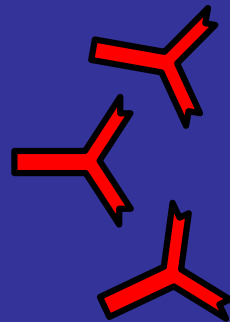


Immunoabsorption in ME/CFS and Post COVID Syndrom

INTERNATIONAL ME/CFS CONFERENCE 08/05/2026

Elisa Stein

Institut für
Medizinische
Immunologie
Charité



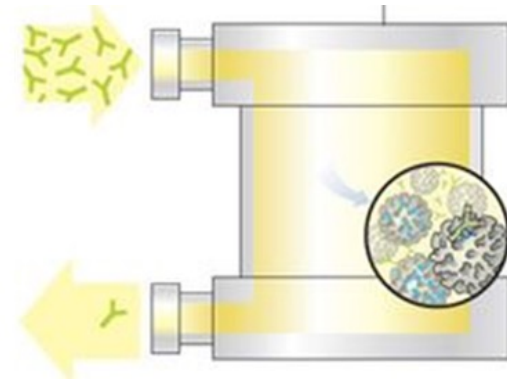
Immunadsorption in ME/CFS / Post Covid Syndrom

- **Observational NKSG immunoadsorption trial (RIA, 20 patients in 2022-2024)**
- **Observational immunoadsorption trial (piMECFS, 13 patients in 2025)**
- **New study: IMPACT (50 patients in 2026)**
- **Overview of the 3 RCT in Germany (Berlin, Hannover, Mainz)**

Immunadsorption

Principle

- Separation of plasma by centrifugation
- Immunglobulin removal by specific column



Adsorber

- Ig Fc-Binder (Therasorb, Globaffin)
Depletion 80 – 90%
- Tryptophan (TR-350)
Depletion 40 – 60%

First evidence for efficacy of immunoadsorption in postinfectious ME/CFS



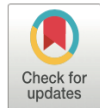
RESEARCH ARTICLE

Immunoadsorption to remove β_2 adrenergic receptor antibodies in Chronic Fatigue Syndrome CFS/ME

Carmen Scheibenbogen^{1,2*}, Madlen Loebel¹, Helma Freitag¹, Anne Krueger³, Sandra Bauer¹, Michaela Antelmann¹, Wolfram Doehner⁴, Nadja Scherbakov⁴, Harald Heidecke⁵, Petra Reinke^{2,3}, Hans-Dieter Volk^{1,2}, Patricia Grabowski¹

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* Carmen.Scheibenbogen@charite.de



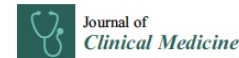
OPEN ACCESS

Citation: Scheibenbogen C, Loebel M, Freitag H, Krueger A, Bauer S, Antelmann M, et al. (2018) Immunoadsorption to remove β_2 adrenergic receptor antibodies in Chronic Fatigue Syndrome CFS/ME. PLoS ONE 13(3): e0193672. <https://doi.org/10.1371/journal.pone.0193672>

Abstract

Introduction

Infection-triggered disease onset, chronic immune activation and autonomic dysregulation in Chronic Fatigue Syndrome/Myalgic Encephalomyelitis (CFS/ME) point to an autoimmune disease directed against neurotransmitter receptors. We had observed elevated autoanti-



Article

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: Efficacy of Repeat Immunoadsorption

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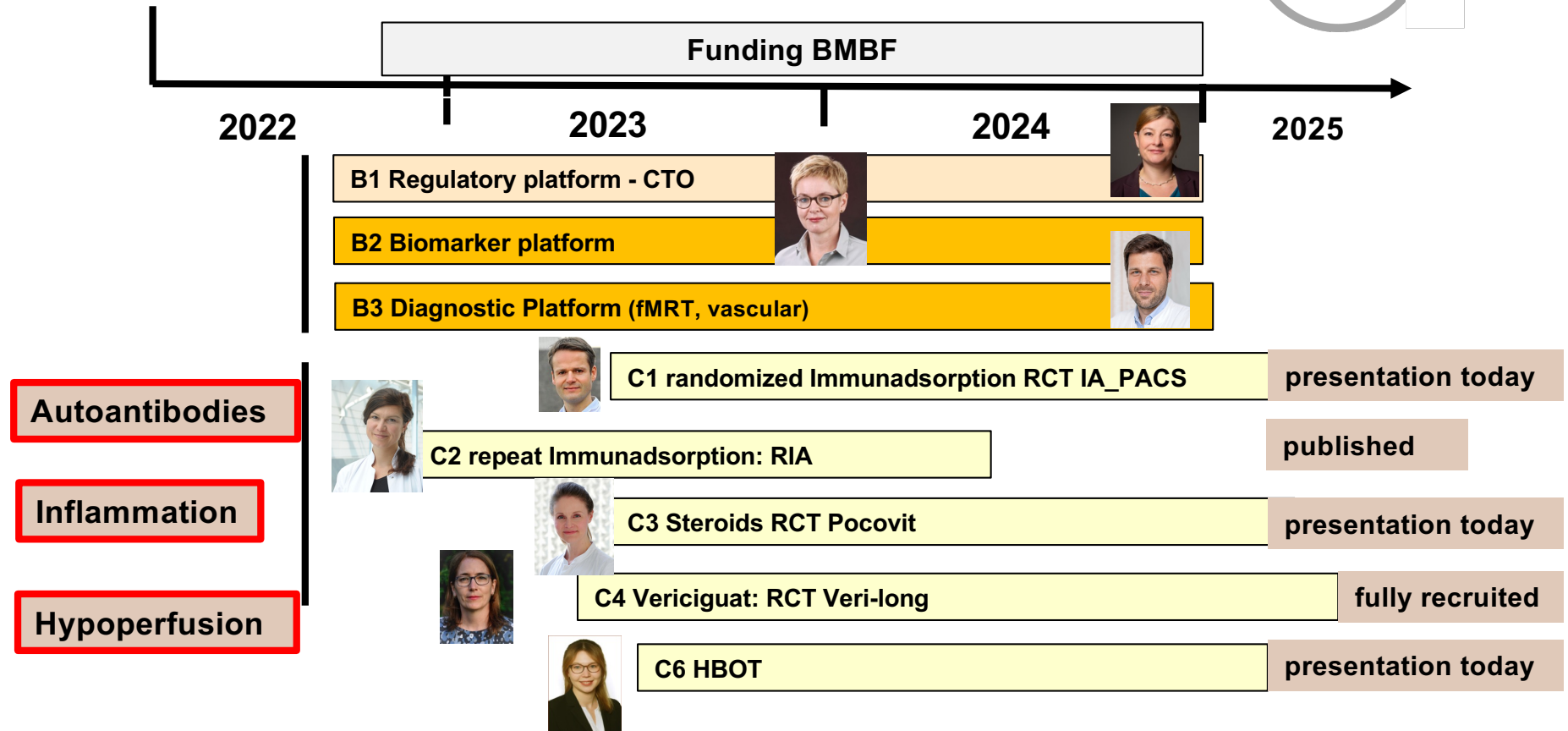


Abstract: (1) Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) is a complex neuroimmunological disease. There is evidence for an autoimmune mechanism for ME/CFS with an infection-triggered onset and dysfunction of β_2 -adrenoreceptor antibodies (β_2 AR-AB). In a first proof-of-concept study, we could show that IA was effective to reduce β_2 AR-AB and led to improvement of various symptoms. (2) Five of the ME/CFS patients who had clinical improvement following treatment with a five-day IA were retreated in the current study about two years later with a modified IA protocol. The severity of symptoms was assessed by disease specific scores during a follow-up period of 12 months. The antibodies were determined by ELISA. (3) The modified IA treatment protocol resulted in a remarkable similar clinical response. The treatment was well tolerated and 80–90% decline of total IgG and β_2 AR-AB was achieved. Four patients showed a rapid improvement in several clinical symptoms during IA therapy, lasting for six to 12 months. One patient had no improvement. (4) We could provide further evidence that IA has clinical efficacy in patients with ME/CFS. Data from our pilot trial warrant further controlled studies in ME/CFS.

National clinical study group (NKSG) for ME/CFS and Post Covid Syndrome: Research and Clinical trial platform



Bundesministerium
für Bildung
und Forschung



LONG COVID
DEUTSCHLAND

ME/CFS
DEUTSCHE GESELLSCHAFT
FÜR ME/CFS E.V.

CHARITÉ UNIVERSITÄTSMEDIZIN BERLIN



Observational study

Repeat immunoadsorption in patients with ME/CFS and elevated β 2-adrenergic receptor antibodies

**Primary aim:
improvement of SF36 PF**

Inclusion criteria

- Age 18-65
- Post COVID ME/CFS Canadian Consensus Criteria (CCC)
- Elevated β 2 adrenergic receptor antibody
- Bell 30 – 60
- 5 immunoadsorptions with Therasorb (Fc binder)

Efficacy of repeated immunoadsorption in patients with post-COVID myalgic encephalomyelitis/chronic fatigue syndrome and elevated β 2-adrenergic receptor autoantibodies: a prospective cohort study



The Lancet Regional Health - Europe
2025;49: 101161

Elisa Stein,^a Comelia Heindrich,^a Kirsten Wittke,^a Claudia Kedor,^a Rebekka Rust,^{a,c} Helma Freitag,^a Franziska Sotzny,^a Anne Krüger,^b Markus Tölle,^b Patricia Grabowski,^a Carmen Schäbenbogen,^a and Laura Kim^{a,*}



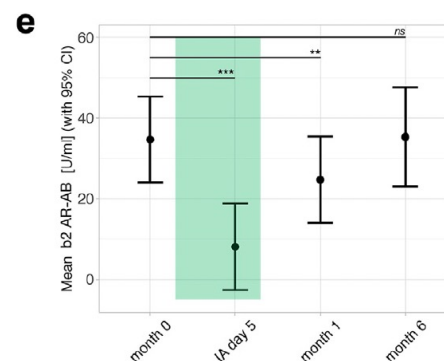
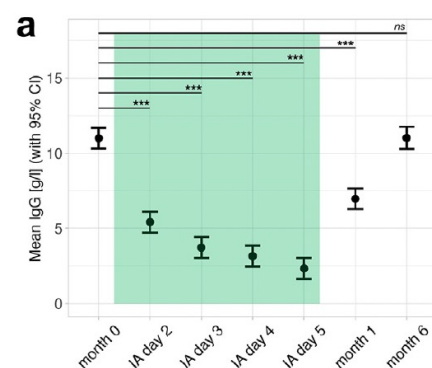
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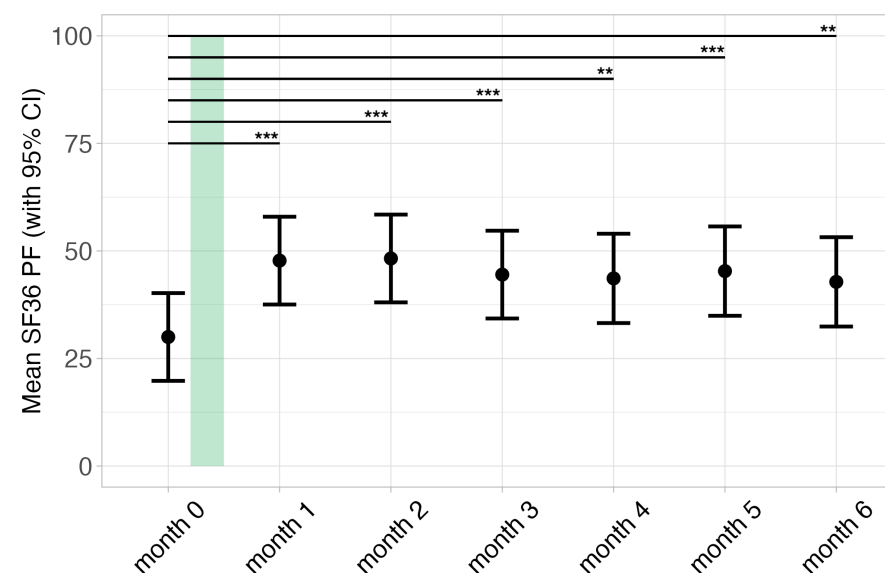
^cExperimental and Clinical Research Center and Neuro Science Clinical Research Center, Charité - Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt Universität zu Berlin, Berlin Institute of Health, Charitéplatz 1, Berlin, 10117, Germany



IgG and antibody depletion



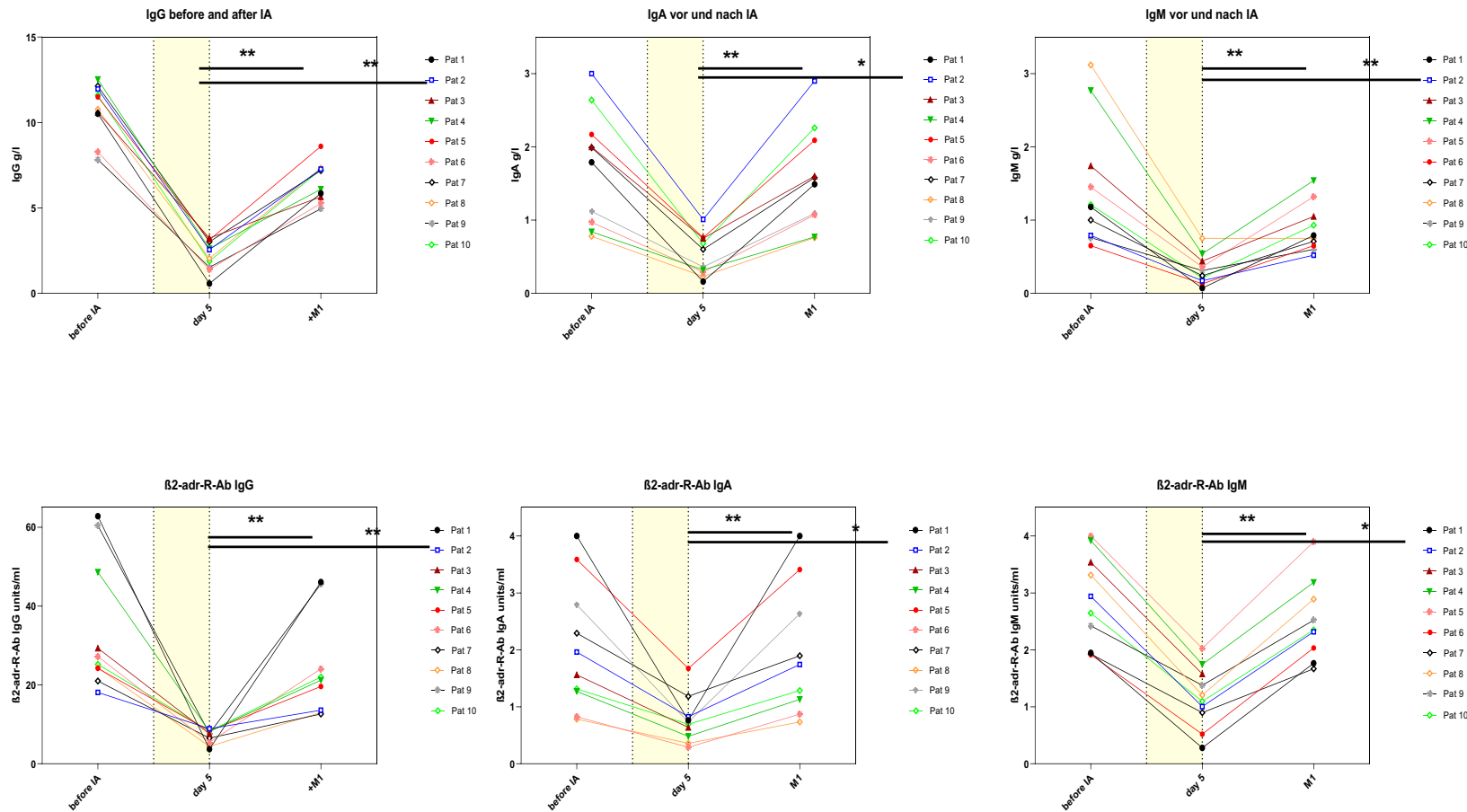
SF-36 physical function, n=20



C2 Repeat Immunoabsorption

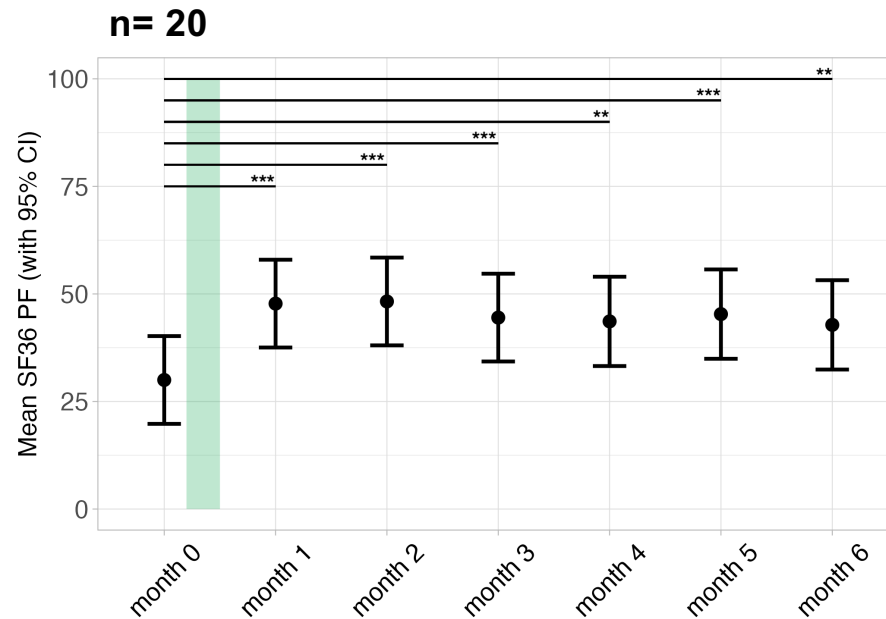
Beobachtungsstudie zur wiederholten Immunadsorption bei Post-COVID-ME/CFS-Patienten mit erhöhten β 2-Adrenorezeptor-Autoantikörpern

Efficient depletion of IgG, IgA, IgM and β 2R adrenergic antibodies (n=10)

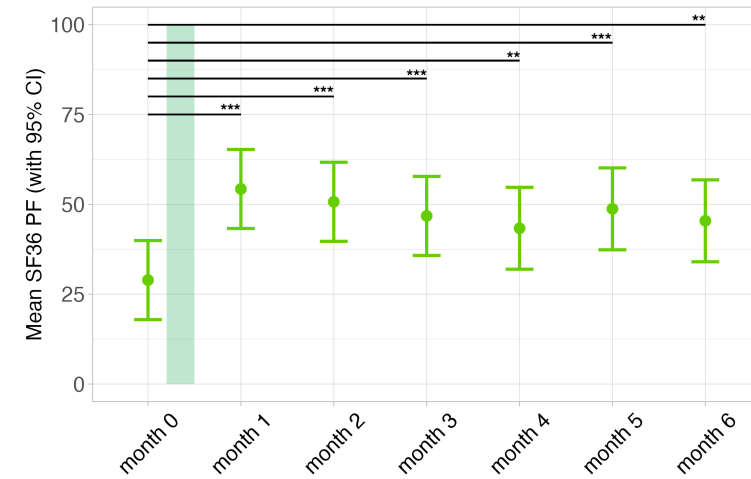


C2 Repeat Immunoabsorption

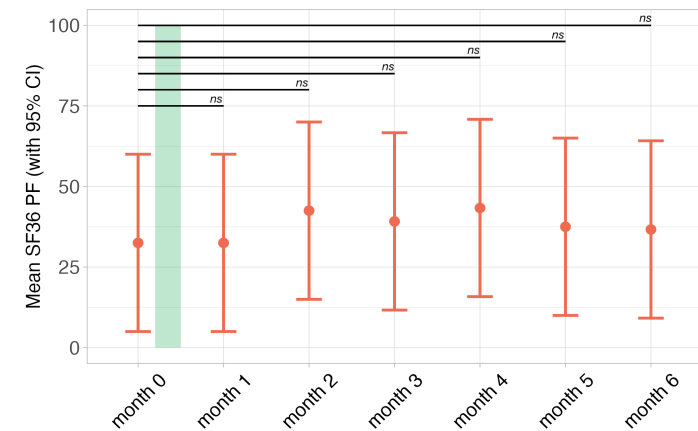
SF-36 physical function



SF-36PF ≥ 10 n=14



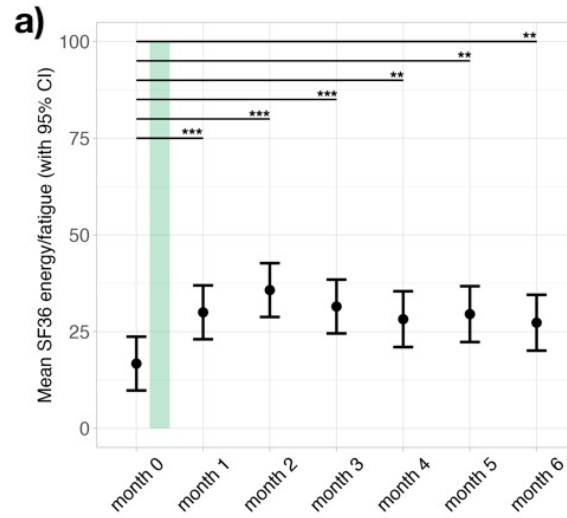
SF-36PF <10 n= 6



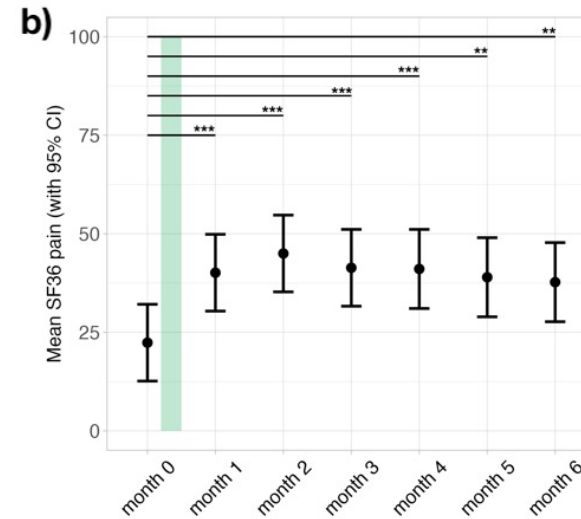
Stein E et al., Lancet RHE 2025

C2 Repeat Immunoabsorption

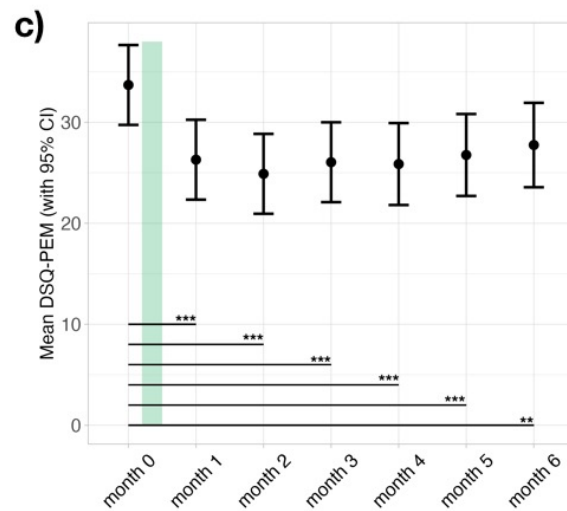
**SF36
fatigue**



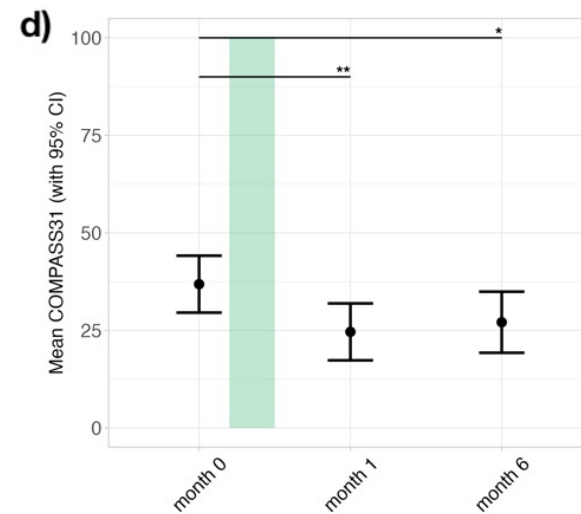
SF36 pain



PEM



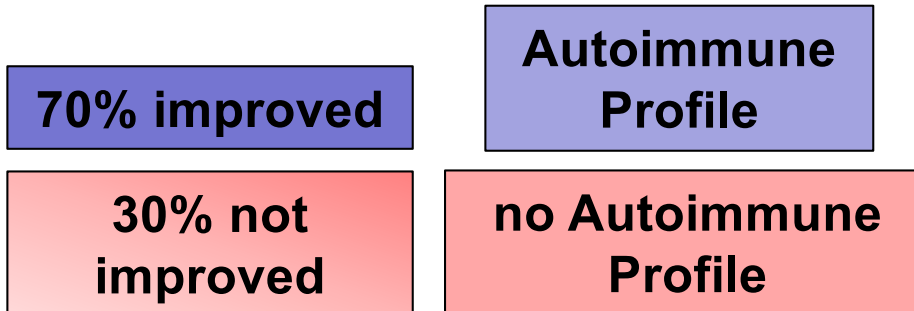
**autonomic
dysfunction**



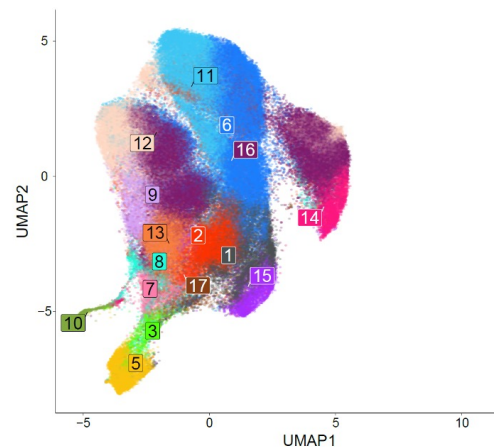
Stein E et al., Lancet Reg Health Eur. 2024 Dec

NKSG: Biomarker Platform

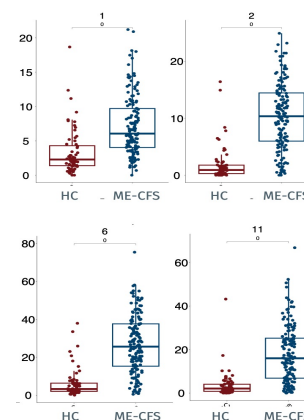
Observational study immunoadsorption



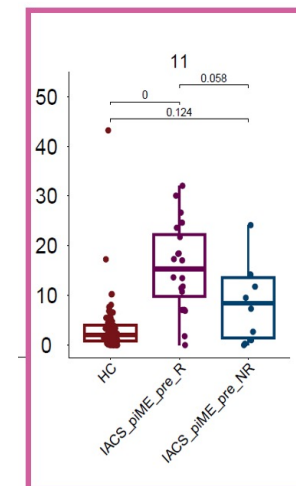
Subclustering of memory B cells



HC vs ME/CFS



Resp vs Non-Resp



Immunoadsorption in piMECFS (post Covid and non PC)

15 patients with MECFS in 09-12.2025

Inclusion criteria:

- **postinfectious MECFS**
- **diagnosed at Fatigue Centrum, Charite**
- **age 18-65**
- **Bell at least 30**
- **elevated aab (β 2-adr-r-aab)**

Design:

- **5 Zykycles IA at Diamedicum Potsdam with TheraSorb Filter (Milteniy)**

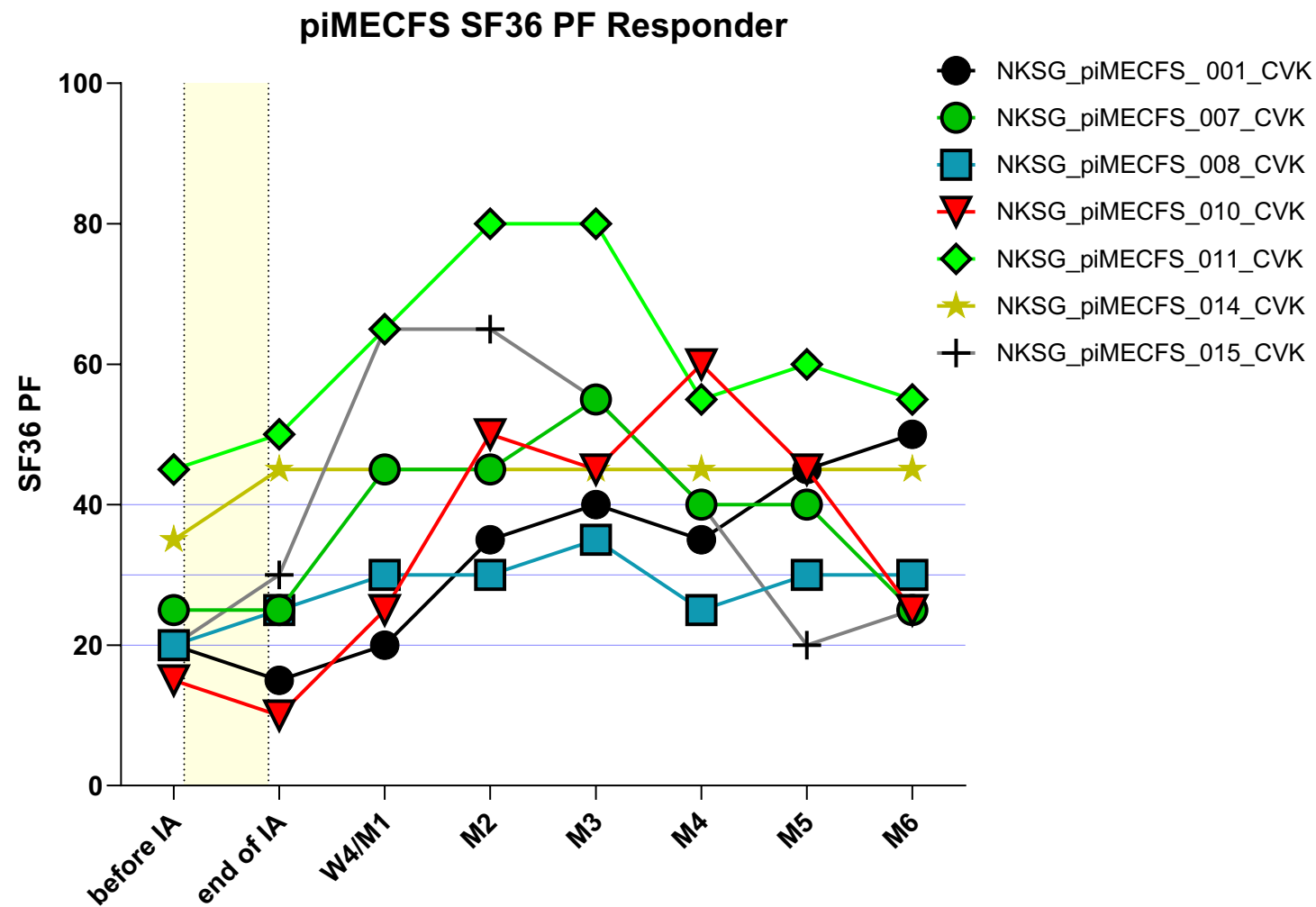
Primary endpoint:

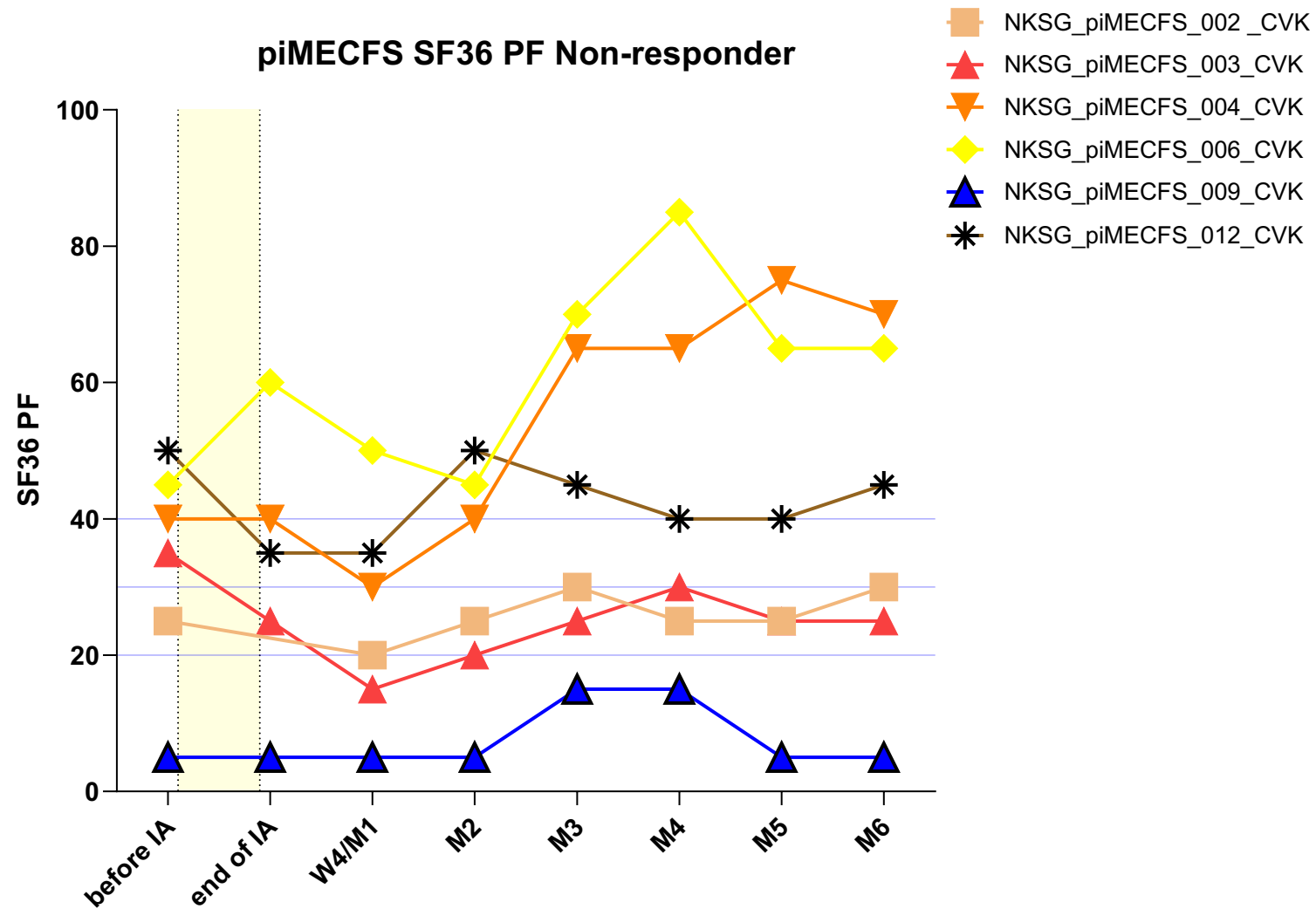
- **Increase in SF36, physical function of 10 points at week 8 after IA**

Result:

- **7 responder, 6 non-responder**

Follow up data and further analysis are still pending.





Current: IMPACT immunoadsorption in piMECFS since 03/2026

IC:

- **Postinfectious MECFS**
- **diagnosed in Fatigue Centrum, Charite**
- **age 18-65**
- **Bell: at least 30**
- **elevated aab (β 2-adr-r-aab)**

Design:

- **5 Zycycles of IA at Diamedicum Potsdam with TheraSorb Filter (Milteniy)**

Primary endpoint:

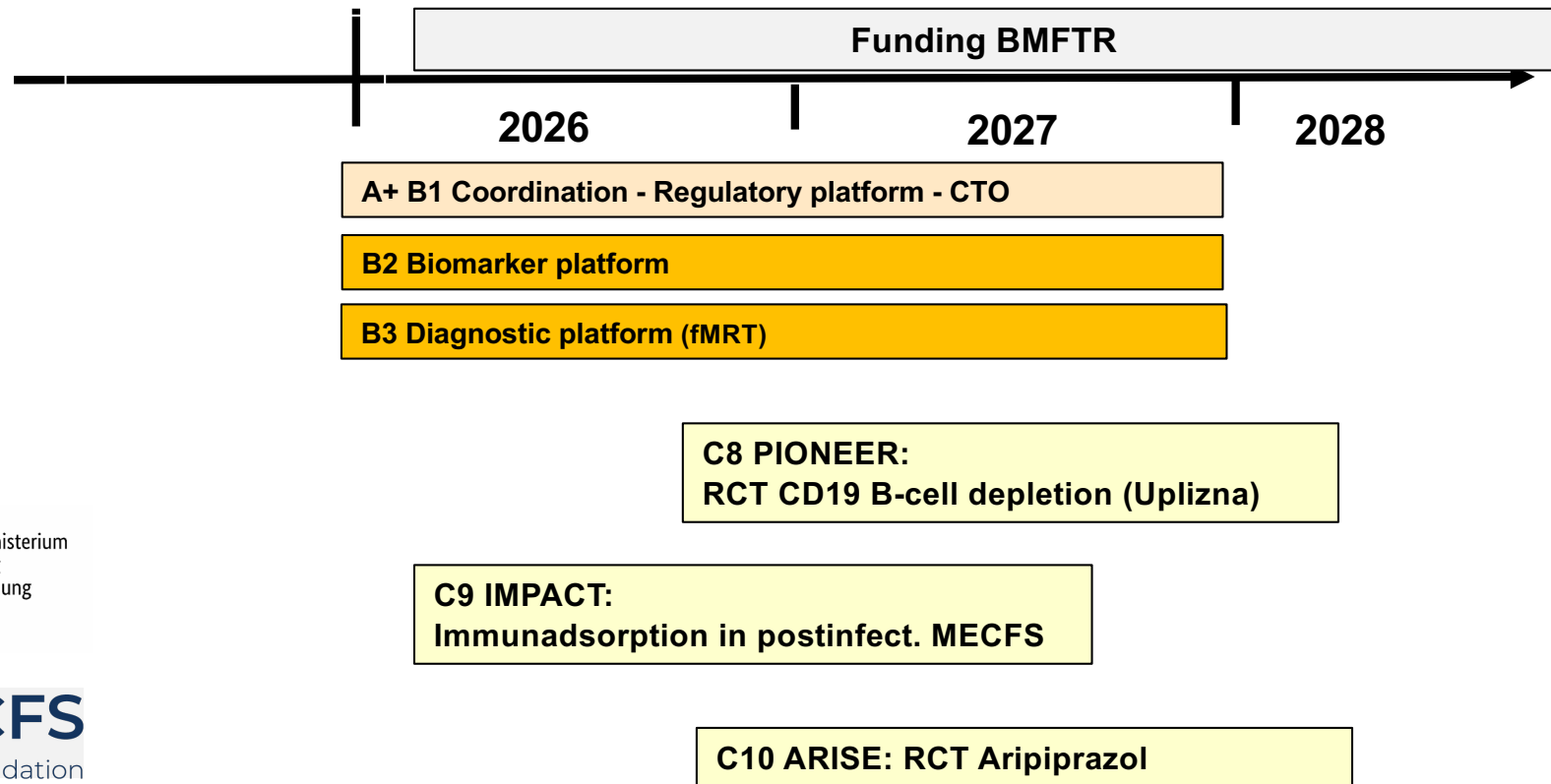
- **Increase of SF36, physical function at week 8 after IA**

Upcoming: PIONEER B-Zell depletion in piMECFS



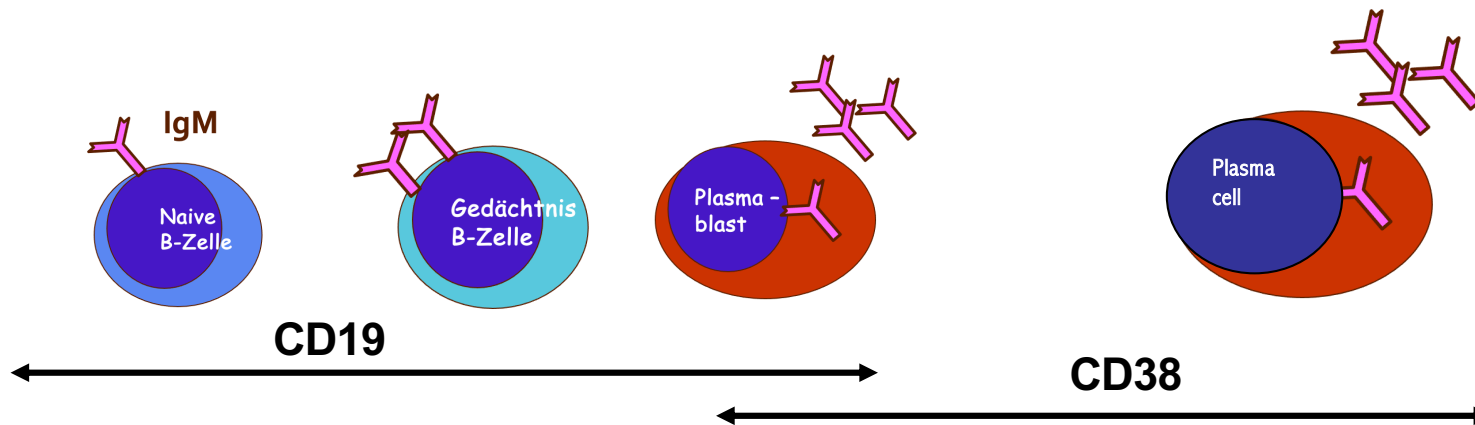
National clinical study group (NKSG) for ME/CFS and Post Covid Syndrome: Research and Clinical trial platform

2. Funding period



WEIDENHAMMER
ZÖBELE **STIFTUNG**

B-/Plasmacell-depletion trials



Key inclusion criteria:

- Response to immunoadsorption
- Postinfectious ME/CFS



Phase II RCT

anti-CD19 (PIONEER)

placebo/ saline

RCT zur Immunadsorption bei Patienten mit PCS

☐ ● RECRUITING

NCT05954325

Immunoadsorption vs. Sham Treatment in **Post COVID-19** Patients With Chronic Fatigue **Syndrome**

Conditions

Post-Acute COVID-19 Syndrome Fatigue

Locations

Hannover, Lower Saxony, Germany

☐ ● RECRUITING

NCT05841498

Immunoadsorption Study Mainz in Adults With **Post-COVID Syndrome**

Conditions

Post COVID-19 Condition Post-COVID-19 Syndrome Post-COVID Syndrome

Locations

Mainz, Rheinland-Pfalz, Germany

☐ ● RECRUITING

NCT05710770

Immunoadsorption in Patients With Chronic Fatigue **Syndrome** Including Patients With **Post-COVID-19 CFS**

Conditions

Post-COVID ME/CFS ME/CFS

Locations

Berlin, Germany

Patient inclusion criteria	outcome	n	IA
PC ME/CFS CCC Bell 20 - 50	CFQ week 12	60	5 days IA vs sham IA TheraSorb
PCS WHO	CFQ week 2	40	7 days IA vs sham IA Immunsorba TR-350 Tryptophan
pi ME/CFS CCC Bell 20 – 50	CFQ week 12	66	5 days IA vs sham IA TheraSorb

Team, collaboration and funding

Med. Immunologie Charité

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Linus Fock
Rebekka Rust
Claudia Kedor
Katrin Metz
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Sandra Bauer
Carmen Scheibenbogen

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Bundesministerium
für Bildung
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Birgit Sawitzki
Lucas Arendholz
Katrin Vogt
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Christine Appelt

WEIDENHAMMER
ZÖBELE **STIFTUNG**

ME CFS
Research Foundation

Diamedicum Potsdam

Anja Ramlow
Simone Horn
Wolfgang Ramlow
Jens Ringel



https://cfc.charite.de/klinische_studien/nksg/

The screenshot shows the Charité Fatigue Centrum website. The header includes the Charité logo and navigation links. The main content area features the NKSG logo and text: "Nationale Klinische Studiengruppe (NKSG) ME/CFS und Post-COVID-19-Syndrom". Below this is a search bar and a list of studies: "Studie IA-PACS-CFS", "Studie RIA", "Studie PoCoViT", "Studie VERI-LONG", and "Studie HBOT". A sidebar on the left lists various services like "Für Patienten", "Für Ärzte", "Klinische Studien", "NKSG", "Clinical Trial Office", "Biomarker Plattform", "Diagnostik Plattform", and "Weitere Forschung".



Miltenyi Biotec

LONG COVID
DEUTSCHLAND



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