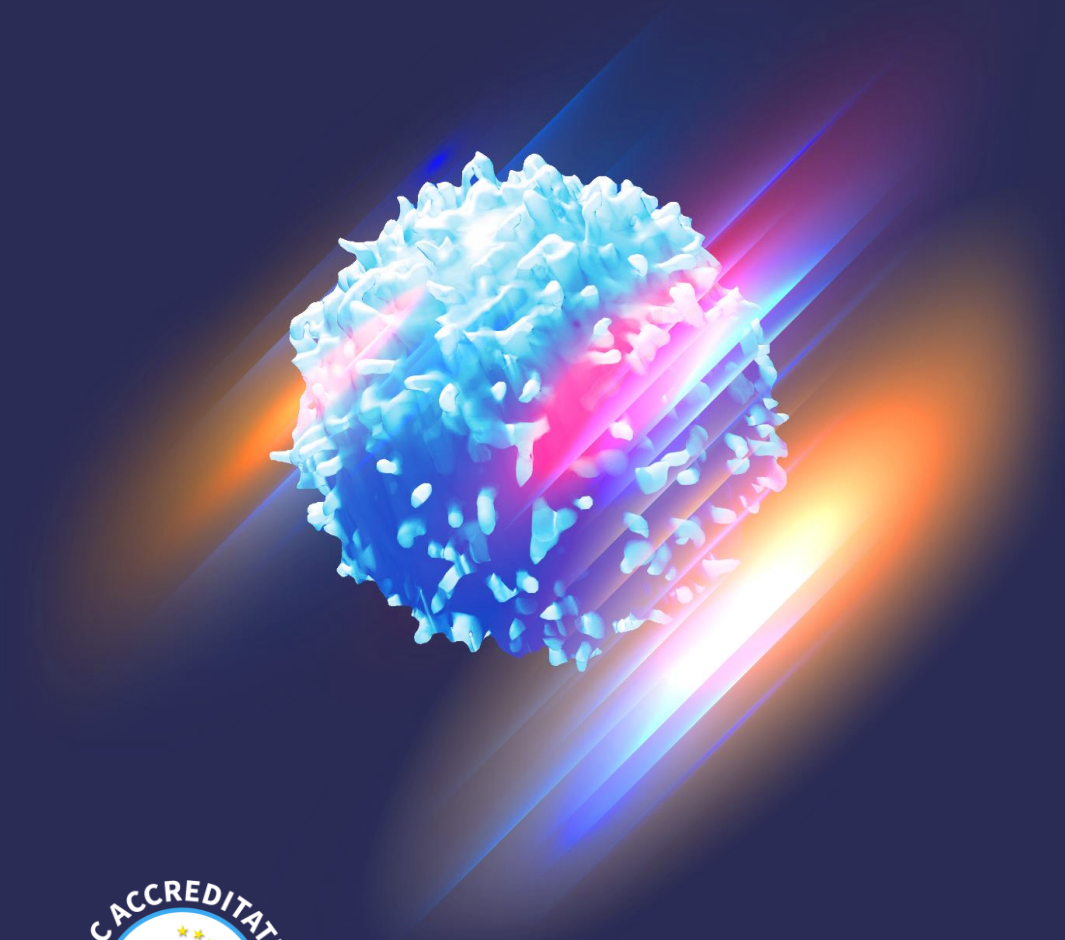
The role of ECP in the management of GvHD

November 29, 2022

Chair: Mohamad Mohty
Speakers: Hildegard Greinix, Daniel Wolff



EBAC ACCREDITATION
EBAC®
2 CME CREDITS

Brought to you by Scientific Education Support

Professor Hildegard Greinix: What is ECP?

Disclosures

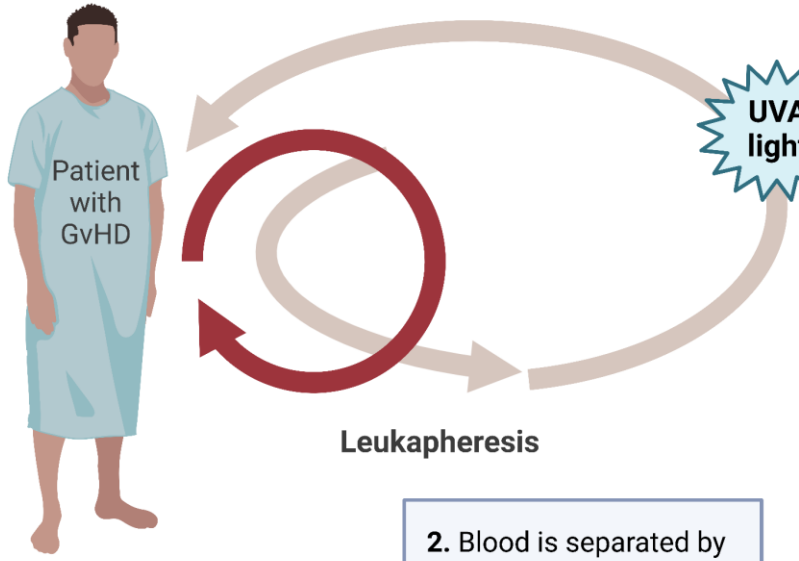
Hildegard Greinix

The following declarations are made for the last 3 years and the following 12 months (where arrangements have already been made):

- Research grant(s)/in kind support: None
- Participation in accredited CME/CPD: DGHO, EBMT, EHA, Gilead, Mallinckrodt
- Consultant/strategic advisor: Gilead, Mallinckrodt, Novartis, Sanofi
- Patents/shares or stocks related or unrelated to this presentation: None
- Non-financial interests: None

Introduction

What is extracorporeal photopheresis?



Adapted from Knobler R, et al. *J Am Acad Dermatol*. 2009;61(4):652-65.
Created with BioRender.com.

ECP, extracorporeal photopheresis; GvHD, graft-versus-host disease; UVA, ultraviolet A.

How does ECP work?[1–6]

Direct effects

- Depletion of alloreactive donor T cells that can cause GvHD
- Depletion of proinflammatory myeloid cells
- Induction of Tregs

Indirect effects

- Apoptotic cells can directly release soluble anti-inflammatory factors
- Uptake of apoptotic cells may affect the secretion of cytokines and pro-resolving factors by tissue-residing macrophages
- Apoptotic cells and their interactions may lead to increased tolerogenic DCs

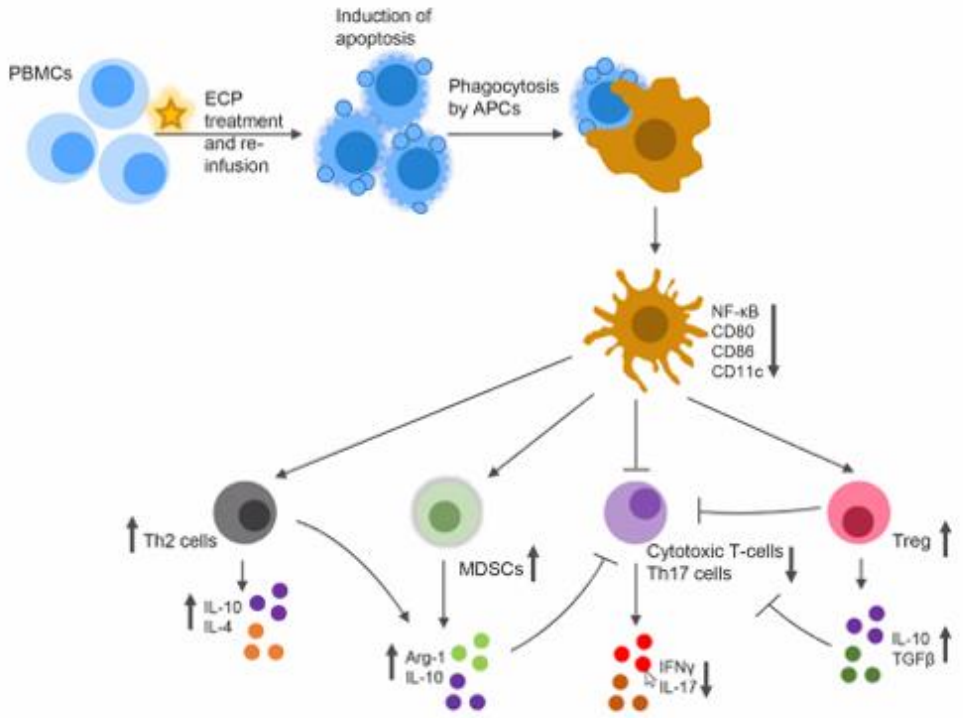


Figure provided by R Zeiser.

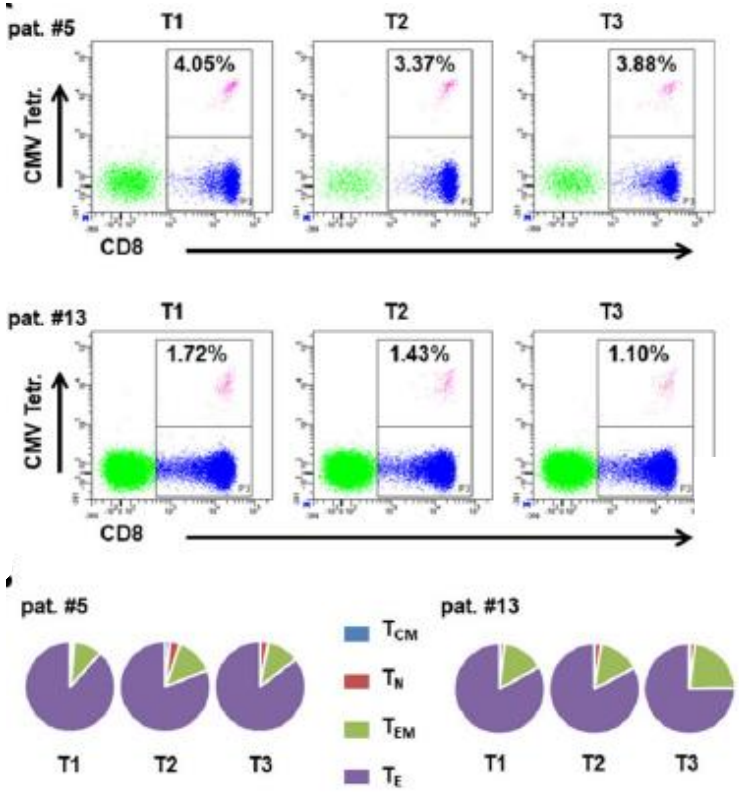
APCs, antigen presenting cells; CD, cluster of differentiation; DC, dendritic cell; ECP, extracorporeal photopheresis; IFN, interferon; IL, interleukin; MDSC, myeloid-derived suppressor cell; NF, nuclear factor; PBMC, peripheral blood mononuclear cell; TGF, transforming growth factor; Th, T helper cell; Treg, regulatory T cell.

1. Craciun LI, et al. *Transplantation*. 2002;74(7):995-1000. **2.** Bladon J, Taylor PC. *Br J Haematol.* 1999;107(4):707-711. **3.** Franklin C, et al. *PLoS One.* 2015;10(8):e0134518. **4.** Gorgun G, et al. *Blood.* 2002;100(3):941-947. **5.** Gerner M, et al. *Transplantation*. 2009;87(8):1134-1139. **6.** Di Biaso I, et al. *Transplantation*. 2009;87(9)1422-1425. **7.** Wang L, et al. *Front Immunol.* 2018;9:2207.

Impact of ECP on antiviral immune response

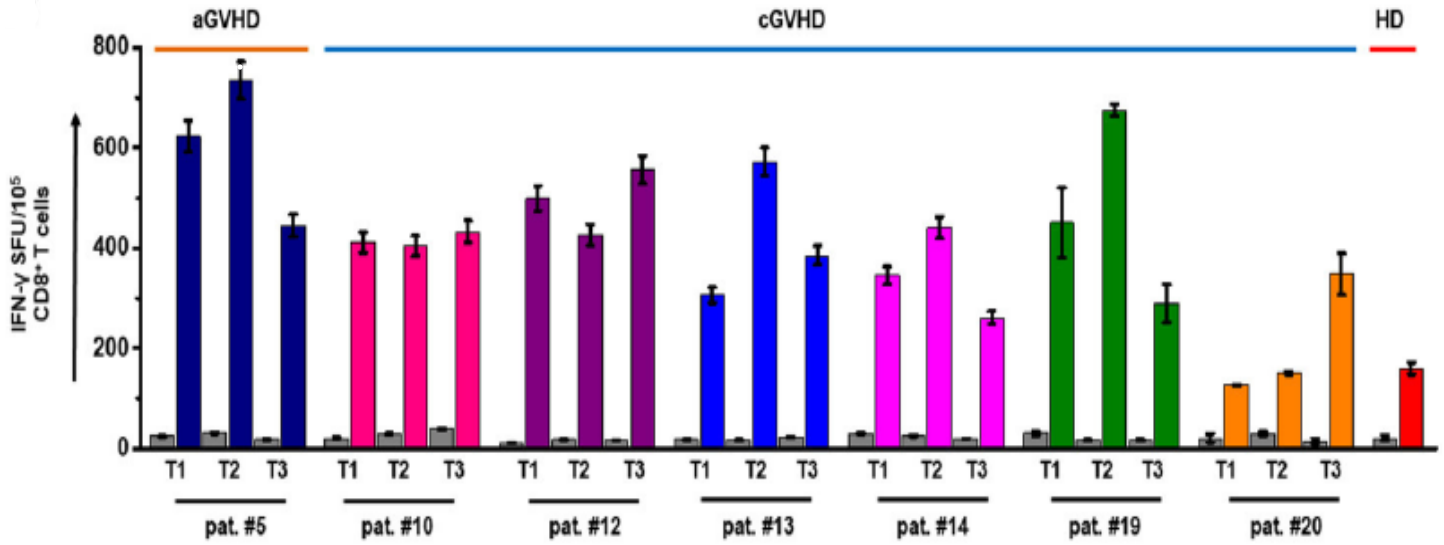
CMV-specific CD8⁺ T cells before and after ECP in acute and chronic GvHD are not different

Cell function measured by IFN-γ release remains stable



Wang L, et al. *Front Immunol.* 2018;9:2207.

ECP does not cause generalized immunosuppression



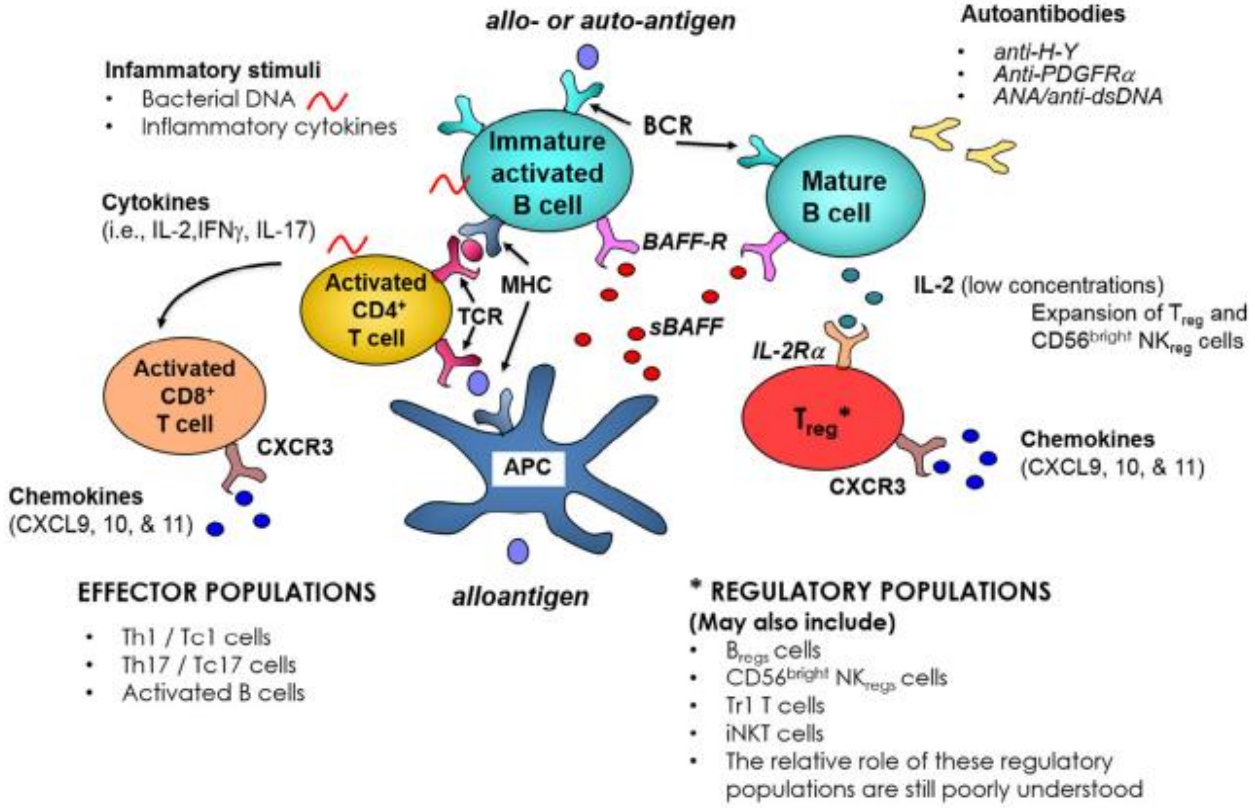
Wang L, et al. *Front Immunol.* 2018;9:2207.

aGvHD, acute graft-versus-host disease; CD, cluster of differentiation; cGvHD, chronic graft-versus-host disease; CMV, cytomegalovirus; ECP, extracorporeal photopheresis; HD, healthy donor; IFN, interferon.
Wang L, et al. *Front Immunol.* 2018;9:2207.

Impact of ECP on chronic inflammation and dysregulated immunity in cGvHD

Potential impact of ECP

- Shift from Th1 to Th2 cytokine profile
- Shift to Th2 phenotype
- ↓ proinflammatory cytokines
- ↑ anti-inflammatory cytokines
- Tolerogenic DCs
- Neutrophilic MDSCs
- Impact on activated B cells

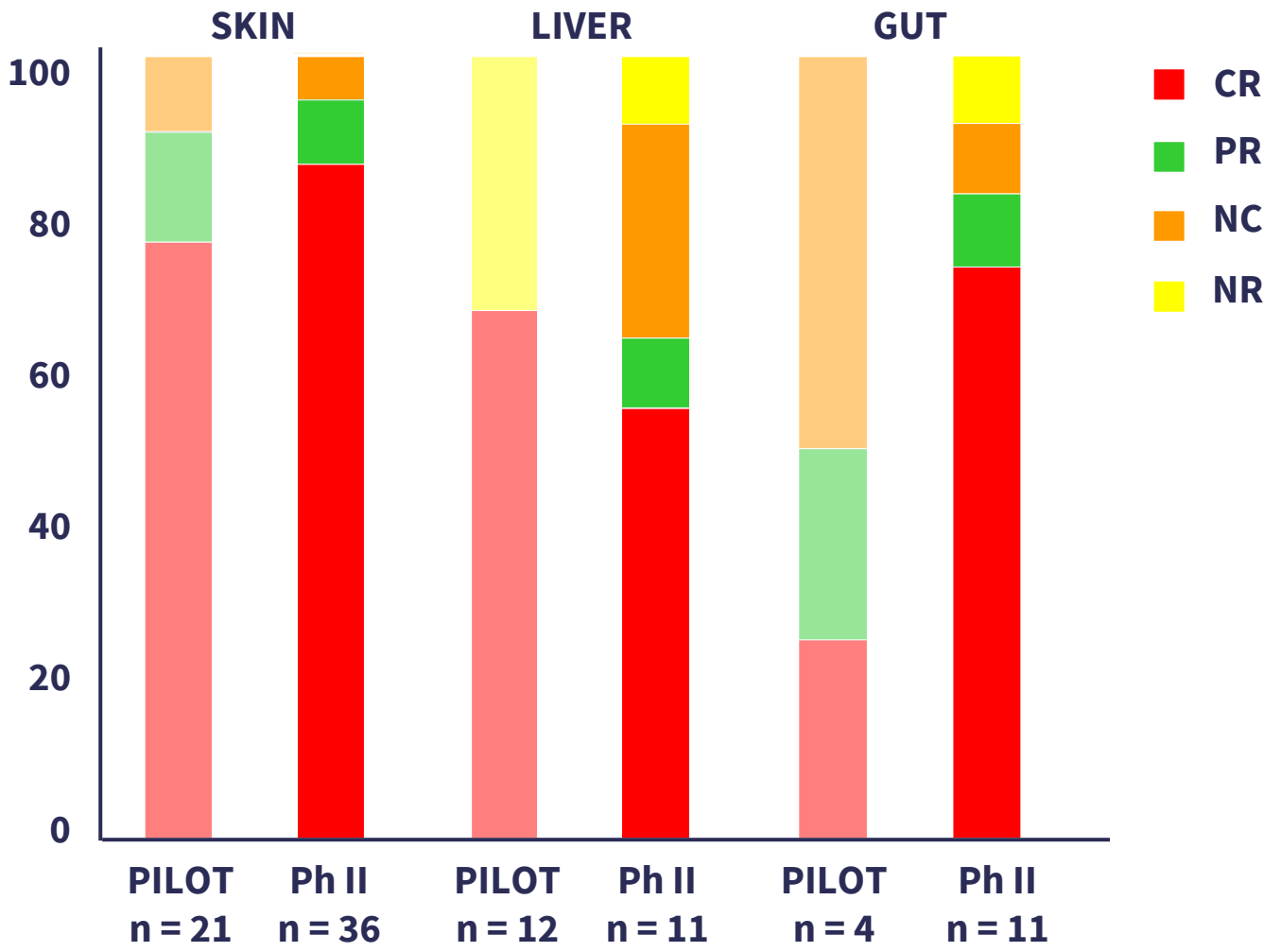


Cooke KR, et al. *Biol Blood Marrow Transplant*. 2017;23(2):211-234.

ANA, antinuclear antibody; APC, antigen presenting cell; BCR, B-cell receptor; CD, cluster of differentiation; cGvHD, chronic graft-versus-host disease; CXCL, chemokine ligand; DC, dendritic cell; ds, double stranded; ECP, extracorporeal photopheresis; IFN, interferon; IL, interleukin; iNKT, inducible natural killer T; MDSC, myeloid-derived suppressor cell; MHC, major histocompatibility complex; NKreg, regulatory natural killer; PDGRF, platelet derived growth factor receptor; sBAFF, soluble B-cell activating factor; TCR, T-cell receptor; Th, T helper; Treg, regulatory T cell.

ECP in acute GvHD

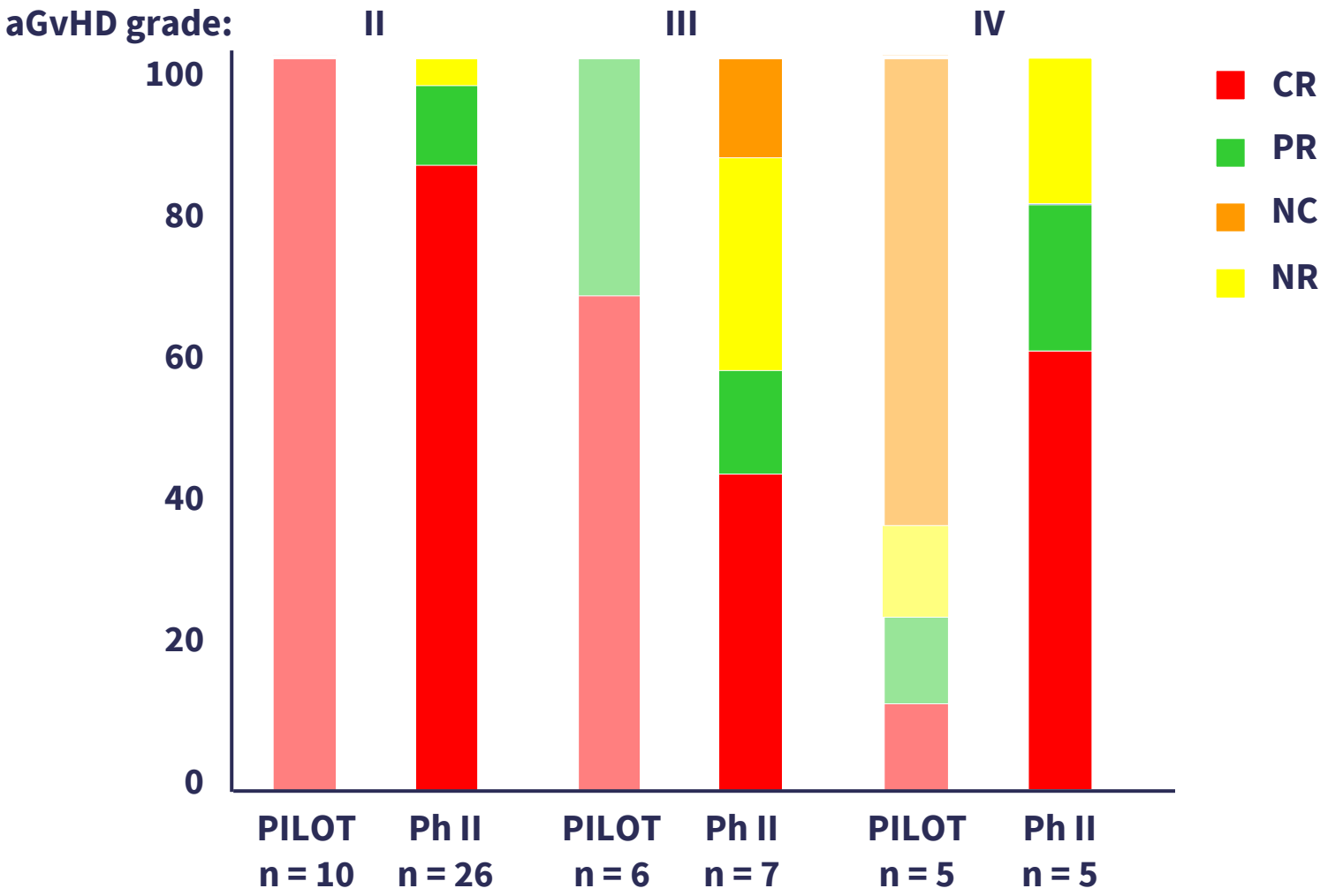
ECP as second-line therapy in acute steroid-refractory GvHD



Adapted from Greinix HT, et al. *Haematologica.* 2006;91:405-408

CR, complete response; ECP, extracorporeal photopheresis; GvHD, graft-versus-host disease; NC, no change; NR, no response; Ph, phase; PR, partial response.
Greinix HT, et al. *Haematologica.* 2006;91(3):405-408.

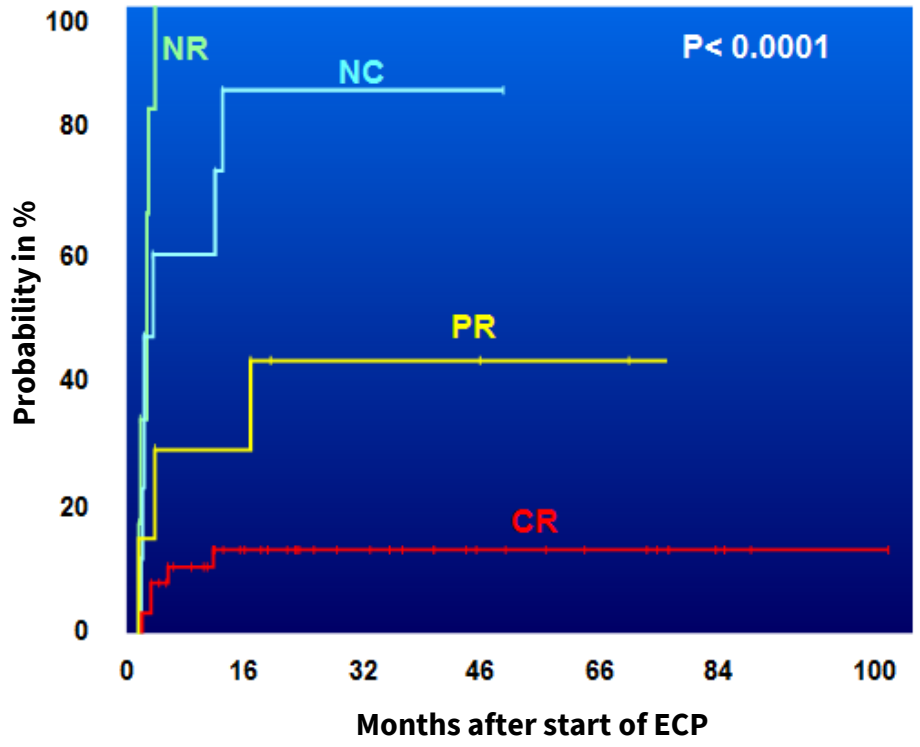
ECP as second-line therapy in acute steroid-refractory GvHD



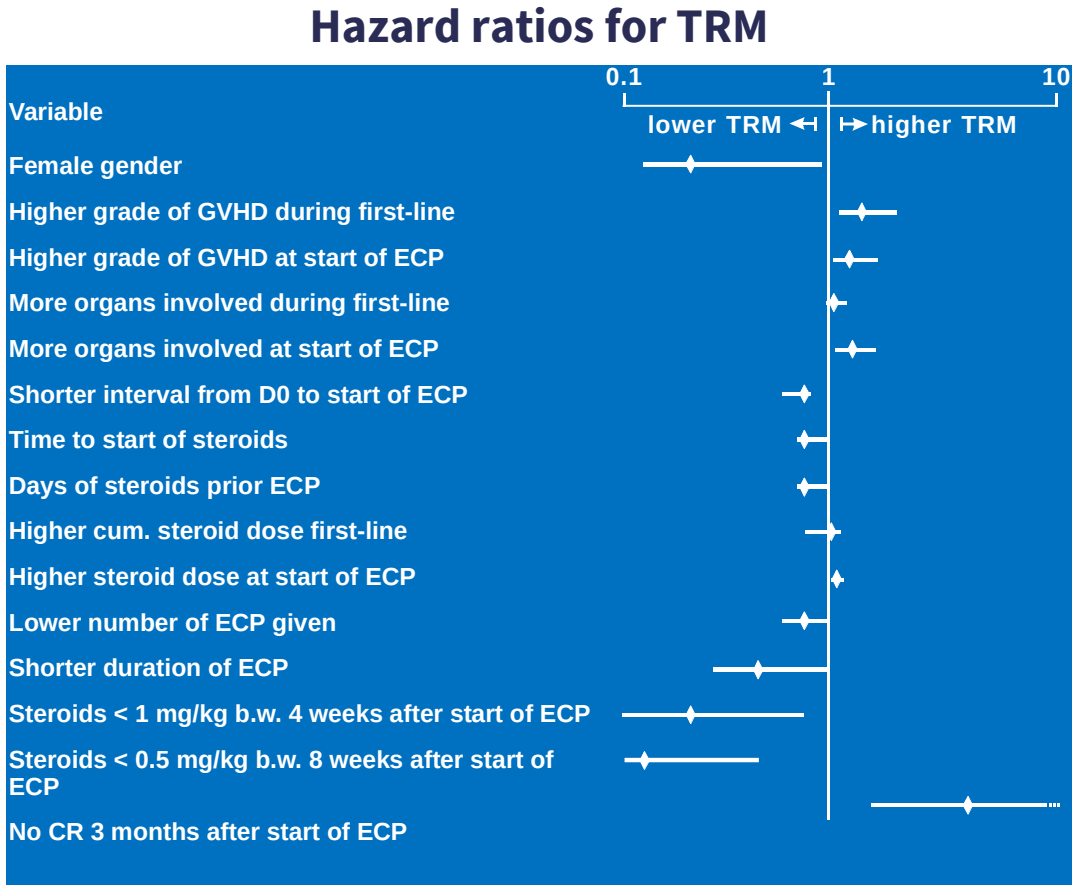
Adapted from Greinix HT, et al. *Haematologica.* 2006;91:405-408

CR, complete response; ECP, extracorporeal photopheresis; GvHD, graft-versus-host disease; NC, no change; NR, no response; Ph, phase; PR, partial response.
Greinix HT, et al. *Haematologica.* 2006;91(3):405-408.

TRM of patients with steroid-refractory acute GvHD according to response to second-line ECP



Data from Greinix HT, et al. *Haematologica.* 2006;91(3):405-408.

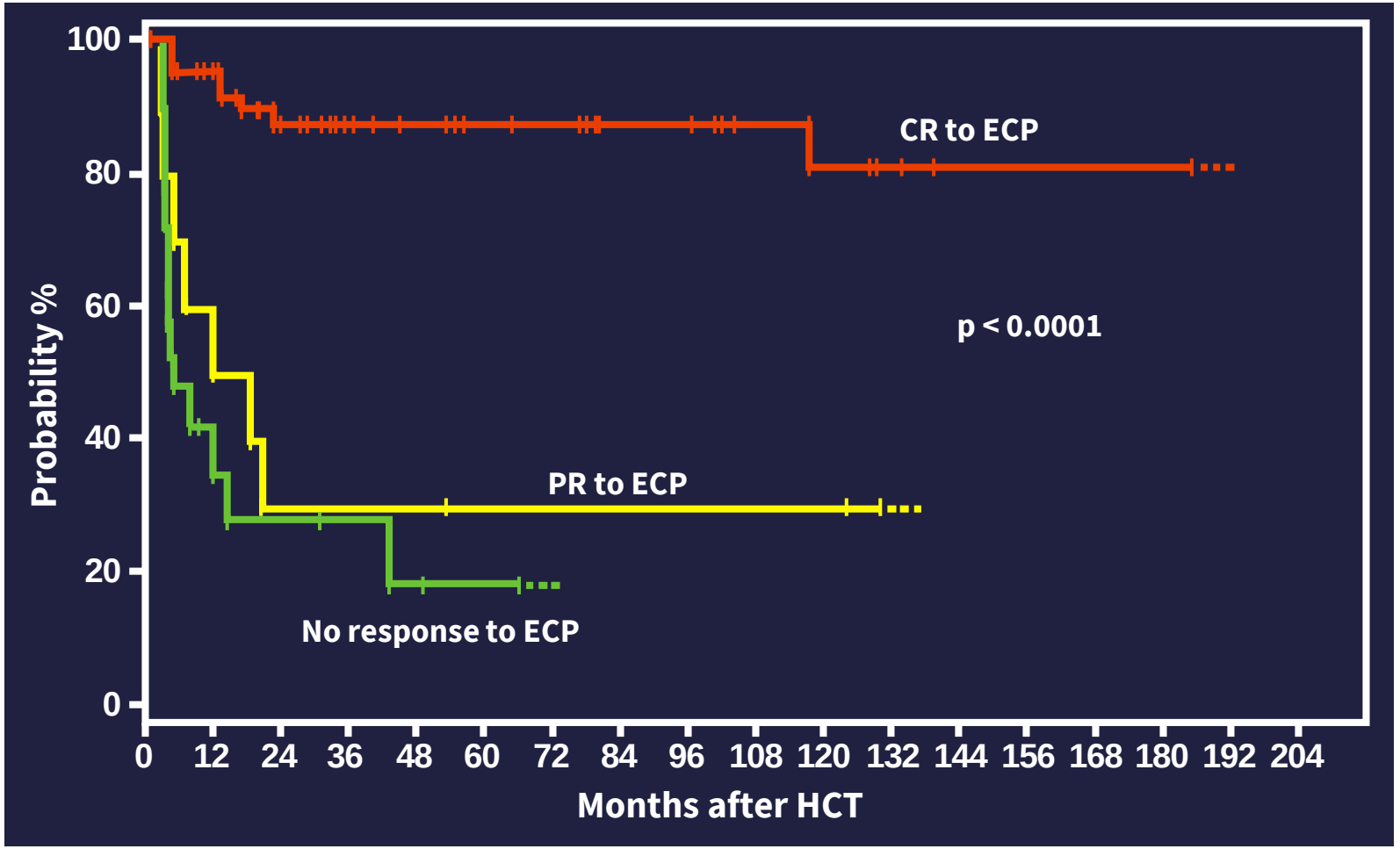


Data from Greinix HT, et al. *Haematologica.* 2006;91(3):405-408.

CR, complete response; D, day; ECP, extracorporeal photopheresis; GvHD, graft-versus-host disease; NC, no change; NR, no response; PR, partial response; TRM, transplant-related mortality.
Greinix HT, et al. *Haematologica.* 2006;91(3):405-408.

ECP in steroid-refractory acute GvHD

Long-term survival according to response (n = 96)



Adapted from Greinix HT, et al. *Haematologica.* 2006;91(3):405-408. PR-ECP line from personal data.

CR, complete response; ECP, extracorporeal photopheresis; GvHD, graft-versus-host disease; HCT, hematopoietic cell transplant; PR, partial response.

ECP vs anticytokine therapy

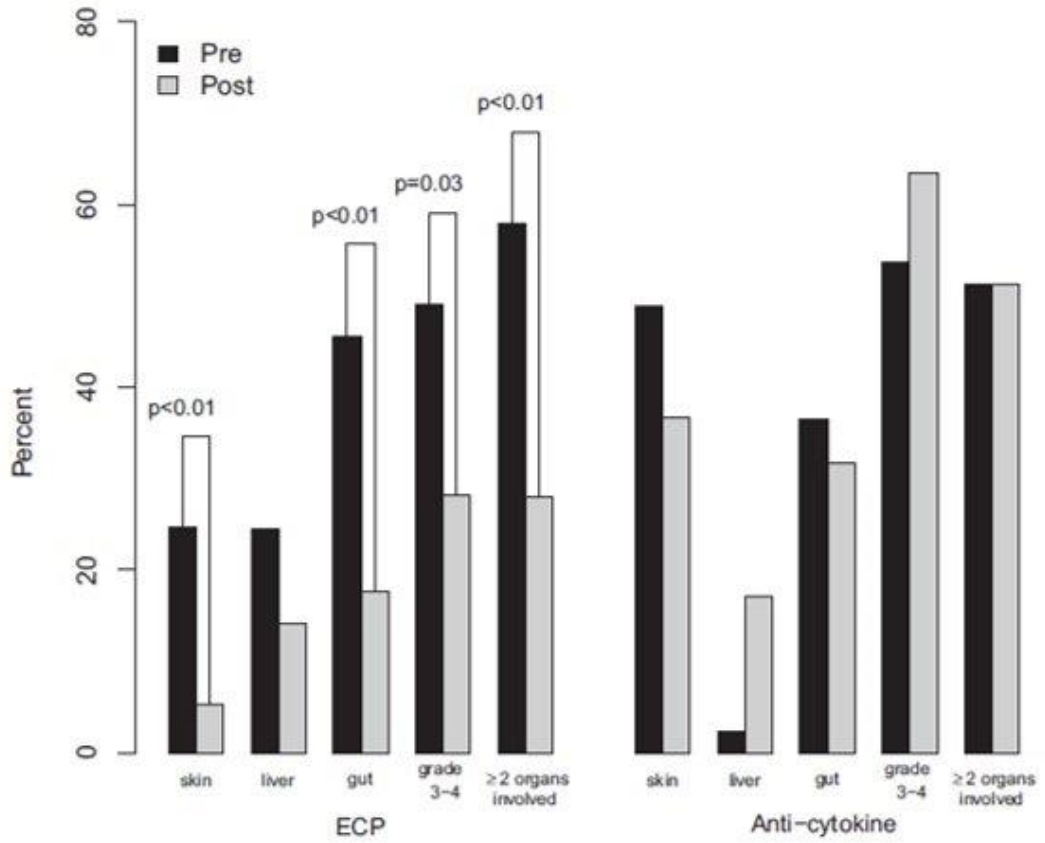
Retrospective comparison of patients with aGvHD given second-line treatment for SR/SD aGvHD

Patient selection criteria

- Allo-SCT after January 2005
- >Grade II
- Steroids >1 mg/kg/d alone as first-line therapy and continuation of CNIs during second-line therapy

Comparison of ECP with anticytokines

- Inolimomab (anti-IL2R):
  0.3 mg/kg/day × 8 days, 0.4 mg/kg × 3/week for 3 weeks
- Etanercept (anti-TNF):
  25 mg × 2/week for 4 weeks, 25 mg/week for 4 weeks
- ECP: 2–3/week



Jagasia M, et al. *Biol Blood Marrow Transplant*. 2013;19(7):1129-1133.

aGvHD, acute graft-versus-host disease; allo-SCT, allogeneic stem cell transplant; CNI, calcineurin inhibitor; d, day; ECP, extracorporeal photopheresis; IL-2R, interleukin-2R; SD, steroid-dependent; SR, steroid-refractory; TNF, tumor necrosis factor; w, week.

Jagasia M, et al. *Biol Blood Marrow Transplant*. 2013;19(7):1129-1133.

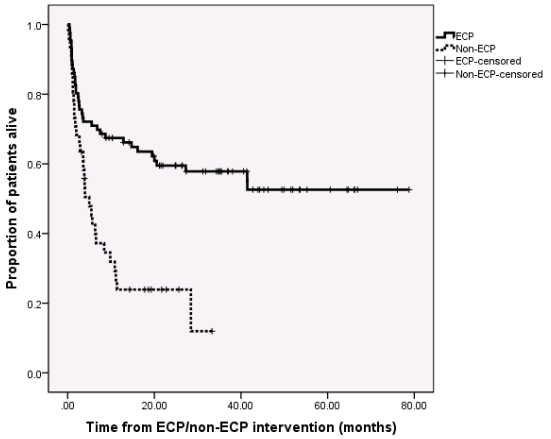
ECP vs anticytokine therapy

- **ECP was an independent predictor of response** (OR, 3.42; p = 0.007)
- **ECP was an independent predictor of survival** (HR, 2.12; p = 0.018)
- **ECP was associated with superior survival** (HR, 4.6; p = 0.016) in SR Grade II aGvHD
- **ECP was associated with lower NRM** (HR, 0.45; p = 0.018)

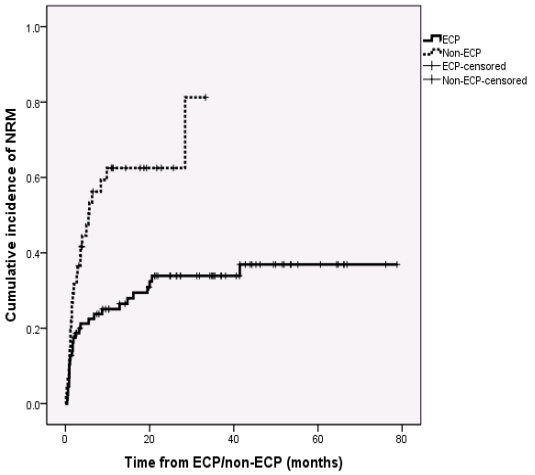
Variable	ECP, n (%)	Non-ECP, n (%)
Overall response*	38 (66)	13 (32)
PR	7 (12)	5 (12)
CR*	31 (54)	8 (20)

*p=0.001
Jagasia M, et al. *Biol Blood Marrow Transplant*. 2013;19(7):1129-1133.

Survival



NRM



Jagasia M, et al. *Biol Blood Marrow Transplant*. 2013;19(7):1129-1133; Personal data.

aGvHD, acute graft-versus-host disease; CR, complete response; ECP, extracorporeal photopheresis; HR, hazard ratio; NRM, non-relapse mortality; OR, odds ratio; PR, partial response; SR, steroid-refractory.

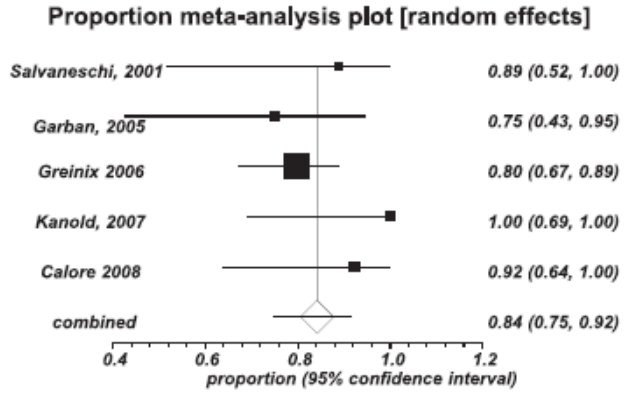
ECP in steroid-refractory acute GvHD

Systematic review of prospective studies

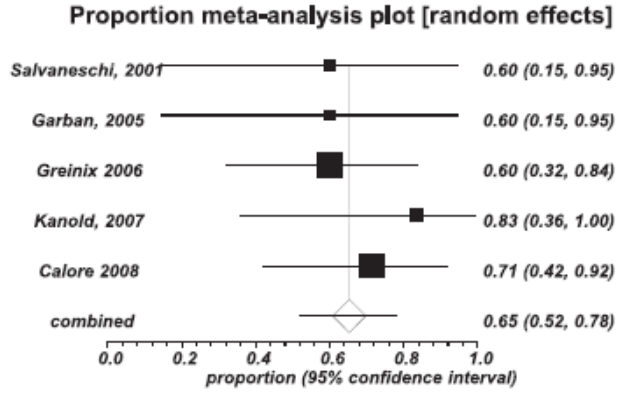
Six studies with 103 patients

- ORR: 69%
- ORR in skin: 84%
- ORR in GI: 65%
- ORR in liver: 55%

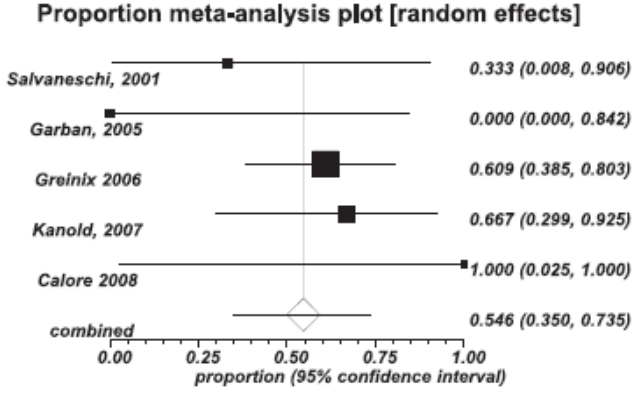
Response in skin



Response in GI



Response in liver



Abu-Dalle I, et al. *Biol Blood Marrow Transplant.* 2014;20(11):1677-1686.

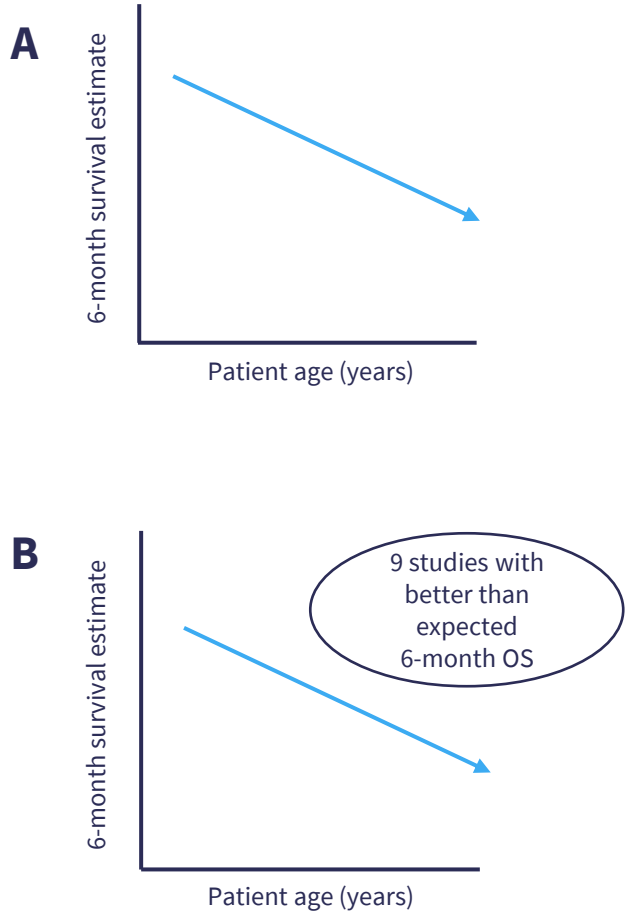
ECP, extracorporeal photopheresis; GI, gastrointestinal; GvHD, graft-versus-host disease; ORR, overall response rate.
Abu-Dalle I, et al. *Biol Blood Marrow Transplant.* 2014;20(11):1677-1686.

How I treat steroid-refractory aGvHD

A: Older age = lower 6-month OS across prospective and retrospective studies

B: Group of 9 studies with better than expected 6-month OS

- Ruxolitinib: n = 2
  (Jagasia 2020, Zeiser 2015)
- ECP: n = 5
  (Jagasia 2013, Das-Gupta 2014, Malagola 2016, Worel 2018, Nygaard 2019)
- CD25-specific Abs: n = 2
  (Girerd 2013, Tao 2015)
- "… patterns suggesting consistently favorable results with ruxolitinib and ECP would prompt me to use either of these agents preferentially in treating SR-aGvHD. For patients with active infection or severe neutropenia or thrombocytopenia, I would use ECP rather than ruxolitinib."

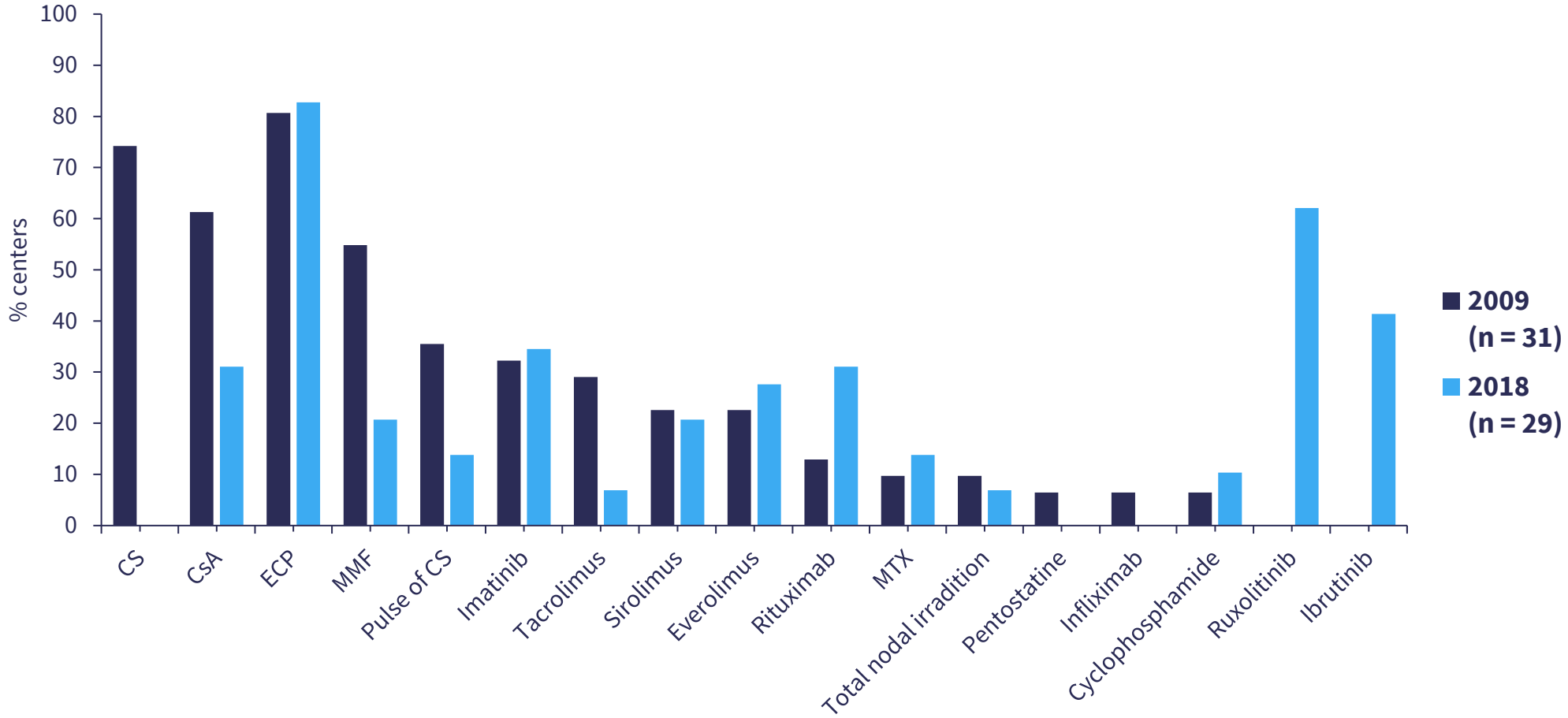


Abs, antibodies; aGvHD, acute graft-versus-host disease; ECP, extracorporeal photopheresis; GI, gastrointestinal; GvHD, graft-versus-host disease; OS, overall survival; SR, steroid refractory.
Martin PJ, et al. *Blood*. 2020;135(19):1630-1638.

ECP in chronic GvHD

Most frequently used cGvHD treatments

2009 vs 2018

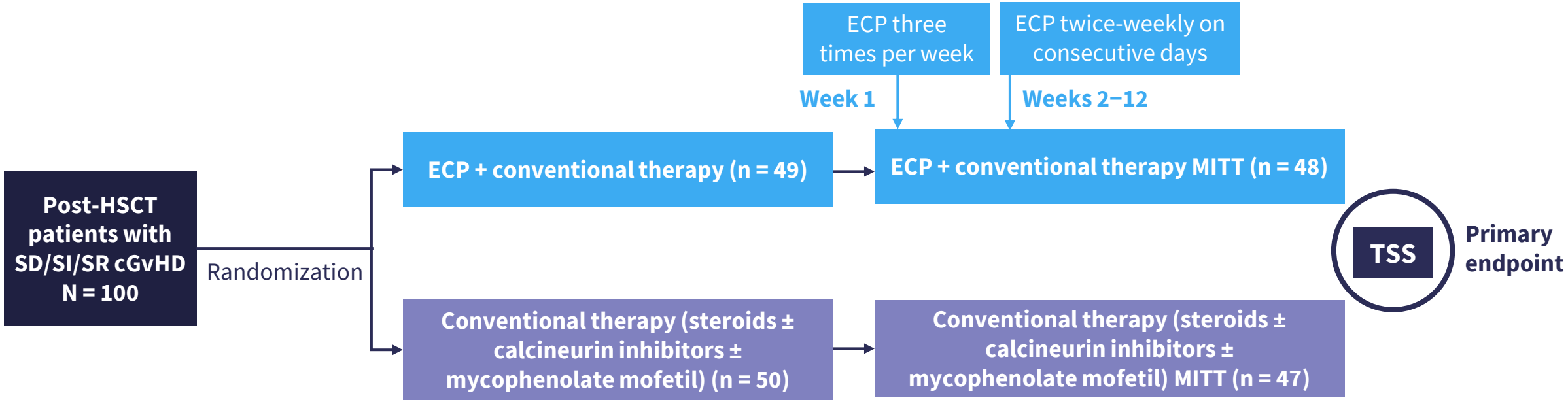


Data from Wolff D, et al. *Biol Blood Marrow Transplant.* 2019;25(7):1450-1455.

cGvHD, chronic graft-versus-host disease; CS, corticosteroid; CsA, cyclosporine; ECP, extracorporeal photopheresis; MMF, mycophenolate mofetil; MTX, methotrexate.

Prospective randomized study for patients with SR or SD cGvHD

Role of ECP

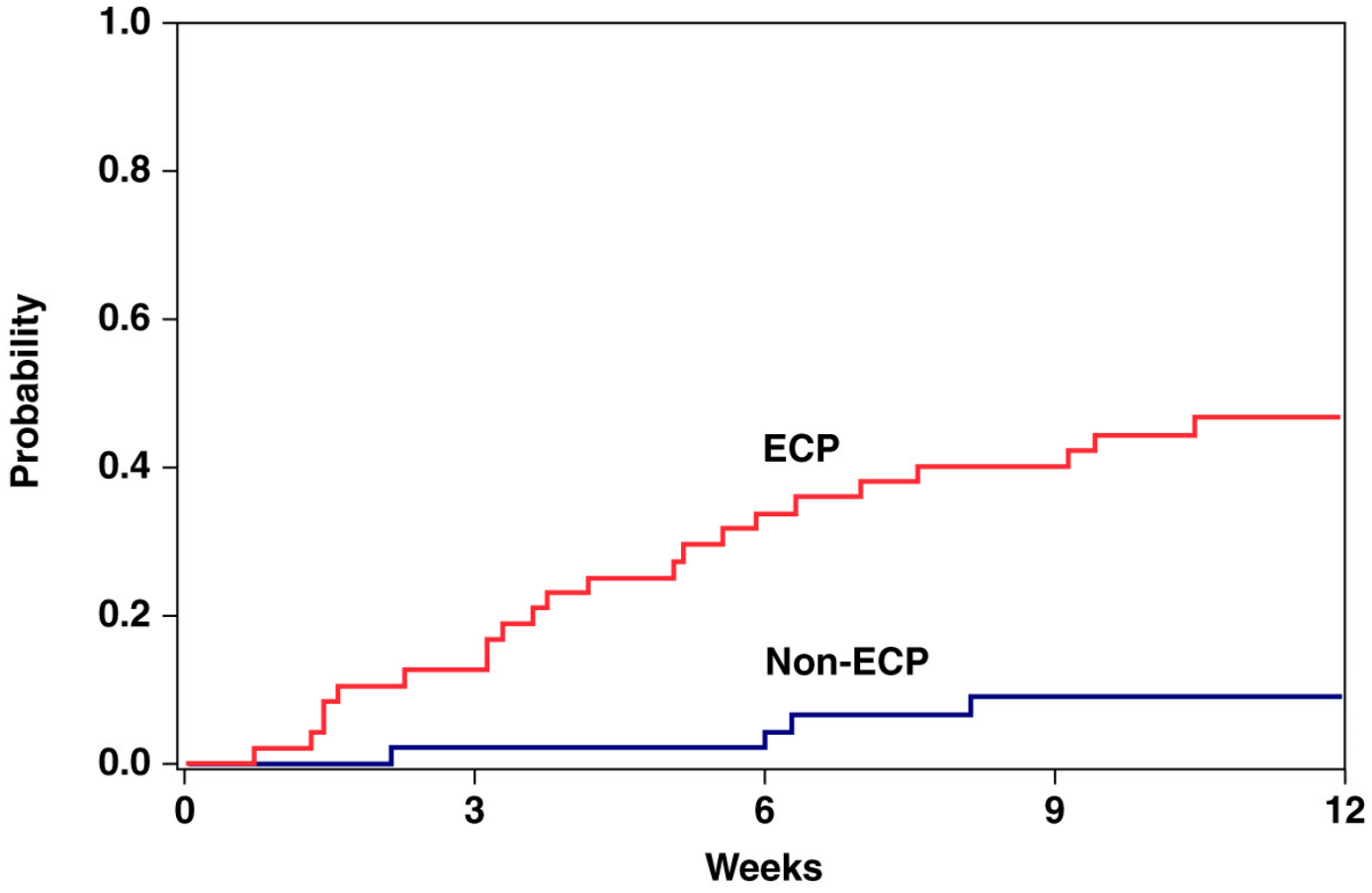


Primary endpoint:
Median % change in TSS at Week 12 compared with baseline

cGvHD, chronic graft-versus-host disease; ECP, extracorporeal photopheresis; MITT, modified intent-to-treat; SD, steroid-dependent; SI, steroid-intolerant; SR, steroid-refractory; TSS, total skin score.
Flowers MED, et al. *Blood.* 2008;112(7):2667-2674.

Cumulative incidence of CR/PR in skin

Phase II study of ECP in steroid-refractory/dependent cGvHD: Investigator assessment



cGvHD, chronic graft-versus-host disease; CR, complete response; ECP, extracorporeal photopheresis; PR, partial response.

Prospective randomized study for patients with SR or SD cGvHD

Primary endpoint: Total skin score

- At Week 12
- N = 95
- Blinded assessment

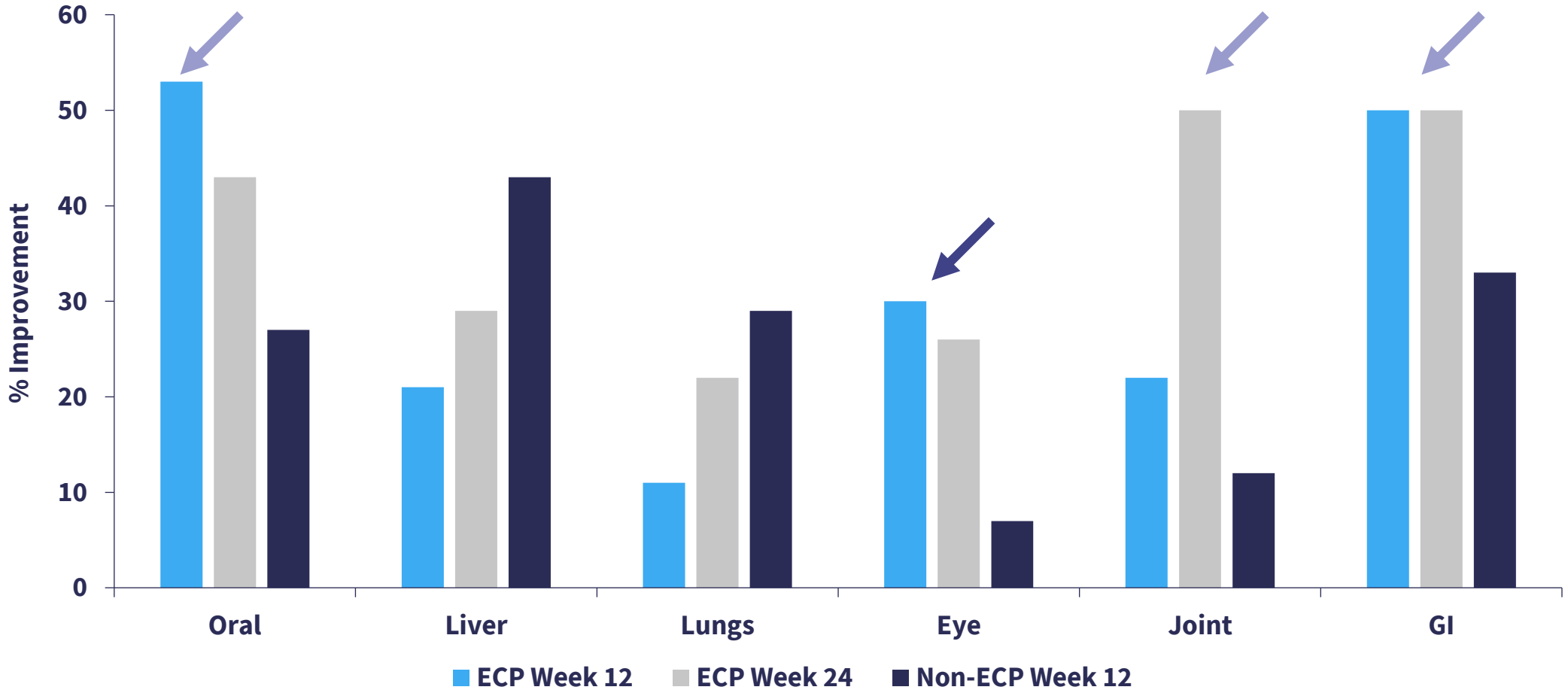
Corticosteroid response to ECP treatment*			
	Week 12†		
Parameter	**ECP (n = 48)**	**Control (n = 47)**	**p**
Median percent change from baseline in TSS	−14.5	−8.5	0.48
≥50% reduction in corticosteroid dose and ≥25% improvement in TSS, %	8.3	0	0.04
≥50% reduction in corticosteroid dose and final corticosteroid dose of <10 mg/day, %	20.8	6.4	0.04

Data from Flowers MED, et al. *Blood.* 2008;112(7):2667-2674.

cGvHD, chronic graft-versus-host disease; CR, complete response; ECP, extracorporeal photopheresis; PR, partial response; SD, steroid-dependent; SR, steroid-refractory; TSS, total skin score.
*The large number of patients who discontinued the study in the control arm precluded statistical comparison for Week 24.
†In both groups, the last known dose of corticosteroids was used when the Week 12 dose was missing.
Flowers MED, et al. *Blood.* 2008;112(7):2667-2274.

Resolution/improvement in extracutaneous cGvHD at Week 12

Phase II study of ECP in steroid-refractory/dependent/intolerant cGvHD

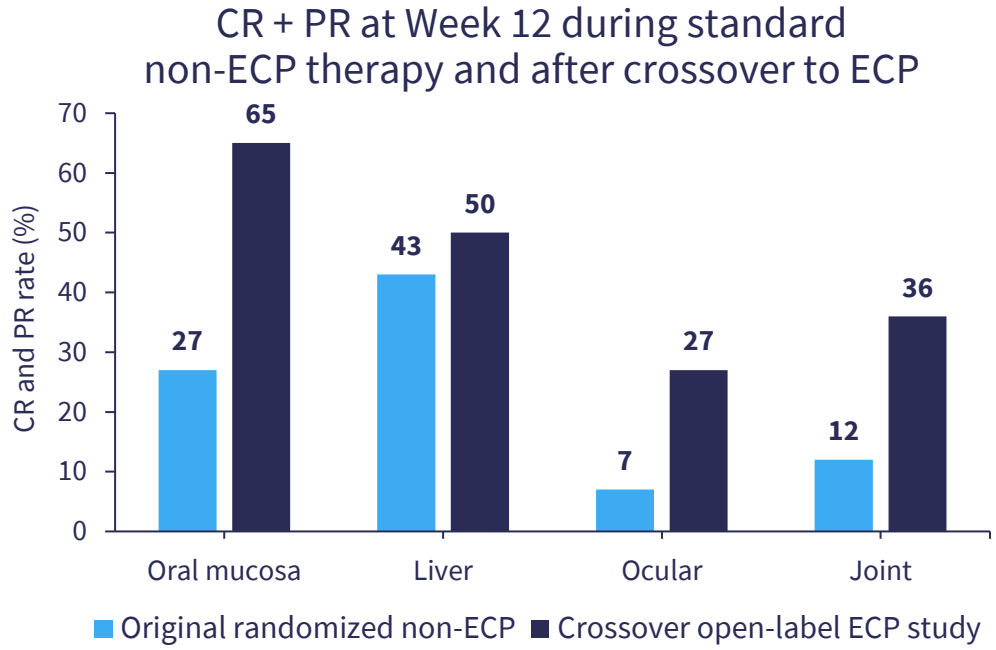


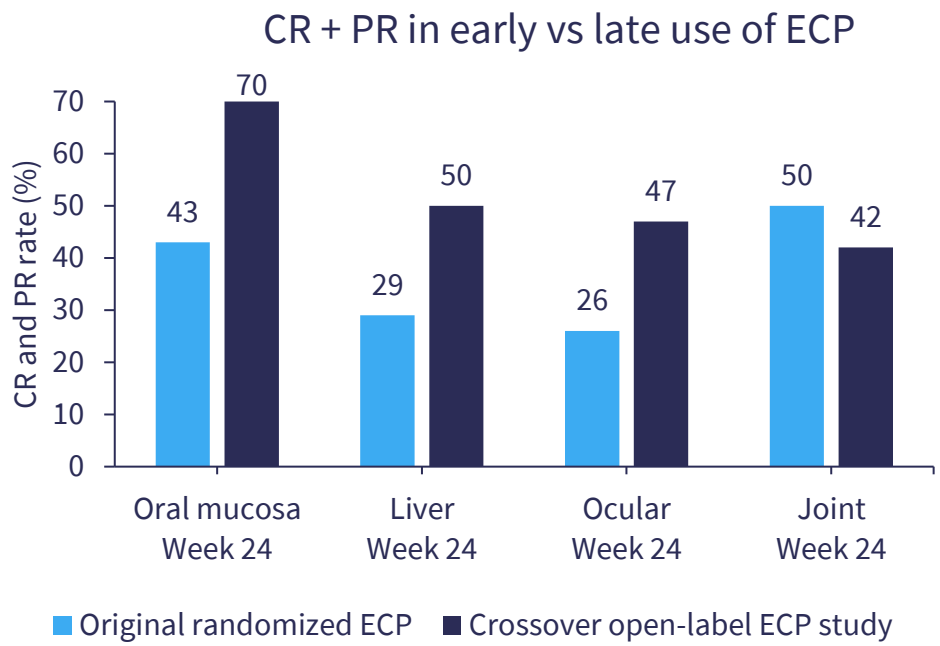
Data from Flowers MED, et al. *Blood.* 2008;112(7):2667-2274.

cGvHD, chronic graft-versus-host disease; ECP, extracorporeal photopheresis; GI, gastrointestinal.

Phase II study of ECP in SR/SD/SI cGvHD

- CR + PR of skin by investigator assessment in nine (31%) patients at Week 24
- 8/24 (33.3%) patients achieved ≥50% reduction in steroid dose at Week 24
- Similar response rates in skin and extracutaneous cGvHD compared with original ECP cohort despite longer duration of cGvHD





cGvHD, chronic graft-versus-host disease; CR, complete response; ECP, extracorporeal photopheresis; PR, partial response; SI, steroid-intolerant; SD, steroid-dependent; SR, steroid-refractory.
Greinix H, et al. *Biol Blood Marrow Transplant.* 2011;17(12):1775-1782.

Meta-analysis on ECP in cGvHD

Overall response rate

Effect size: 0.68 (0.62–0.74)

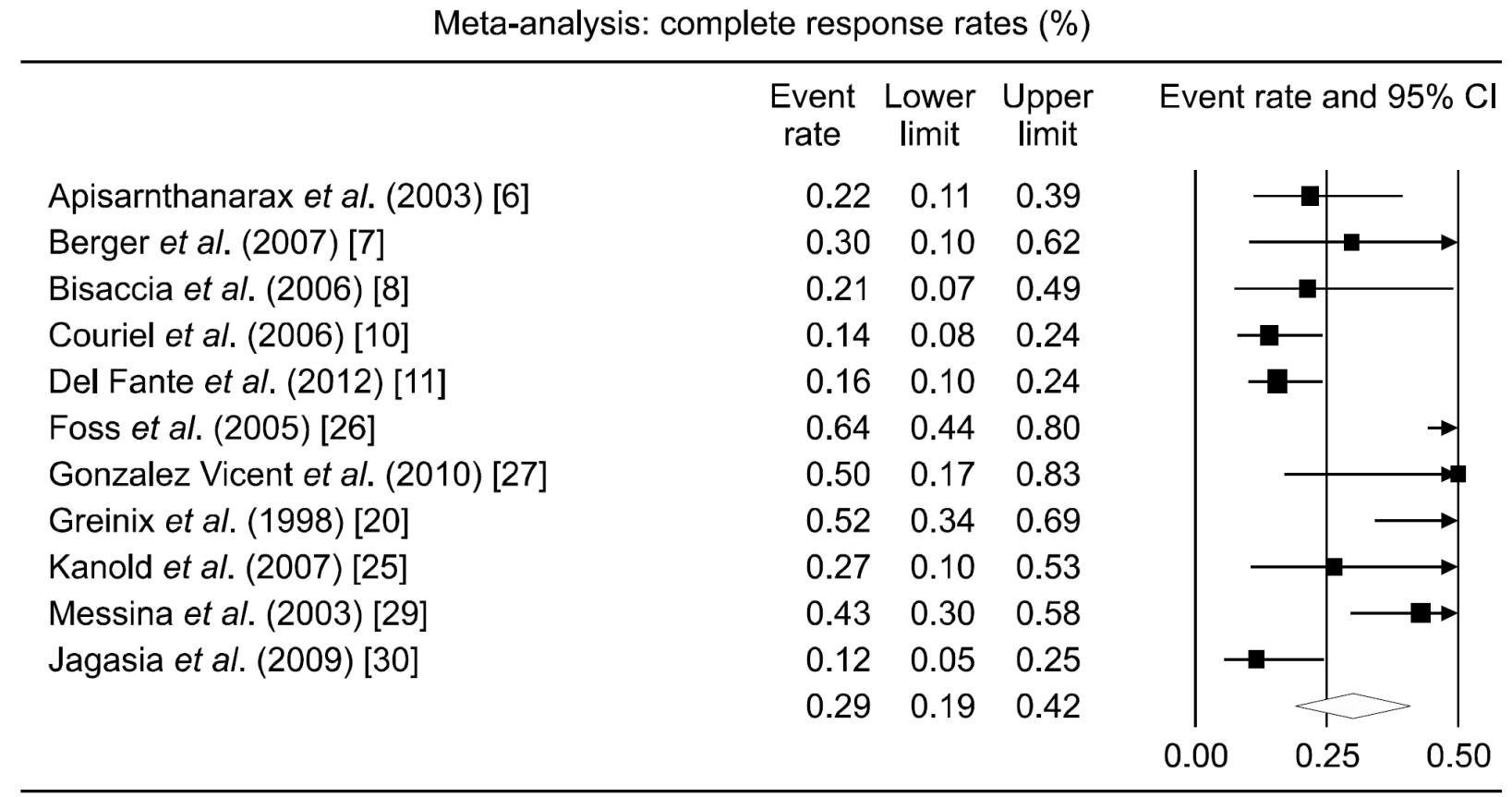
Study (ECP)	No. patients	Study type	Effect size (95% CI)
Smith (1998)	18	Prospective	0.33 (0.13–0.59)
Whittle (2011)	46	Prospective	0.52 (0.37–0.67)
Tsirigotis (2012)	47	Prospective	0.57 (0.42–0.72)
Foss (2005)	25	Prospective	0.64 (0.43–0.82)
Salvaneschi (2001)	14	Prospective	0.64 (0.35–0.97)
Alcindor (2002)	10	Prospective	0.70 (0.35–0.93)
Kanold (2007)	15	Prospective	0.73 (0.45–0.92)
Rubegni (2005)	32	Prospective	0.78 (0.60–0.91)
Dignan (2012)	82	Prospective	0.79 (0.69–0.87)
Gorgun (2002)	10	Prospective	0.80 (0.44–0.07)
Ayyildiz (2007)	7	Prospective	0.86 (0.42–1.00)
Rubegni (2007)	14	Prospective	0.86 (0.57–0.98)
Garban (2005)	15	Prospective	0.87 (0.60–0.98)
Biagi (2007)	6	Prospective	1.00 (0.54–1.00)
Hautmann (2013)	32	Retrospective	0.44 (0.26–0.62)
Berger (2007)	10	Retrospective	0.50 (0.19–0.81)
Duzovali (2007)	6	Retrospective	0.50 (0.12–0.88)
Akhtari (2010)	25	Retrospective	0.56 (0.35–0.76)
Messina (2003)	44	Retrospective	0.59 (0.43–0.74)
Couriel (2006)	71	Retrospective	0.61 (0.48–0.72)
Jagasia (2009)	31	Retrospective	0.65 (0.45–0.81)
Perotti (2010)	23	Retrospective	0.70 (0.47–0.87)
Ilhan (2004)	8	Retrospective	0.75 (0.35–0.97)
Perseghin (2007)	25	Retrospective	0.80 (0.59–0.93)
Del Fante (2012)	102	Retrospective	0.80 (0.71–1.00)
Gonzalez-Vinvent (2010)	6	Retrospective	0.83 (0.36–1.00)
Subtotal (I^2=57.05%, p = 0.00)			**0.68 (0.62–0.74)**

cGvHD, chronic graft-versus-host disease; CI, confidence interval; ECP, extracorporeal photopheresis.

Olivieri J, et al. *Lancet Haematol.* 2015;2:e297-305.

Meta-analysis on ECP in cGvHD

Complete response rate



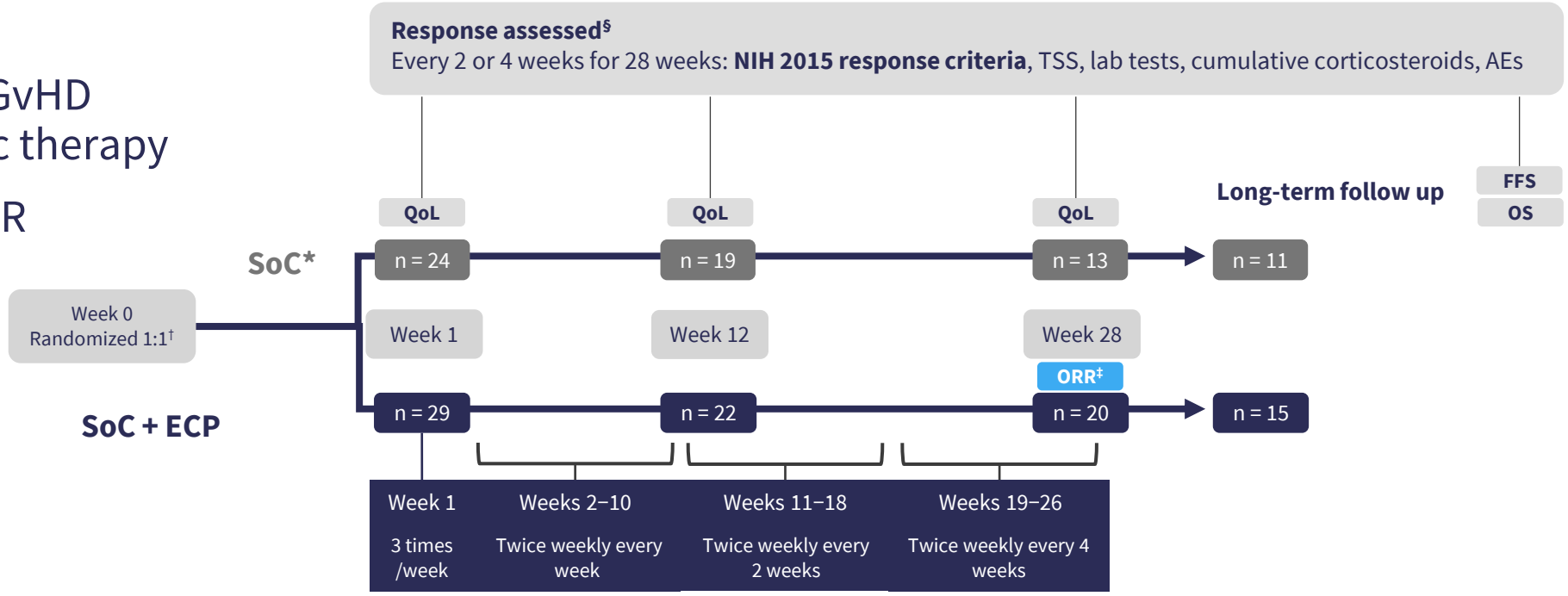
Malik MI, et al. *Blood Res.*2014;49(2):100-106.

cGvHD, chronic graft-versus-host disease; CI, confidence interval; ECP, extracorporeal photopheresis.
Malik MI, et al. *Blood Res.*2014;49(2):100-106.

TKS-005: First prospective study in the first-line setting

Randomized, multicenter, active comparator-controlled, parallel group, pilot study

- New onset (≤3 years from HSCT)
- Moderate or severe cGvHD that requires systemic therapy
- Primary endpoint: ORR
- N = 60



AE, adverse event; cGvHD, chronic graft-versus-host disease; ECP, extracorporeal photopheresis; FFS, failure-free survival; HSCT, hematopoietic stem cell transplant; NIH, National Institutes of Health; ORR, overall response rate; OS, overall survival; QoL, quality of life; SoC, standard of care.

*Corticosteroids ± cyclosporin A ± tacrolimus.

†Corticosteroids were tapered down from 1 mg/kg/day at Week 1 to 0.5 mg/kg/day at Week 8 (±1), 0.25 mg/kg/day at Week 16 (±1), and 0.125 mg/kg/day at Week 24 (±1).

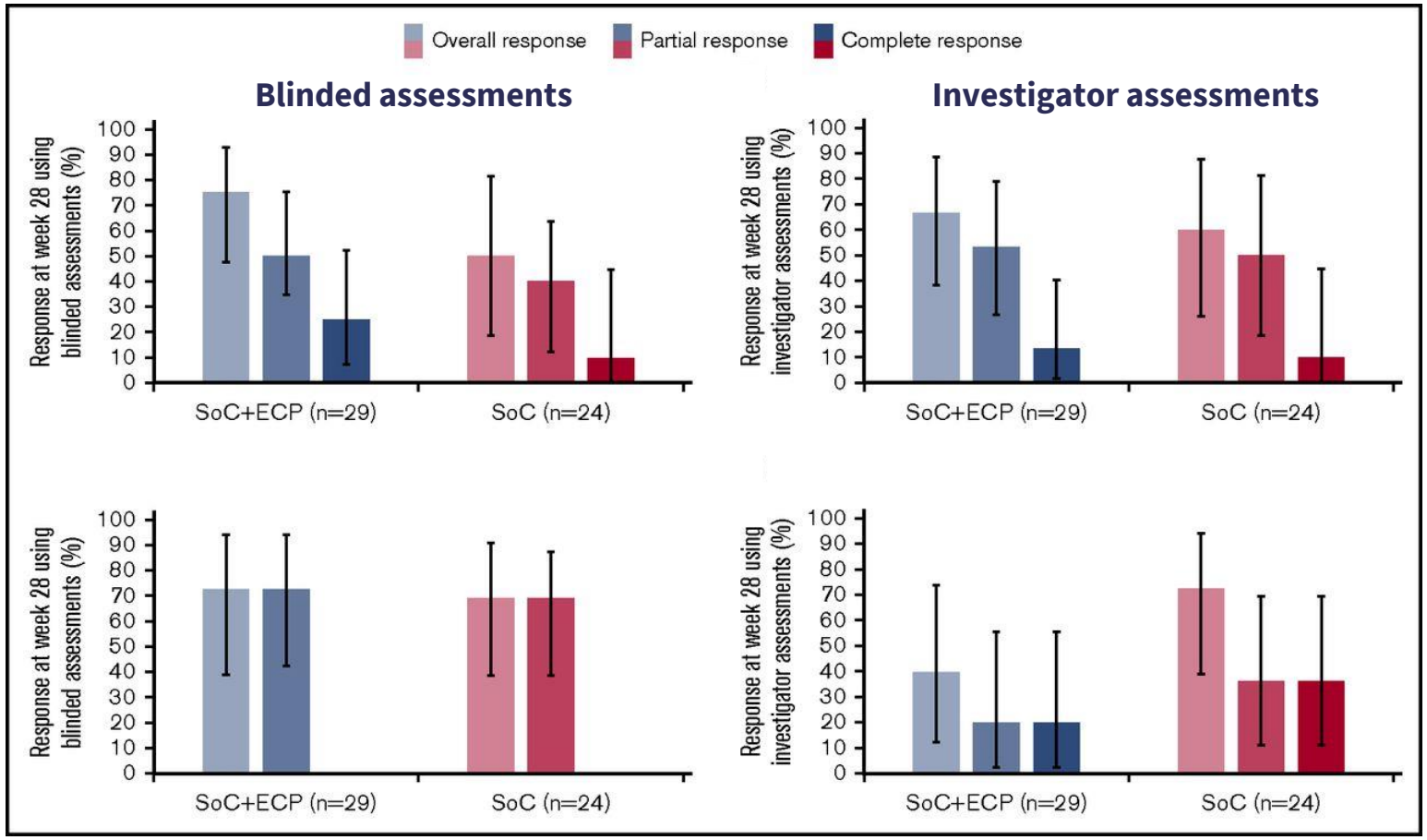
‡ORR is defined as clinically assessed complete response and partial response; partial response requires 50% improvement of the scale used to measure activity, according to NIH 2015 at Week 28.

§Response was assessed by a trained, blinded, third-party assessor for skin and mouth domains, as well as the primary physician.

Jagasia M, et al. *Blood Adv*. 2019;3(14):2218-2229.

Overall response rate at Week 28 by severity

According to NIH cGvHD 2015 response criteria



cGvHD, chronic graft-versus-host disease; ECP, extracorporeal photopheresis; NIH, National Institutes of Health; SoC, standard of care.
Jagasia M, et al. *Blood Adv*. 2019;3(14):2218-2229.

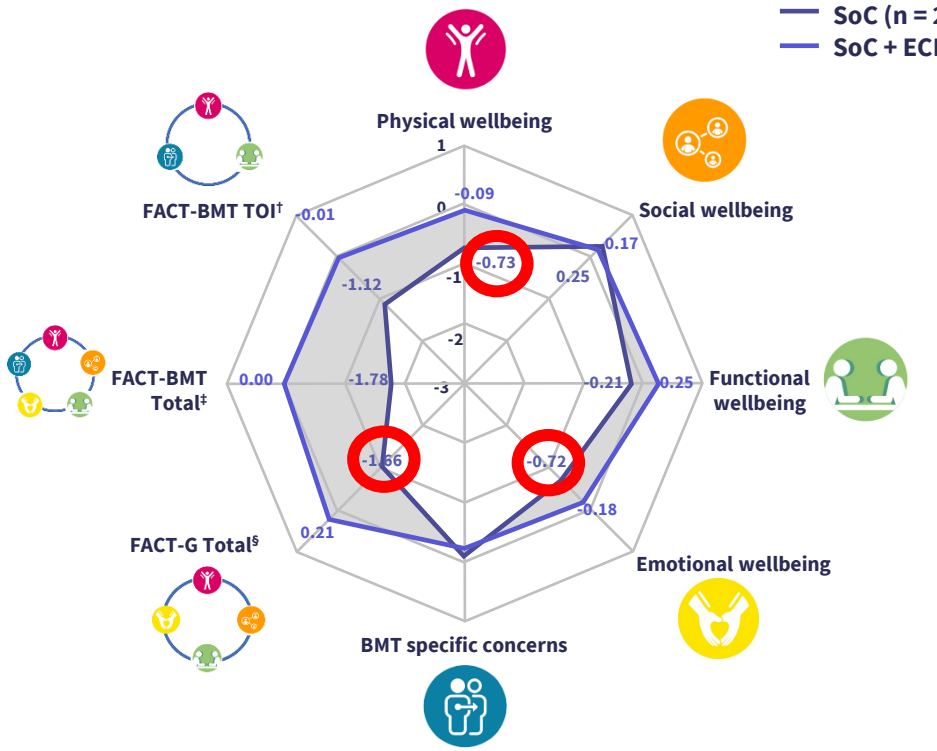
Quality of life during treatment

FACT-BMT

- At baseline, Week 12, and Week 28
- ITT population
- Post hoc analysis

SoC: Significant worsened changes in scores*

- Physical wellbeing (−0.7326; p = 0.032)
- Emotional wellbeing (−0.7151; p = 0.006)
- FACT-G (−1.6618; p = 0.018)



BMT, bone marrow transplantation; ECP, extracorporeal photopheresis; FACT, Functional Assessment of Cancer Therapy; ITT, intention to treat; SoC, standard of care; TOI, trial outcome index.
*Physical wellbeing, social/family well-being, and functional wellbeing were scored from 0 to 28, emotion wellbeing was scored from 0 to 24, and BMT specific concerns were scored from 0 to 40.
†Physical wellbeing + functional wellbeing + BMT specific concerns; score: 0–96.
‡Physical wellbeing + social wellbeing + functional wellbeing + emotional wellbeing + BMT specific concerns; score: 0–148.
§Physical wellbeing + social wellbeing + functional wellbeing + emotional wellbeing; score: 0–108.
Jagasia M, et al. *Blood Adv*. 2019;3(14):2218-2229.

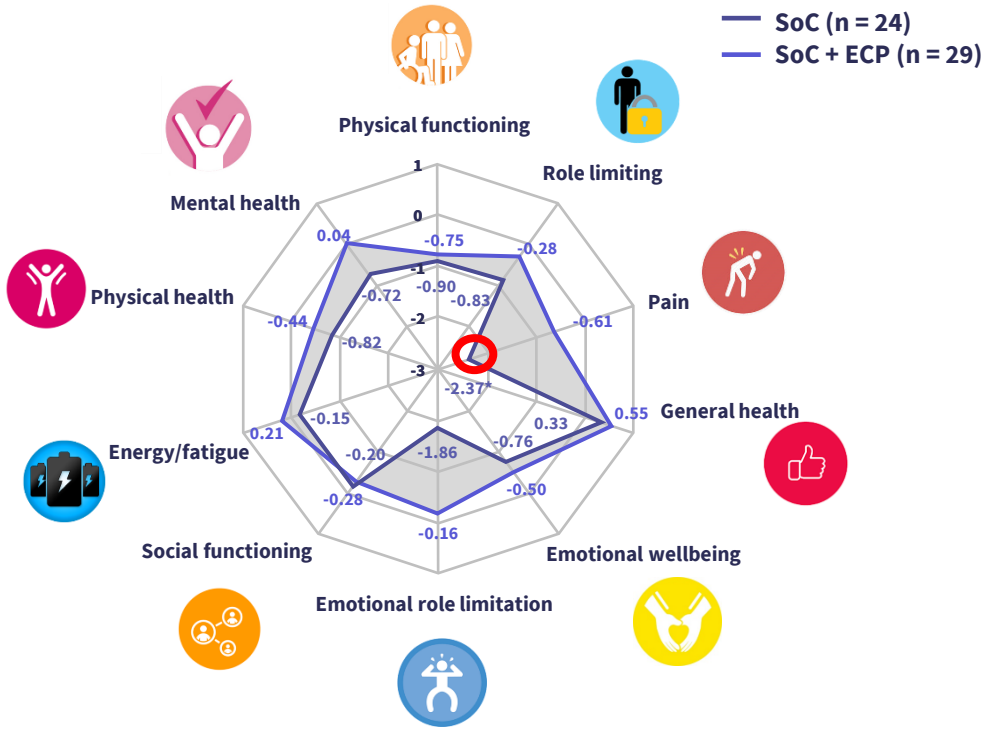
Quality of life during treatment

SF-36*

- At baseline, Week 12, and Week 28
- ITT population
- Post hoc analysis

SoC: Significant worsened changes in scores

- Pain (−2.3728; p = 0.009)



ECP, extracorporeal photopheresis; ITT, intention to treat; SF-36, 36-item short form health survey; SoC, standard of care.
*The SF-36 domains of quality of life were scored from 0 to 100.
Jagasia M, et al. *Blood Adv*. 2019;3(14):2218-2229.

ECP in combination treatment

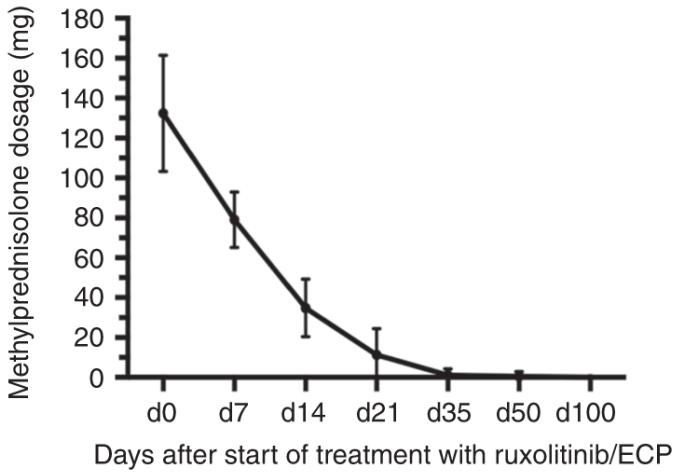
Ruxolitinib plus ECP for SR aGvHD of lower GI tract

- Single-center experience of combining ruxolitinib with ECP in 18 patients
- Additional aGvHD of skin (n = 7), liver (n = 6), or upper GI tract (n = 2) or a combination
- Overall Grade III (50%) or Grade IV aGvHD (50%) at start of ruxolitinib or ECP therapy
- All patients received in addition a CNI to ruxolitinib/ECP therapy and/or methylprednisolone, 17 patients received additional MMF
- The majority of patients (n = 15; 83%) received ruxolitinib before starting ECP (median, 19.7 days before ECP)
- Median duration of ruxolitinib therapy was 59.8 days (range, 14–192 days) with a median starting dosage of 20 mg per day
- Median number of ECP treatments was 20.5/patient (range, 2–71/patient) and median duration of ECP was 5.7 months (range, 0.4–23.4 months)

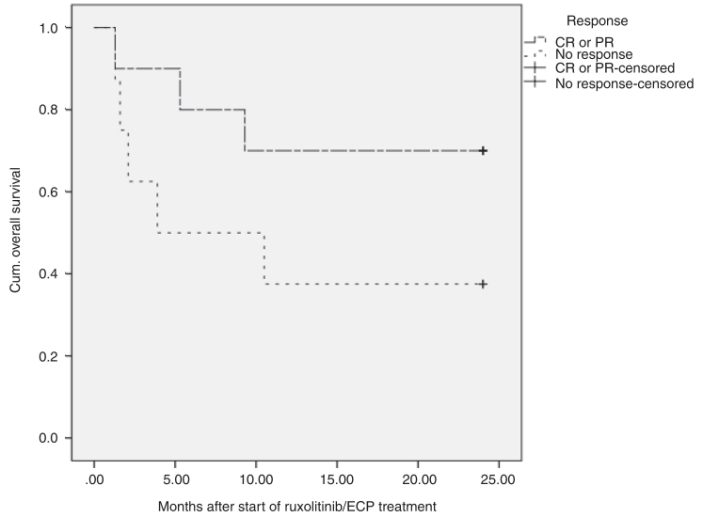
aGvHD, acute graft-versus-host disease; CNI, calcineurin inhibitor; ECP, extracorporeal photopheresis; GI, gastrointestinal; MMF, mycophenolate mofetil; SR, steroid-refractory.

Modemann F, et al. *Bone Marrow Transplant*. 2020;55(12):2286-2293.

Ruxolitinib plus ECP for SR aGvHD of lower GI tract



Modemann F, et al. *Bone Marrow Transplant*. 2020;55(12):2286-2293.



Modemann F, et al. *Bone Marrow Transplant*. 2020;55(12):2286-2293.

- Treatment was well tolerated
  - No severe (Grade IV) cytopenia, Grade III cytopenia in 3 patients
  - CR, 44%; PR, 11%
- Rapid steroid taper: median time for halving of dosage, 2 days
- In patients achieving CR/PR: 70% 2-year OS (median, 18.4 months)
- In patients with NR: 38% 2-year OS (median, 11.4 months)

aGvHD, acute graft-versus-host disease; CR, complete remission; ECP, extracorporeal photopheresis; GI, gastrointestinal; NR, no response; OS, overall survival; PR, partial remission; SR, steroid-refractory.
Modemann F, et al. *Bone Marrow Transplant*. 2020;55(12):2286-2293.

Ruxolitinib + ECP for refractory severe cGvHD

Retrospective survey in 23 patients

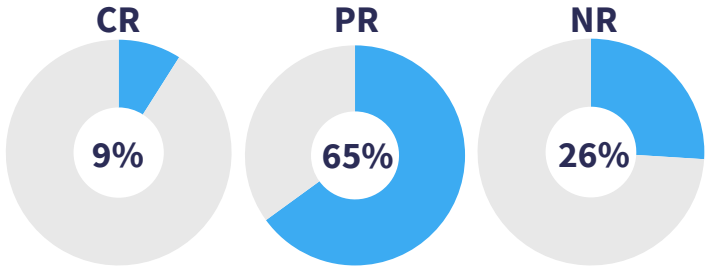
Patient characteristics	Patients, n (%)
>1 organ with GvHD features	20 (87)
Organ affection	
Skin	18 (78)
Liver	14 (61)
GI	13 (57)
Eye	10 (43)
Lung	8 (35)
cGvHD NIH Grade III	13 (57)
Beyond second-line treatment	21 (91)

Treatment

- Two treatments of ECP (on consecutive days) every 2–4 weeks
- Median time of RUX-ECP was 6 months (1–27 month)
- 35% (8/23) started ruxolitinib first, median 15 months (range, 1–29 months) of ruxolitinib prior to combination therapy

Results

Response rate after >1 week of combined therapy



- Best response (CR or PR) at any time point, 74% (17/23)
- 2-year OS, 75% (CI, 56.0–94.1)

Responses per cGVHD affected organ:

- GIT, 54%
- Skin, 44%
- Liver, 21%
- Eye, 20%
- Lung, 13%

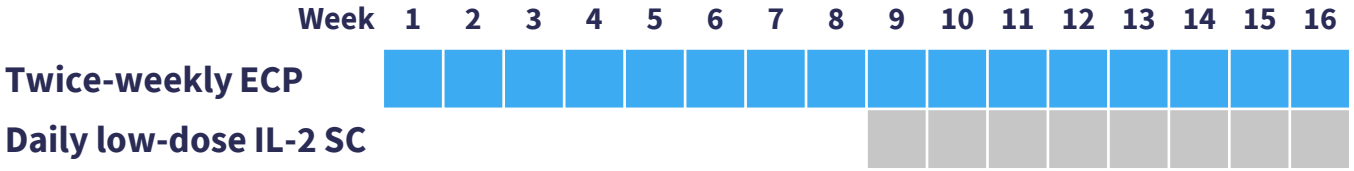
- Steroid dose was reduced in 76% (13/17) of patients that responded to the RUX–ECP combination
- Serum levels of sIL-2R correlated with response
  - IL-2R levels declined once patients started RUX monotherapy (p=0.02)
  - IL-2R levels further declined after RUX-ECP combination therapy (p=0.046)

cGvHD, chronic graft-versus-host disease; CI, confidence interval'; CR, complete response; ECP, extracorporeal photopheresis; GIT, gastrointestinal tract; NR, no response; OS, overall survival; PR, partial response; RUX, ruxolitinib; sIL-2R, soluble interleukin-2R.

Maas-Bauer K et al. *Bone Marrow Transplant.* 2020;56(4):909-916.

ECP and IL-2 in steroid-refractory cGvHD

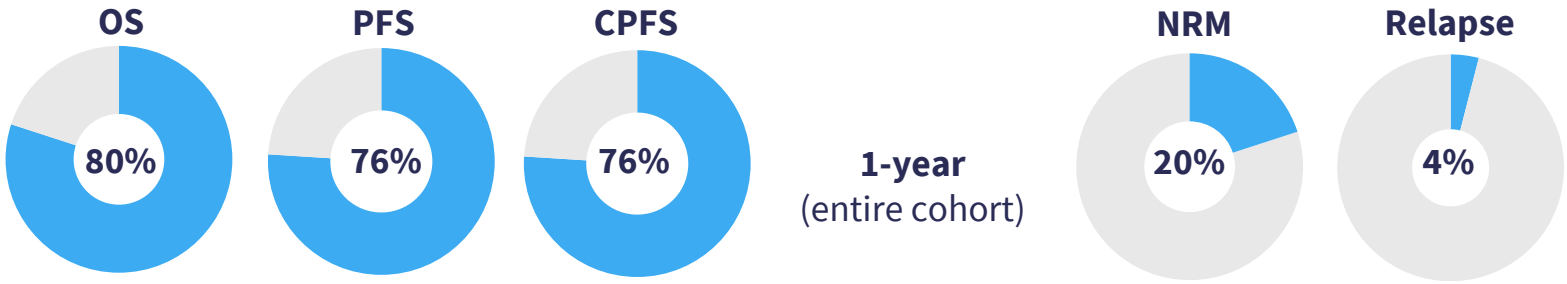
Treatment



Response sites with ECP alone	Additional response sites with ECP + IL-2
Skin (n = 2)	Skin (n = 7)
GI tract (n = 2)	GI tract (n = 1)
Joint/fascia (n = 4)	Joint/fascia (n = 4)
Lung (n = 1)	Lung (n = 1)
Liver (n = 1)	

Results

- PR of 29% and 62% at 8 and 16 weeks of therapy, respectively; 1 ECP-related anemia and 2 infectious deaths
- After ECP: decline in $CD4^+$ T_{con} and $CD8^+$ T cells
- After ECP + IL-2: increase in T_{reg}, T_{reg}:T_{con} ratio, and NK cells



cGvHD, chronic graft-versus-host disease; CPFS, cGvHD progression-free survival; ECP, extracorporeal photopheresis; IL, interleukin; NK, natural killer; NR, non-responders; NRM, non-relapse mortality; OS, overall survival; PFS, progression-free survival; PR, partial response; R, responders; SC, subcutaneous; Treg, regulatory T cell; Tcon, conventional T cell.

Belizaire R, et al. *Blood Adv.* 2019;3(7):969-979.

Approved and recommended use of ECP

Approved and recommended use of ECP[1-4]

Approved

- Treatment of advanced cutaneous T-cell lymphoma

Recommended

- As second-line treatment for steroid-refractory acute and chronic GvHD


Reprinted From

The New England Journal of Medicine

VOLUME 316 FEBRUARY 5, 1987 NUMBER 6

TREATMENT OF CUTANEOUS T-CELL LYMPHOMA BY EXTRACORPOREAL PHOTOCHEMOTHERAPY

Preliminary Results

Richard Edelson, M.D., Carole Berger, Ph.D., Francis Gasparro, Ph.D., Brian Jegasothy, M.D., Peter Heald, M.D., Bruce Wintroub, M.D., Eric Vonderheid, M.D., Robert Knobler, M.D., Klaus Wolff, M.D., Gerhard Plewig, M.D., Glynis McKiernan, R.N., Inger Christiansen, R.N., Martin Oster, M.D.,Herbert Honigsmann, M.D., Hubert Wilford, M.D., Eva Kokoschka, M.D., Thomas Rehle, M.D., Maritza Perez, M.D., George Stingl, M.D., and Liliane Laroche, M.D.

BJD British Journal of Dermatology
IMPROVING PATIENT OUTCOMES IN SKIN DISEASE WORLDWIDE

U.K. consensus statement on the use of extracorporeal photopheresis for treatment of cutaneous T-cell lymphoma and chronic graft-versus-host disease

J.J. Scarisbrick, P. Taylor, U. Holtick, Y. Makar, K. Douglas, G. Berlin, E. Juvonen, S. Marshall, on behalf of the Photopheresis Expert Group

First published: 30 January 2008 | https://doi.org/10.1111/j.1365-2133.2007.08415.x | Citations: 127

GvHD
Graft-versus-Host Disease
German-Austrian-Swiss Consortium

THE JOURNAL OF AABB transfusion.org
TRANSFUSION

COMMITTEE REPORT

Extracorporeal photopheresis for the treatment of acute and chronic graft-versus-host disease in adults and children: best practice recommendations from an Italian Society of Hemapheresis and Cell Manipulation (SIdEM) and Italian Group for Bone Marrow Transplantation (GITMO) consensus process

Luca Pierelli, Paolo Perseghin, Monia Marchetti, Chiara Messina, Cesare Perotti, Alessandro Mazzoni, Andrea Bacigalupo, Franco Locatelli, Paolo Carlier, Alberto Bosi for ... See all authors

First published: 10 January 2013 | https://doi.org/10.1111/trf.12059 | Citations: 38

EADV JEADV JOURNAL OF THE EUROPEAN ACADEMY OF DERMATOLOGY & VENEREOLOGY

Guidelines | Open Access

European dermatology forum – updated guidelines on the use of extracorporeal photopheresis 2020 – part 1

R. Knobler, P. Arenberger, A. Arun, C. Assaf, M. Bagot, G. Berlin, A. Bohbot, P. Calzavara-Pinton, F. Child, A. Cho, L.E. French, A.R. Gennery, R. Gniadecki, H.P.M. Gollnick, E. Guenova ... See all authors

First published: 06 October 2020 | https://doi.org/10.1111/jdv.16890 | Citations: 23

GvHD, graft-versus-host disease; ECP, extracorporeal photopheresis.

1. Scarisbrick JJ, et al. *Br J Dermatol*. 2008;158(4):659-78. **2.** Pierelli L, et al. *Transfusion*. 2013;53(10):2340-52. **3.** Knobler R, et al. *J Eur Acad Dermatol Venereol*. 2020;34(12):2693-2716. **4.** Edelson R, et al. *N Engl J Med*. 1987;316(6):297-303.

Collaboration group

Vienna

BMT Unit

- P. Kalhs
- W. Rabitsch
- Z. Kuzmina
- M. Mitterbauer
- R. Weigl

Dept. Immunology

- W.F. Pickl
- U. Körmöczy
- A. Rottal

Dept. Dermatology

- R. Knobler
- U. Just
- W. Bauer
- G. Stary

Dept. Transfusion Medicine

- N. Worel

Dept. Pulmonology

- V. Petkov

Graz

BMT Unit

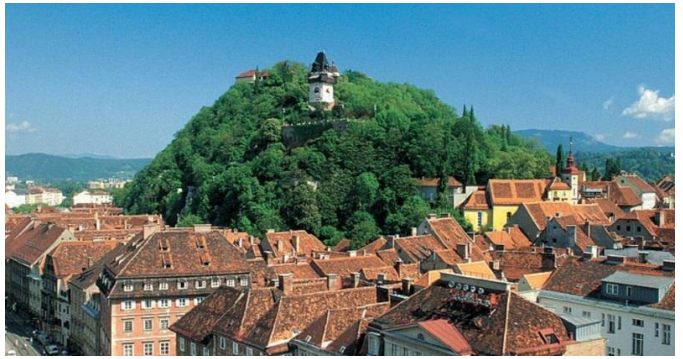
- P. Neumeister
- B. Huber-Kraßnitzer
- K. Prochazka
- L. Gaksch
- H. Sill

Dept. Dermatology

- P. Wolf
- I. Wolf

Dept. Transfusion Medicine

- P. Schlenke



GvHD
Graft-versus-Host Disease
German-Austrian-Swiss Consortium

EBMT
European Society for Blood and Marrow Transplantation

Thank you