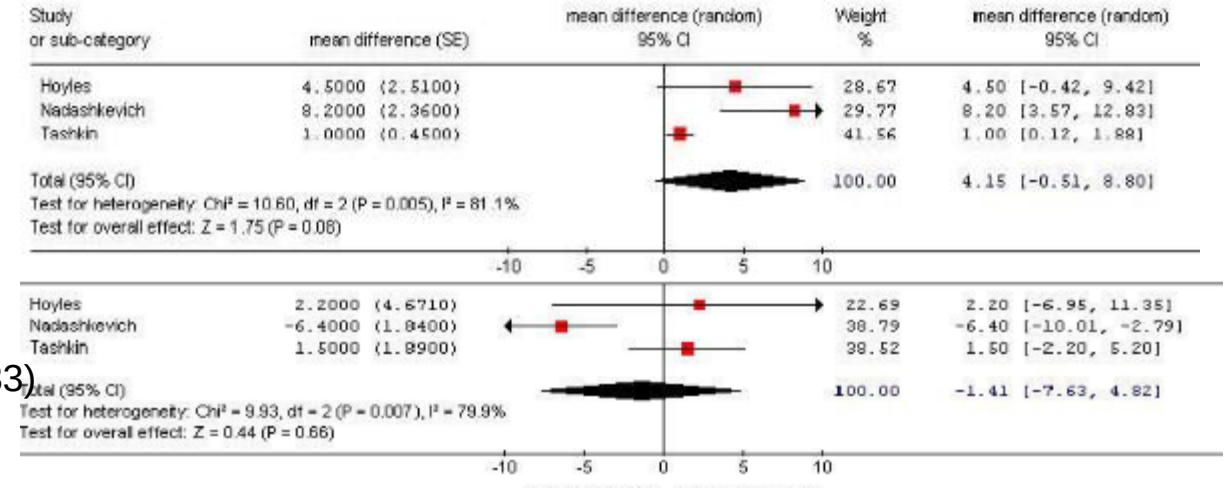
AHSCT CAN REVERSE THE ACTIVATION and RESET THE IMMUNE RESPONSE in SSc



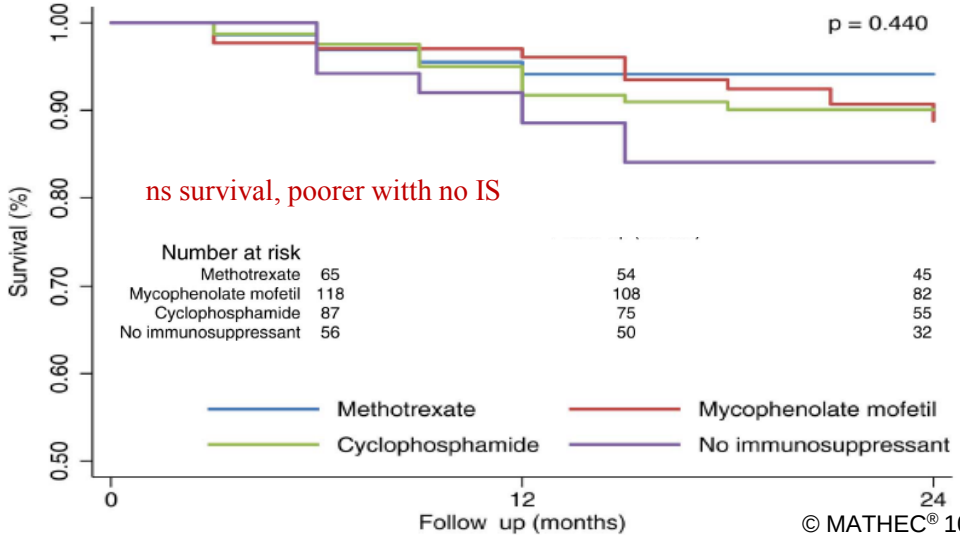
Baraut J, et al, Autoimmun rev. 2010

FVC : mean change
2.83% (95% CI:0.35; 5.31)

DLCO : mean change
4.56% (95% CI :-0.21; 9.33)



Nanini Athr Res Ther 2008



ns survival, poorer witth no IS

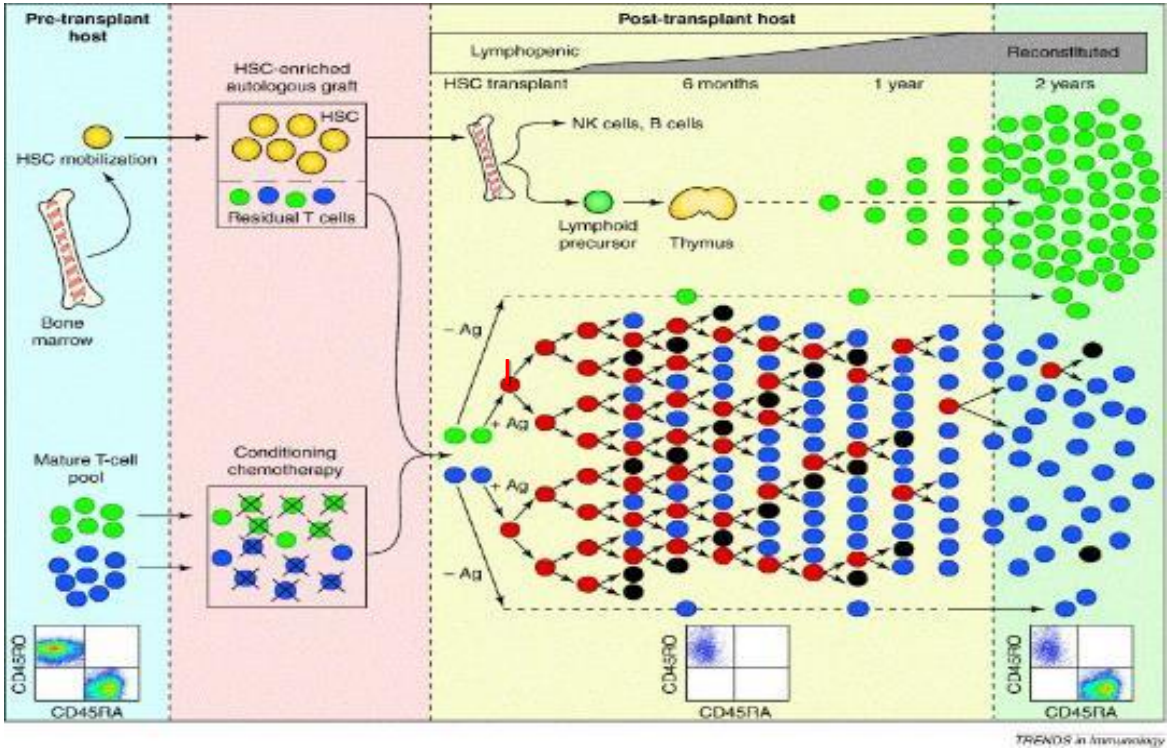
ESOS Study
Early Diffuse cutaneous SSc
326 pts 50 centers;

Herrick AL, *et al*. *Ann Rheum Dis* 2016;**0**:1–12.

AHSCT : renewal of the immune repertoire Immune reconstitution

Type I : replacement of mature T/B memory repertoire with naïve, non-pathogenic cells

Type II : reinstatement of Immune Regulation ↑ nb and/or function of regulatory cells



Naïve

Memory

Senescent

1. **Immunophenotyping**,
2. Thymic (T cells) and bone marrow (B cells) function by **DNA excision circles quantification during T / B cell Receptor rearrangements**:
   signal-joint (SjTREC) or β-chain (βTREC) TCR, Coding (Cj) and signal-joint-K-chain (sjKREC)
3. **T and B cell repertoire diversity** :
   - CDR3 spectratyping
   - *Nucleotide sequencing*

Farge Arthritis Rhum 2008 (n = 7), Barault BMT2013 (n = 7), Michel BMT 2016 (n=7), Farge Hemato Oncol 2017 (n=12), Coelho Blood Advances 2018 (n= 25 + 6 **non / responders**)

T regulatory cells Foxp3, higher T-cell receptor (TCR) diversity, ↑ **$CD4^{+}CD25^{high}FoxP3$** ↑**regulatory T cells suppressive function**
newly generated naive B cells, ↑ B regs and ↑ IL10 (6 months after AHSCT)

20 YEARS - 3 RCT TRIALS : GRADE 1 evidence for AHSCT in SSC

Phase I-II

Phase II-III

Recommandations

1997 Special Report : **Blood and marrow stem cell transplants in auto-immune disease: a consensus report written on behalf of the European League against Rheumatism (EULAR) and the European Group for Blood and Marrow Transplantation (EBMT)** Tyndall A, Gratwohl A et al . BMT

2002 **Autologous bone marrow transplantation in the treatment of refractory systemic sclerosis: early results from a French multicentre phase I-II study.** Farge D et al., Br J Haematol.

2004 **Autologous stem cell transplantation in the treatment of systemic sclerosis: report from the EBMT/EULAR Registry.** Farge D et al. Ann Rheum Dis.

2008 **Long-term follow-up results after autologous haematopoietic stem cell transplantation for severe systemic sclerosis.** Vonk MC et al, Ann Rheum Dis.

2011 **Autologous non-myeloablative haemopoietic stem-cell transplantation compared with pulse cyclophosphamide once per month for systemic sclerosis (ASSIST): an open-label, randomised phase 2 trial.** Burt RK et al, Lancet.

2012 **Haematopoietic SCT in severe autoimmune diseases: updated guidelines of the European Group for Blood and Marrow Transplantation.** Snowden JA et al, BMT

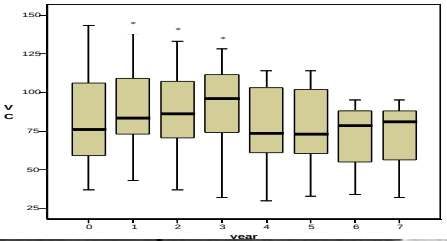
2014 **Autologous hematopoietic stem cell transplantation vs intravenous pulse cyclophosphamide in Haematopoietic SCT in severe diffuse cutaneous systemic sclerosis: a randomized clinical trial.** van Laar JM and Farge D, et al JAMA.

2015 **SCT for severe autoimmune diseases: consensus guidelines of the European Society for Blood and Marrow Transplantation for immune monitoring and biobanking.** Alexander T et al , BMT

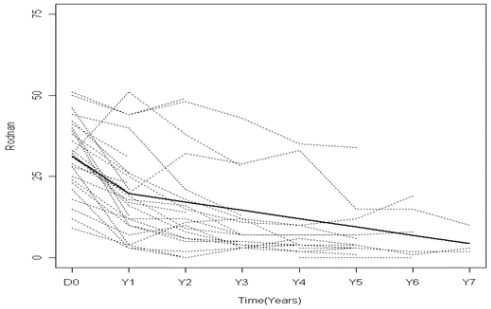
2017 **Cardiopulmonary assessment of patients with systemic sclerosis for hematopoietic stem cell transplantation: recommendations from the European Society for Blood and Marrow Transplantation Autoimmune Diseases Working Party and collaborating partners** Farge D and Burt R, et al BMT

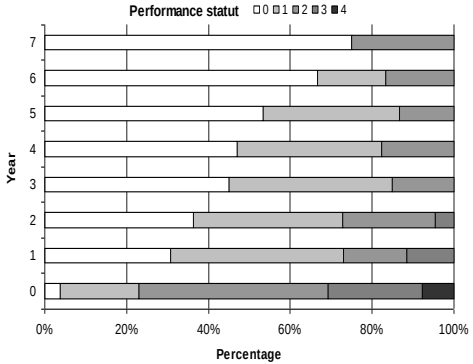
2018 **Myeloablative Autologous Stem-Cell Transplantation for Severe Scleroderma** Mc Sweenay NEJM

CLINICO PATHOLOGICAL RESULTS from the phase I-II studies: Skin and lung fibrosis regression + Improved functionnal status

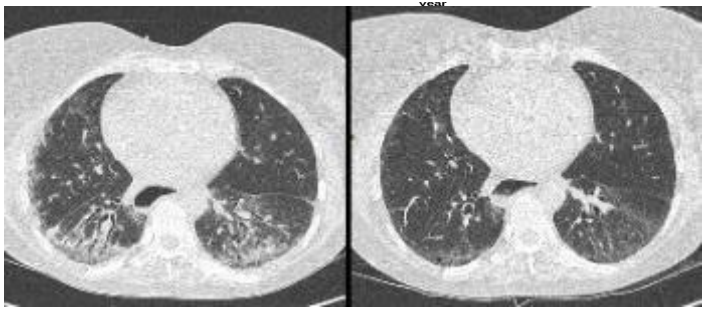


FVC

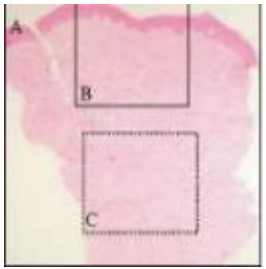


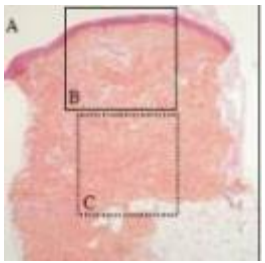


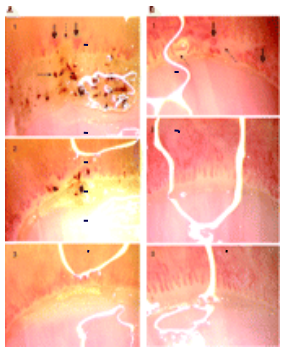
Farge et al BJH 002 , Ann Rheum 2004 , Vonk et al Ann Rheum 2008



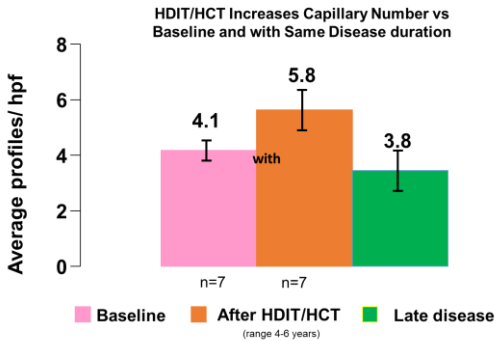
Launay D J Rheumatol 2009 VFC + DLCO + scanner



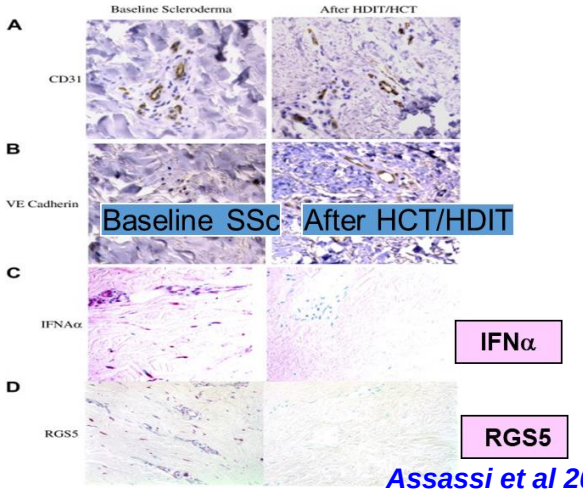




Aschwanden et al ARD 2008



Fleming JN et al 2008



Assassi et al 2010

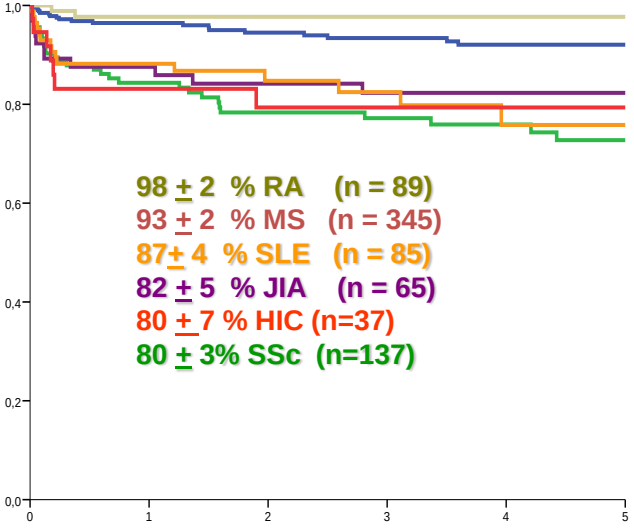
Verrecchia F, O Verola Rheumatology 2007

Autologous hematopoietic stem cell transplantation for autoimmune diseases: an observational study on 12 years' experience from the European Group for Blood and Marrow Transplantation Working Party on Autoimmune Diseases

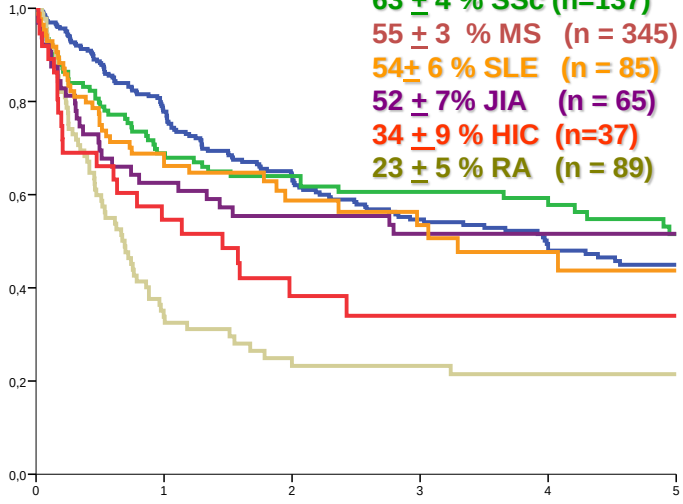
Dominique Farge,[1] Myriam Labopin,[2] Alan Tyndall,[3] Athanasios Fassas,[4] Gian Luigi Mancardi,[5] Jaap Van Laar,[6] Jian Ouyang,[7] Tomas Kozak,[8] John Moore,[9] Ina Kötter,[10] Virginie Chesnel,[11] Alberto Marmont,[12] Alois Gratwohl,[13] and Riccardo Saccardi[14]

haematologica | 2009; 95(2)

Overall Survival 3 yrs (n= 900)



PFS 3 yrs (n=900)



CENTRE EFFECT ON TRM, OS, PFS :
According to activity center (n ≥ 13);

100 D TRM for SSC : 6 %

in 2018: 560 SSc in the EBMT registry

100-day transplant-related mortality*	P	HR	95.0% IC
Centers' experience	0.003	0.32	0.16-0.69
Diagnosis	0.03		
Multiple sclerosis		1.78	0.21-14.8
Systemic sclerosis		4.45	0.56-35.4

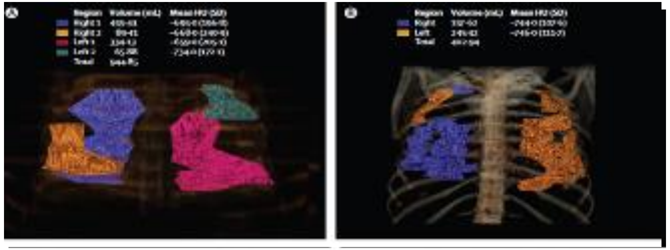
Autologous non-myeloablative haemopoietic stem-cell transplantation compared with pulse cyclophosphamide once per month for systemic sclerosis (ASSIST): an open-label, randomised phase 2 trial

Lancet 2011; 378: 498–506

Richard K Burt, Sanjiv J Shah, Karin Dill, Thomas Grant, Mihai Gheorghiade, James Schroeder, Robert Craig, Ikuo Hirano, Kevin Marshall, Eric Ruderman, Borko Jovanovic, Francesca Milanetti, Sandeep Jain, Kristin Boyce, Amy Morgan, James Carr, Walter Barr*

Age (years)	45 (32–58)	44 (26–54)
Sex (female)	9	8
Ethnicity		
White	7	8
Hispanic	1	0
Black	2	1
Disease duration from diagnosis (months)	13·6 (2–33)	18 (6–36)
History of Raynaud's	9	9
Modified Rodnan skin score	28 (6–48)	19 (4–45)
Systemic sclerosis		
Diffuse	8	7
Limited (with lung involvement)	2	2
Gastrointestinal		
Gastrointestinal reflux disease	10	9
Patulous (gaping) oesophagus	6	5
Small bowel involvement	1	0
Lung		
Forced vital capacity	62% (53–70)	67% (43–84)
Diffusing capacity of CO_2 corrected	58% (29–82)	75% (29–111)
Involvement on high-resolution chest tomography	7	8
Non-specific interstitial pneumonia	6	8
Usual interstitial pneumonia	1	0
Bronchiectasis	1	0
Honeycombing	1	0
Nodules or micronodules	0	3
Cardiac		
Abnormal electrocardiogram	8	2
Tricuspid annular plane systolic excursion (cm)	2·24 (NA)	2·42 (NA)
Cardiac catheterisation		
Pulmonary artery systolic pressure (mm Hg)	29 (4·5)	28 (6·9)
Mean pulmonary artery pressure (mm Hg)	20 (4·0)	19 (4·8)

	Before switch to transplantation				
	Cyclophosphamide group (n=9)		Transplant group (n=10)		p value
	Baseline	1 year	Baseline	1 year	
Predicted forced vital capacity (%)					
Mean (SD)	67% (17·0)	61% (19·8)	62% (15·0)	74% (15·7)	0·004
Median (range)	78% (43–84)	69% (35–83)	62% (36–85)	82% (52–96)	..
Rate of change (%)†	..	−9%	..	15%	0·006
Predicted total lung capacity (%)					
Mean (SD)	83% (14·8)	74% (18·7)	76% (14·6)	80% (17·9)	0·005
Median (range)	89% (59–99)	69% (45–95)	73% (57–102)	72% (62–104)	..
Predicted DLCO corrected for haemoglobin (%)					
Mean (SD)	75% (27·5)	74% (37·0)	58% (21·8)	69% (18·6)	0·36
Median (range)	80% (29–111)	73% (28–120)	58% (29–94)	67% (33–90)	..
Volume diseased lung (mL)‡					
Mean (SD)	877 (240·6)	985 (277·1)	823 (268·9)	551 (277·1)	0·001
Median (range)	961 (462–1195)	858 (808–1189)	850 (359–1095)	546 (240–1118)	..
Modified Rodnan skin score					
Mean (SD)	19 (13·7)	22 (14·2)	28 (13·6)	15 (7·9)	0·0004
Median (range)	16 (6–45)	22 (3–44)	30 (6–47)	16 (2–29)	..



Autologous Hematopoietic Stem Cell Transplantation vs Intravenous Pulse Cyclophosphamide in Diffuse Cutaneous Systemic Sclerosis A Randomized Clinical Trial

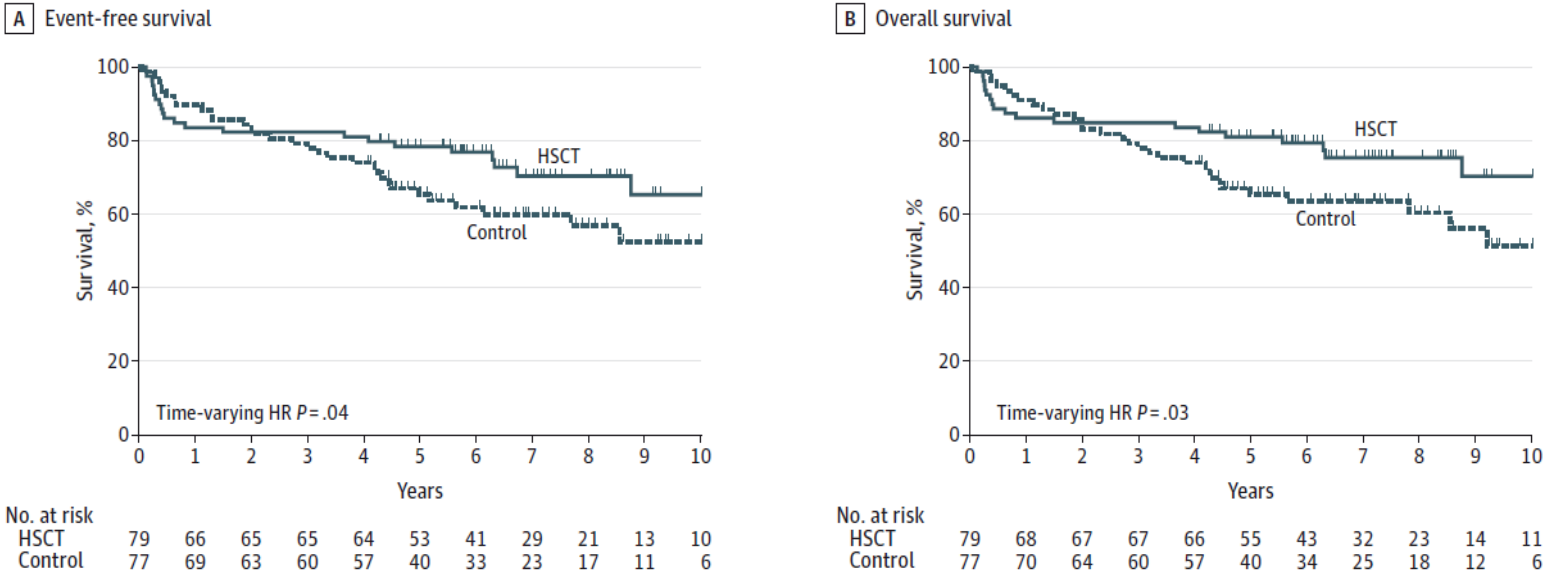
Original Investigation Research

JAMA. 2014;311(24):2490-2498. doi:10.1001/jama.2014.6368

Van Laar JVL and Farge D et al

10% TRM in ASTIS: 15 yrs recruitment

Figure 2. Event-Free and Overall Survival During 10-Year Follow-up



Hazard ratios (HRs) and 95% CIs were calculated by Cox regression. Hazard ratios were time-varying. The hazard (slope of the survival curve) in the hematopoietic stem cell transplantation (HSCT) group is initially high because of treatment-related mortality but gradually improves. At 1-year follow-up, the HR already favors the HSCT group, which leads to the crossing of the survival curves at 2 years' follow-up. A, Three-month follow-up: HR, 2.01 (95% CI, 0.74-5.49); *P* = .17; 6-month follow-up: HR, 1.35 (95% CI, 0.62-2.96); *P* = .45; 1-year follow-up: HR, 0.52 (95% CI, 0.28-0.96); *P* = .04; 2-year follow-up: HR, 0.35 (95% CI, 0.16-0.74); *P* = .006; 3- through 10-year follow-up: HR, 0.34 (95% CI, 0.16-0.74); *P* = .006. B, Three-month follow-up: HR, 2.40 (95% CI, 0.75-7.67); *P* = .14; 6-month follow-up: HR, 1.50 (95% CI, 0.61-3.68); *P* = .38; 1-year follow-up: HR, 0.48 (95% CI, 0.25-0.91; *P* = .02; 2-year follow-up: HR, 0.29 (95% CI, 0.13-0.65); *P* = .002; 3- through 10-year follow-up: HR, 0.29 (95% CI, 0.13-0.64); *P* = .002.

SCOT US trial Sullivan K. et al NEJM 2018

STATISTICAL ANALYSIS

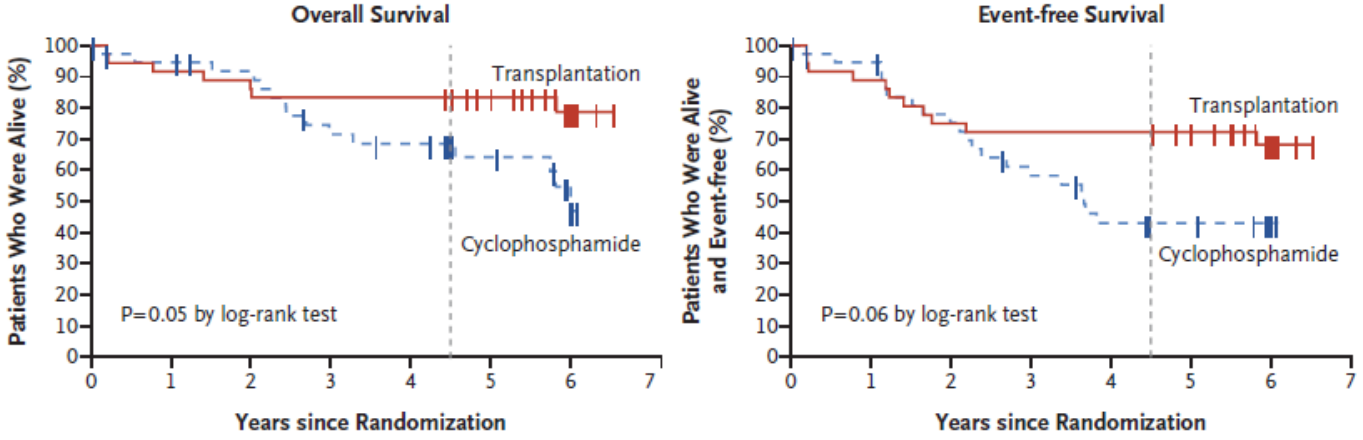
The trial was originally designed for 226 participants, with event-free survival as the primary end point. Low accrual prompted amendments, first to broaden entry criteria, then, ultimately, to reduce the sample size by changing the primary end point to the global rank composite score. Power for the new design with 114 participants.

board recommended stopping randomization at 75 participants.

Death from any cause — no. (%)			
By 54 mo	6 (17)	11 (28)	0.28
By 48 mo	6 (17)	11 (28)	0.28
Treatment-related death — no. (%)§			
By 54 mo	1 (3)	0	0.48
By 48 mo	1 (3)	0	0.48

72 mths: TRM : 6% ASCT vs 0% cyclo
Overal survival : 86% ASCT vs 51% cyclo

C Intention-to-Treat Population



No. at Risk

Transplantation	36	33	31	30	30	25	9
Cyclophosphamide	39	35	32	24	22	15	7

36	32	27	26	26	24	9	
39	35	27	20	14	12	6	

	ASSIST[13]	ASTIS[14]	SCOT[15]
Mobilisation	Cyclophosphamide 2 g/m^2, G-CSF	Cyclophosphamide 4 g/m^2, G-CSF	G-CSF only
Conditioning	Cyclophosphamide (200 mg/kg), rabbit ATG	Cyclophosphamide (200 mg/kg), rabbit ATG	Cyclophosphamide (120 mg/kg), equine ATG
Total body irradiation	No	No	Yes (800 cGy, lung and kidney shielding)
Stem cell manipulation	None	CD34+ selection	CD34+ selection
Comparator arm	Cyclophosphamide 6 monthly intravenous courses (1000 mg /m^2)	Cyclophosphamide 12 monthly intravenous courses (750 mg/m^2).	Cyclophosphamide 12 monthly intravenous courses (750 mg/m^2).
Primary outcome measure	>25% decrease in mRSS, or >10% increase in FVC at 12 months	Survival without new onset heart, lung or kidney failure	Global Rank Composite Score at month 54
Follow-up	2.6 years (mean)	5.8 years (median)	Up to 4.5 years

Walker UA, *et al. RMD Open* 2018;**4**:e000533.

	ASSIST[13]	ASTIS[14]	SCOT[15]
Patient number	19	156	75
Inclusion criteria	<60 years of age	18–65 years of age	18–69 years of age
	Diffuse SSc	Diffuse SSc	Diffuse SSc
	mRSS≥15	mRSS≥15	mRSS≥16
	Disease duration ≤4 years	Disease duration ≤4 years	Disease duration ≤4 years
	Internal organ involvement	Internal organ involvement	Internal organ involvement
Exclusion criteria	Mean PAP>25 mm Hg or PAPsys>40 mm Hg	Mean PAP>50 mm Hg	Mean PAP>30 mm Hg
	LVEF<40%	LVEF<45%	LVEF<50%
	–	–	FVC<45% predicted DLCO<40% predicted
	Creatinine >177 umol/L	Creatinine clearance <40 mL/min	Creatinine clearance <40 mL/min
	Cyclophosphamide>6 intravenous courses	Cyclophosphamide cumulative intravenous dose >5 g or >3 months oral	Cyclophosphamide cumulative intravenous dose >3 g/m^2 or >4 months oral or >6 months intravenous
	–	–	Active GAVE

Walker UA, *et al. RMD Open* 2018;**4**:e000533.

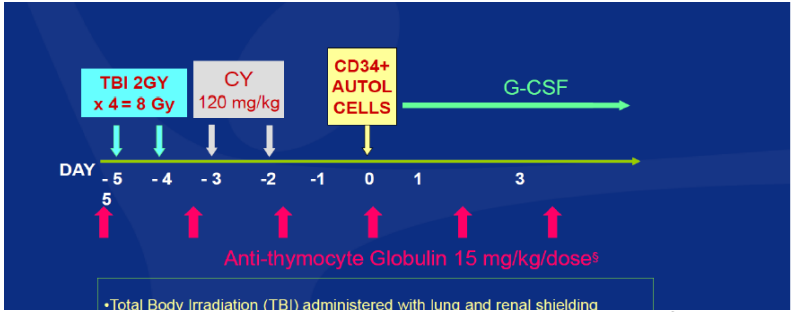
ASTIS DEATH PLEASE:
READ THE ANNEXES !!

JAMA. 2014;311(24):2490-2498.

Survival, days[b]	Survival after Transplant, days	Cause of Death	Autopsy	Relationship to Treatment[c]
153	11	progressive heart failure after HSCT, related to underlying SSc and treatment	not done	probably related
131	35	hemodynamic shock during ATG administration followed by ARDS, mesenteric ischemia, ATN and subsequently MOF	extensive fibrosis and pleural thickening, dilated cardiomyopathy, peripheral (but not coronary) atherosclerosis and ATN	definitely related
87	5	shock and subsequently ARDS	not done	definitely related
144	46	hemodynamic shock, EBV reactivation, PTLD, ATN, ARDS and subsequently MOF	malignant lymphoma in spleen and lymph nodes	definitely related

eTable 2A. Causes of Death

Cause of Death	Transplant Group (n=19)[a]	Control Group (n=30)
Disease progression	9 (47.4)	19 (63.3)
Treatment-related	8 (42.1)	0
Cardiovascular	0	4 (13.3)
Cerebrovascular	1 (5.3)	0
Hemato-oncological malignancy	1 (5.3)	5 (16.7)
Other[b]	0	2 (6.7)



Subject	Mortality	EFS Failure	FVC	HAQ-DI	mRSS	Pairwise Comparisons: Subject 1	2	3	4	5	6	GRCS
1	Dead (2 mo)					.	0	-1	-1	-1	-1	-4
2	Dead (50 mo)					0	.	-1	-1	-1	-1	-4
3	Alive	Yes (renal)	↓>10%	No Δ	↓>25%	1	1	.	-1	-1	-1	-1
4	Alive	Yes (lung)	↓>10%	↓>0.4	No Δ	1	1	1	.	-1	-1	1
5	Alive	No	No Δ	No Δ	↓>25%	1	1	1	1	.	-1	3
6	Alive	No	↑>10%	↓>0.4	No Δ	1	1	1	1	1	.	5

Hierarchy of component outcomes

The GRCS is an analytic tool that accounts for multiple disease manifestations simultaneously but does not measure clinical disease activity or severity; it reflects how participants compare to one another based on a hierarchy of ordered outcomes. To compute the GRCS, each subject is first compared to every other subject and assigned a "pairwise comparison score" of 1 (better off), 0 (no different), or -1 (worse off). The table provides an example of how 6 hypothetical subjects would be scored.

Statist. Med. **18**, 1341–1354 (1999)

COMBINING MORTALITY AND LONGITUDINAL MEASURES IN CLINICAL TRIALS

SYSTEMIC SCLEROSIS

Autologous HSCT is efficacious, but can we make it safer?

Richard K. Burt and Dominique Farge

NATURE REVIEWS | RHEUMATOLOGY
doi:10.1038/nrrheum.2018.34
Published online DD Mon 2018

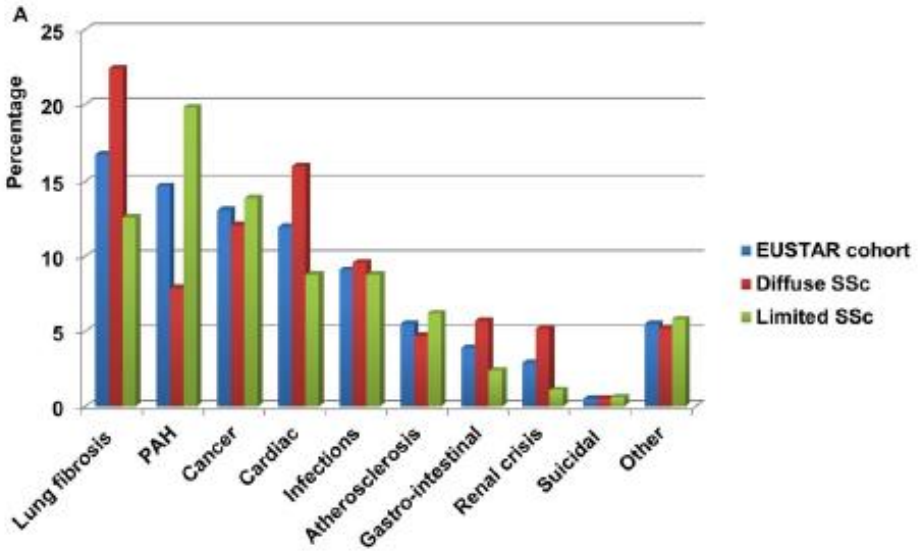
Trial	Patients treated with HSCT (*n*)	Regimen	End points	HSCT-related deaths	Incidence of cancer	Overall survival
ASSIST	10	Non-myeloablative • CYC 200 mg/kg • rATG 6.5 mg/kg	Clinical improvement (mRSS or FVC) ($P = 0.00001$)	0%	0% (0 of 10)	100% (2 years)
ASSIST regimen	89	Non-myeloablative • CYC 200 mg/kg • rATG either 6.5 mg/kg or 4.5 mg/kg	• OS = 78% • RFS = 70% • mRSS ($P = 0.0003$) • FVC ($P = 0.004$)	6%	0% (0 of 89)	78% (5 years)
ASTIS	75	Non-myeloablative • CYC 200 mg/kg • rATG 7.5 mg/kg	• EFS ($P = 0.006$) • mRSS ($P < 0.001$) • FVC ($P = 0.004$)	10%	1.3% (1 of 75)	• 82% (5 years) • OS ($P = 0.002$)
SCOT	33	Myeloabaltive • TBI 800 cGy • CYC 120 mg/kg • eATG 90 mg/kg	EFS (2005–2010) • ITT ($P = 0.06$) • PP ($P = 0.02$) GRCS (after 2010) • ITT ($P = 0.01$) • mRSS (ITT, $P = 0.05$; PP, $P = 0.01$) • FVC (ITT, $P = 0.3$; PP, $P = 0.5$)	6%	9% (3 of 33)	• 86% (54 months) • 54 months OS ($P = 0.28$) • 72 months OS ($P = 0.02$)

Mapping and predicting mortality from systemic sclerosis

(http://dx.doi.org/10.1136/annrheumdis-2017-211448).

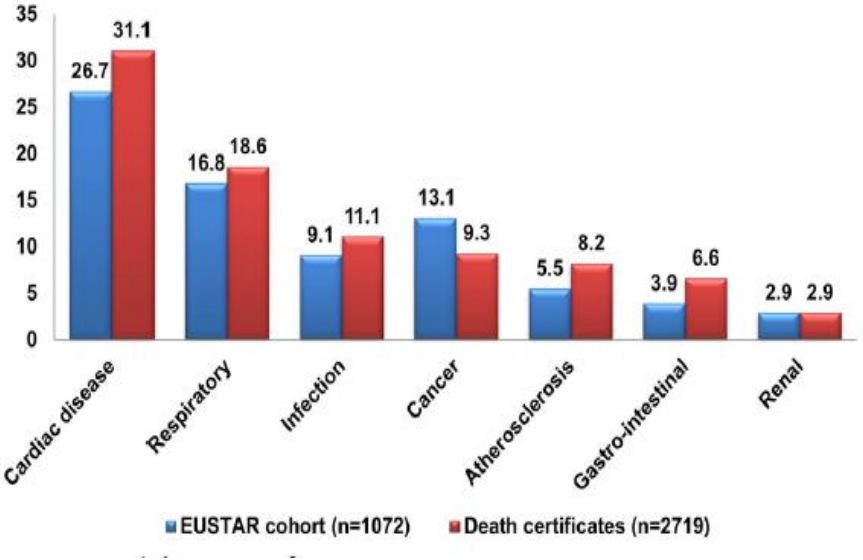
Muriel Elhai,[1] Christophe Meune,[2] Marouane Boubaya,[3] Jérôme Avouac,[1]

11 193 pts EUSTAR sample : 9.6% died after 2.3 yrs median FU



Primary heart disease: 30% of the deaths

SMR : 1.03 (2000) to 0.6 (2011) per 10⁵ men and women

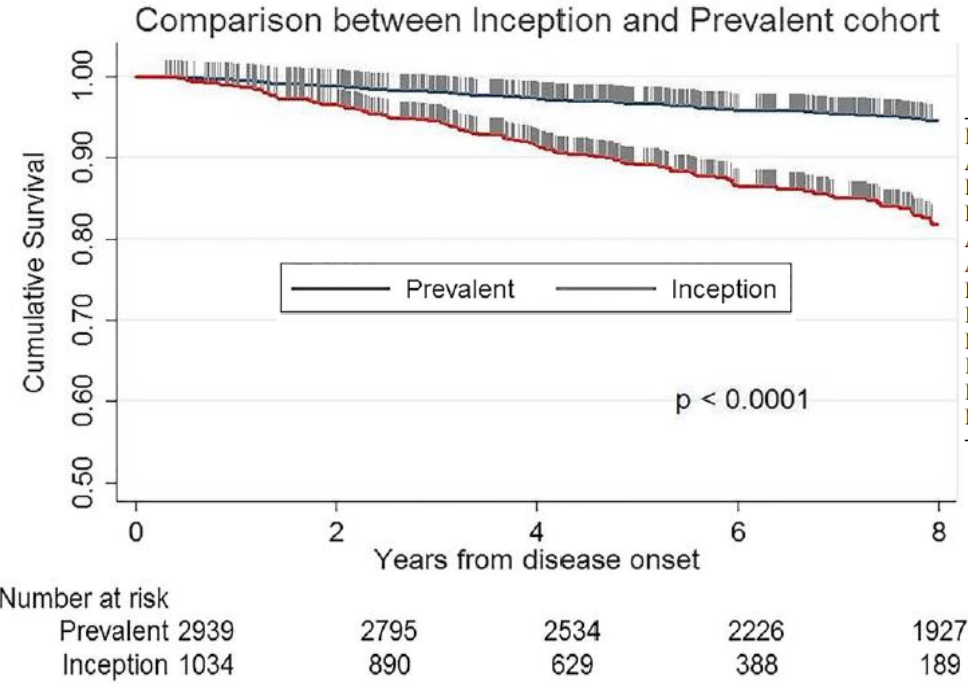


2000- 2011 : EUSTAR cohort deaths + French death certificates

Early Mortality in a Multinational Systemic Sclerosis Inception Cohort

Yanjie Hao,[1] Marie Hudson,[2] Murray Baron,[2] Patricia Carreira,[3] Wendy Stevens,[4] Candice Rabusa,[4] Solene Tatibouet,[5] Loreto Carmona,[6] Beatriz E. Joven,[3] Molla Huq,[7] Susanna Proudman,[8] Mandana Nikpour,[7] the Canadian Scleroderma Research Group, and the Australian Scleroderma Interest Group

13% death after 3 yrs FU (IQR: 1.0-5.1yrs)
POOLED SMR : 4.06 (95% CI: 3.39-4.85)

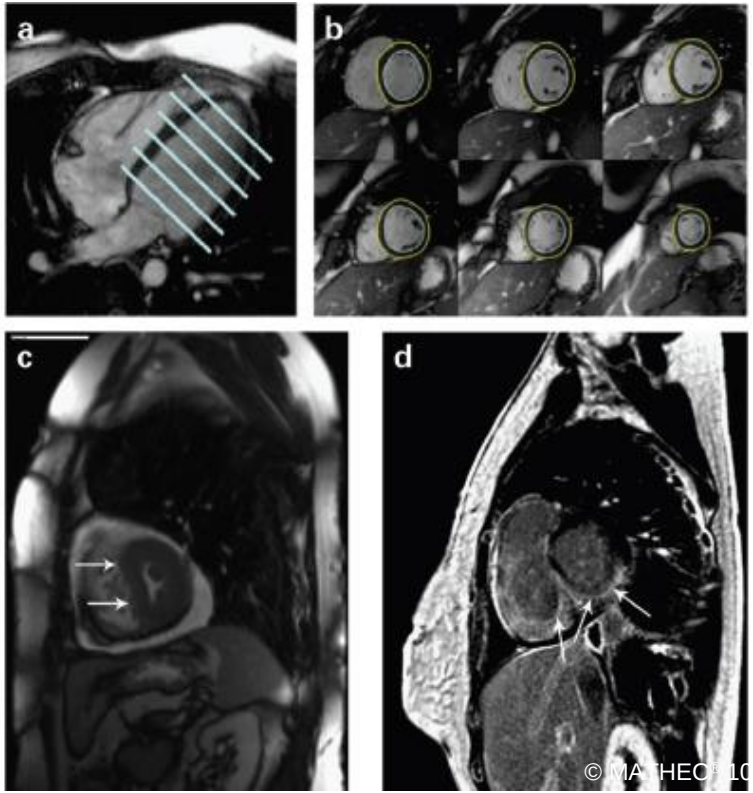


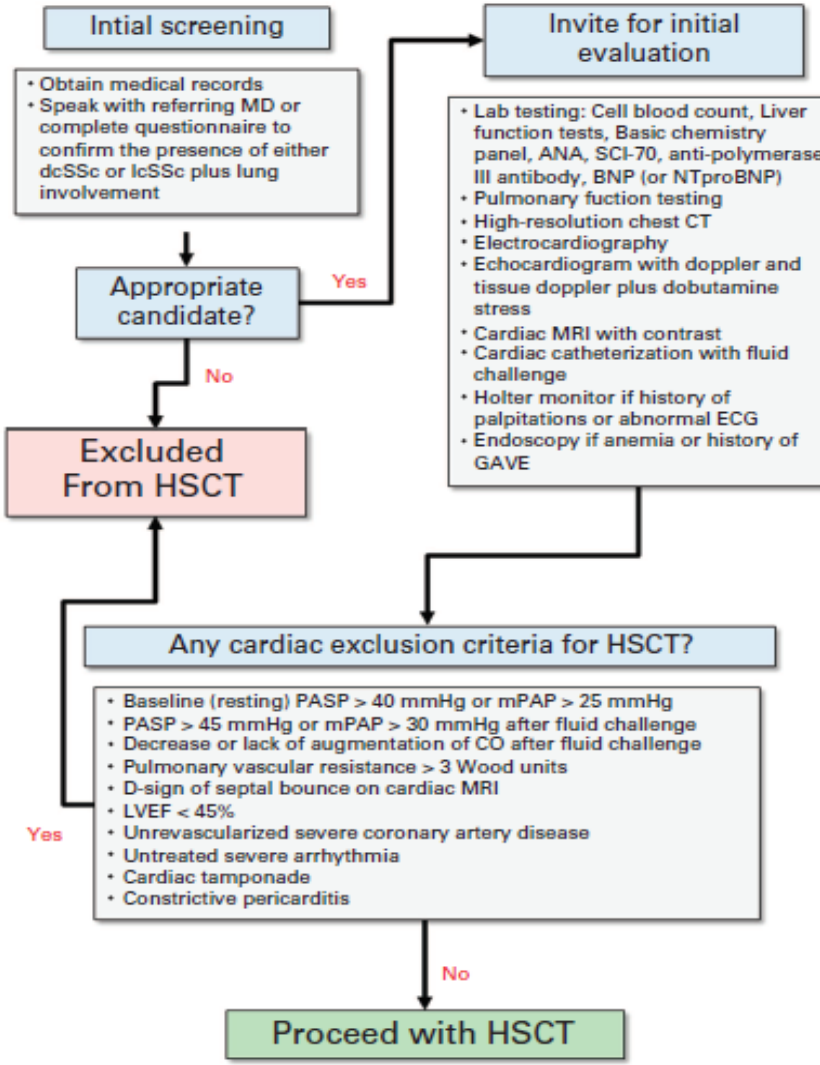
Variable	Combined inception cohort		Combined prevalent cohort	
	HR (95% CI)	*P*	HR (95% CI)	*P*
Male sex	2.28 (1.42–3.65)	0.001	1.72 (1.27–2.33)	0.001
Age at disease onset, years†	1.05 (1.03–1.07)	0.000	1.05 (1.04–1.06)	<0.0001
Diffuse disease subtype	1.83 (1.14–2.92)	0.002	1.40 (1.07–1.83)	0.013
Disease duration at recruitment, years	0.59 (0.47–0.74)	<0.0001	0.71 (0.68–0.74)	<0.0001
Anticentromere antibody‡	–	–	0.71 (0.53–0.94)	0.019
Anti–Scl-70 antibody‡	–	–	0.95 (0.67–1.35)	0.774
PAH	2.35 (1.29–4.29)	0.006	2.50 (1.83–3.42)	<0.0001
ILD‡	–	–	1.31 (1.01–1.70)	0.040
Myocardial involvement	0.99 (0.44–2.23)	0.977	1.18 (0.83–1.69)	0.363
Renal crisis	1.87 (1.01–3.48)	0.048	1.33 (0.86–2.07)	0.205
IHD and/or CVD	1.54 (0.86–2.76)	0.145	1.28 (0.96–1.72)	0.094
Malignancy‡	–	–	0.97 (0.72–1.30)	0.832

Cardiopulmonary assessment of patients with systemic sclerosis for hematopoietic stem cell transplantation: recommendations from the European Society for Blood and Marrow Transplantation Autoimmune Diseases Working Party and collaborating partners

Bone Marrow Transplantation (2017)

D Farge[1,15], RK Burt[2,15], M-C Oliveira[3], E Mousseaux[4], M Rovira[5], Z Marjanovic[6], J de Vries-Bouwstra[7], N Del Papa[8], R Saccardi[9,16], SJ Shah[10], DC Lee[10], C Denton[11], T Alexander[12], DG Kiely[13,18] and JA Snowden[14,16,18] for the EBMT ADWP Scleroderma Working Group and on behalf of the Joint Accreditation Committee of the International Society for Cellular Therapy (JACIE) & European Society for Blood and Marrow Transplantation (EBMT)[17]





CONCLUSION : AHSCT for SSc

The only disease modifying strategy
- with grade A evidence for
- ↑ long term survival, ↓ skin+ lung fibrosis

Limited window of opportunities:
- early, rapidly progressive reversible disease
- severe organ involvement precludes HSCT

Careful patients selection

Early + long term HSCT risks to be decreased
- not only TRM, infection, cancer
- improved conditioning ?
- patient FU in expert centers

Non responders and Relapsing patients
- Response criteria: definition
- Patient clinical and biological monitoring:
Rodnan, SHAQ, CVF + Immune monitoring

CONDITIONING LESS TOXIC

	D-5	D-4	D-3	D-2	D-1
Fludarabine (mg/m²)	30	30	30		
Cytoxan (mg/m²)		60	60		
RATG (mg/m²)	0,5	1,5	1,5	1,5	1,5
Steroids (mg/Kg/d)	1	1	1	1	1

SEPTAL D sign

	D-5	D-4	D-3	D-2	D-1
Fludarabine (mg/m²)	30	30	30	30	
Cytoxan (mg/m²)				60	
RATG (mg/m²)	0,5	1,5	1,5	1,5	1,5
Steroids (mg/Kg/D)	1	1	1	1	1

«RATG»protocole

RATG dose at 0.5 mg/Kg/D at D-5, then 1.5 mg/Kg/D for other days over 12 hrs + steroids dose at 1 mg/Kg/D at D-5, D-4, D-3, D-2 and D-1.

Maladies Autoimmunes
Thérapies Cellulaires

MATHEC
Maladies Auto Immunes & Thérapie Cellulaire

Experts Cliniques
Travail binome
Standard européens
Greffes MAI
Recherche Académique

- Paris
- Lille,
- Strasbourg,
- Grenoble,
- Marseille,
- Toulouse,
- Clermont-Ferrand,

Centre coordination
St Louis (UH 04)
+ St Antoine (EBMT)
+ centres accredités

Groupe Hospitalier Universitaire
SAINT-LOUIS LARIBOISIERE FERNAND-WIDAL

Enseignement
Site web
Paramedical

NTIC : procédures communes, EBMT, Registre

Recherche: CSM
Sclérodermie
Lupus
Crohn

Traitement SSc par MSC allogéniques ? 2011 phase I-II trial
Traitement LED par MSC Cordon ? Prix Fondation Rein