Pulmonary Vascular Research Institute

PVRI GoDeep:

a global meta-registry

H. Ardeschir Ghofrani[1,2,3] and Werner Seeger[1]

Justus-Liebig University Giessen, Germany[1]

Kerckhoff-Klinik Bad Nauheim[2]

Imperial College London[3]

PVRi

GoDeep Global PH Meta-Registry

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

DZL Deutsches Zentrum für Lungenforschung

UGMLC Universities of Giessen & Marburg Lung Center

CARDIO PULMONARY INSTITUTE

ILH Institute for Lung Health

Disclosures

- Research grants from industry:

  Pfizer Inc., Novartis, Merck (MSD), Bayer AG, Actelion, Janssen

- Consultation and lecture fees:

  BayerAG, GSK, Actelion, Merck (MSD), Pfizer/Encysive, Gossamer Bio, Acceleron

- **Public funding**:

  Deutsche Forschungsgemeinschaft (DFG); Excellence Cluster Cardio-Pulmonary System (ECCPS), Cardio-Pulmonary Institute (CPI); Deutsches Zentrum Lungenforschung (DZL); Hessisches Landesprogramm LOEWE; Welcome Trust; British Heart Foundation (BHF)

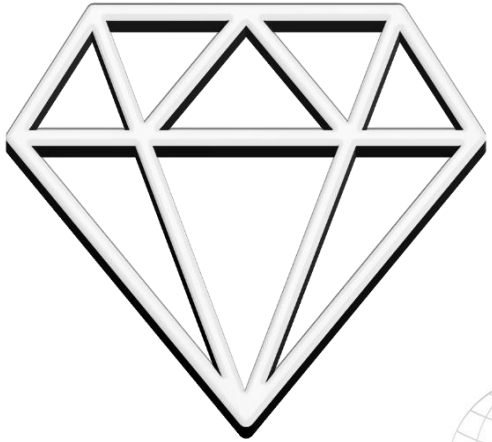
PVRi

Level of parameters (in total 350)

Retrospective and prospective data collection

*** = **mandatory** = no inclusion of subject without these data

RHC!



* = **recommended** = should be collected if possible

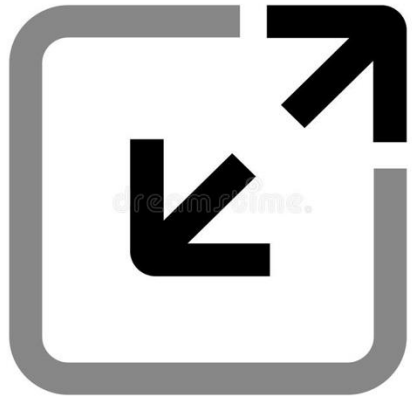
** = **essential** = follow-up data should contain this; used for quality control / benchmarking

E = **extended** = additional deep phenotyping information, additional modules to be set up

Currently:

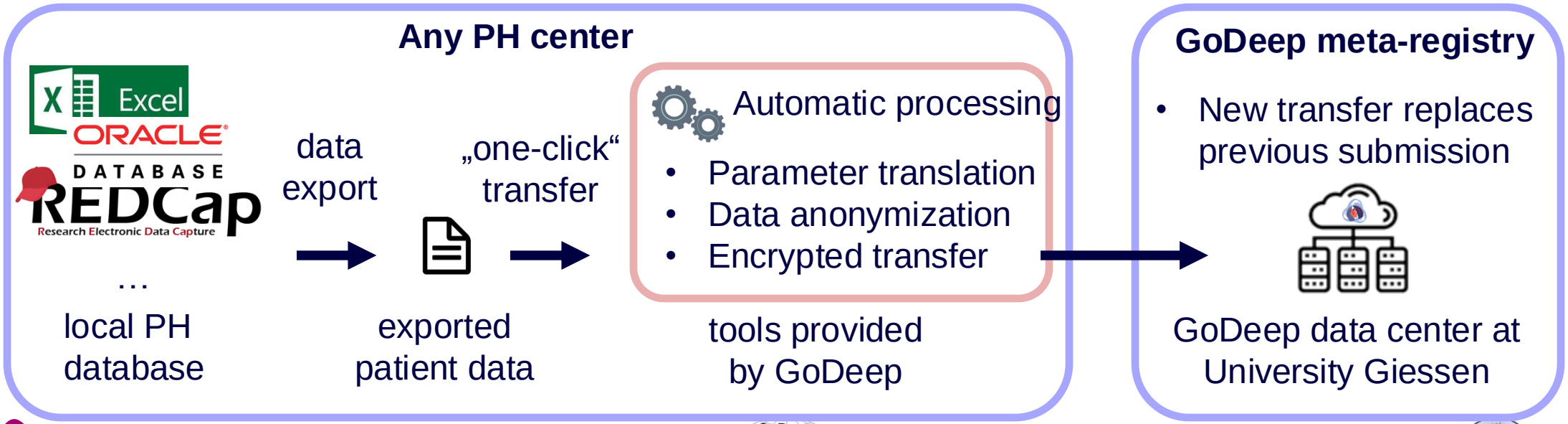
Imaging Module (Echo, MRI)

Genomic Module

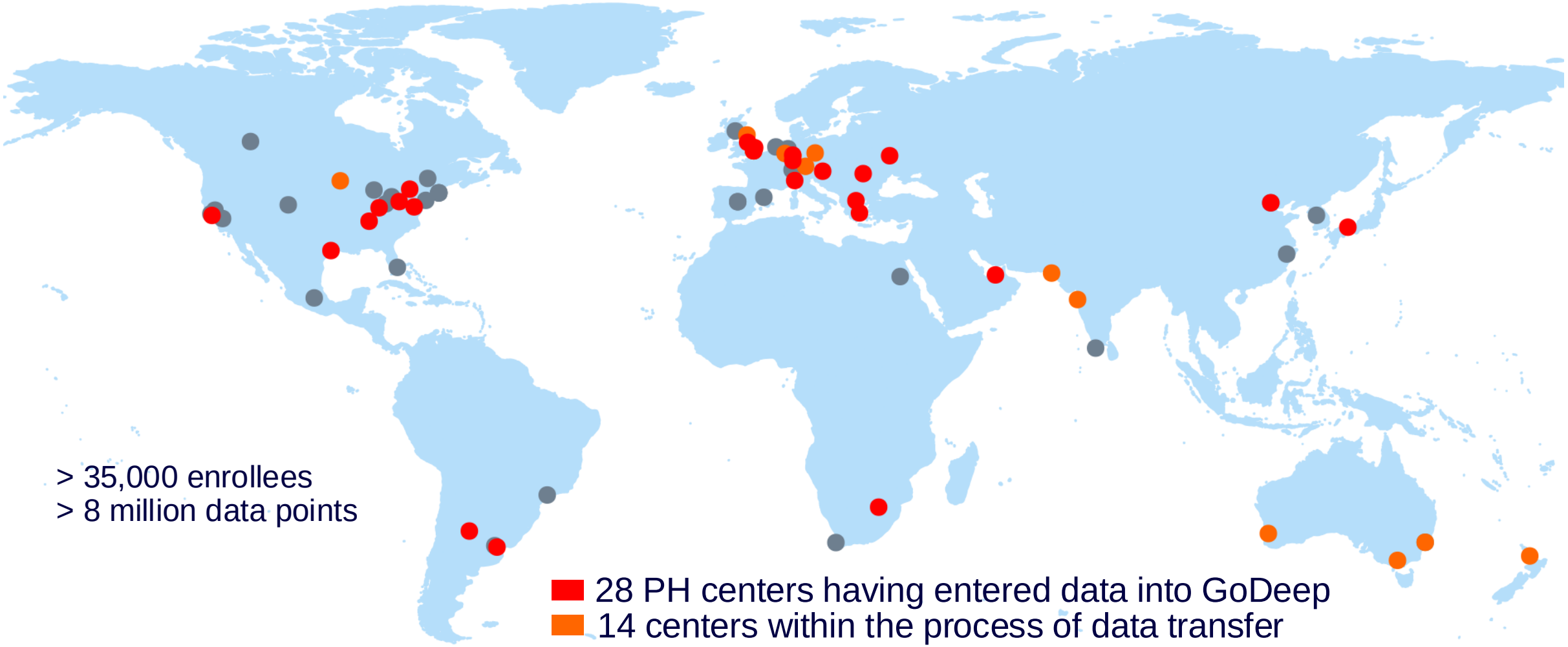


Electronic data transfer

- „Minimally invasive and easy going“
  - no changes required for existing databases
  - no duplicate data entry
- One time mapping of local parameters to GoDeep data set
- „One-click“ anonymized transfer software provided by GoDeep team
- Quarterly transfers for up-to-date data



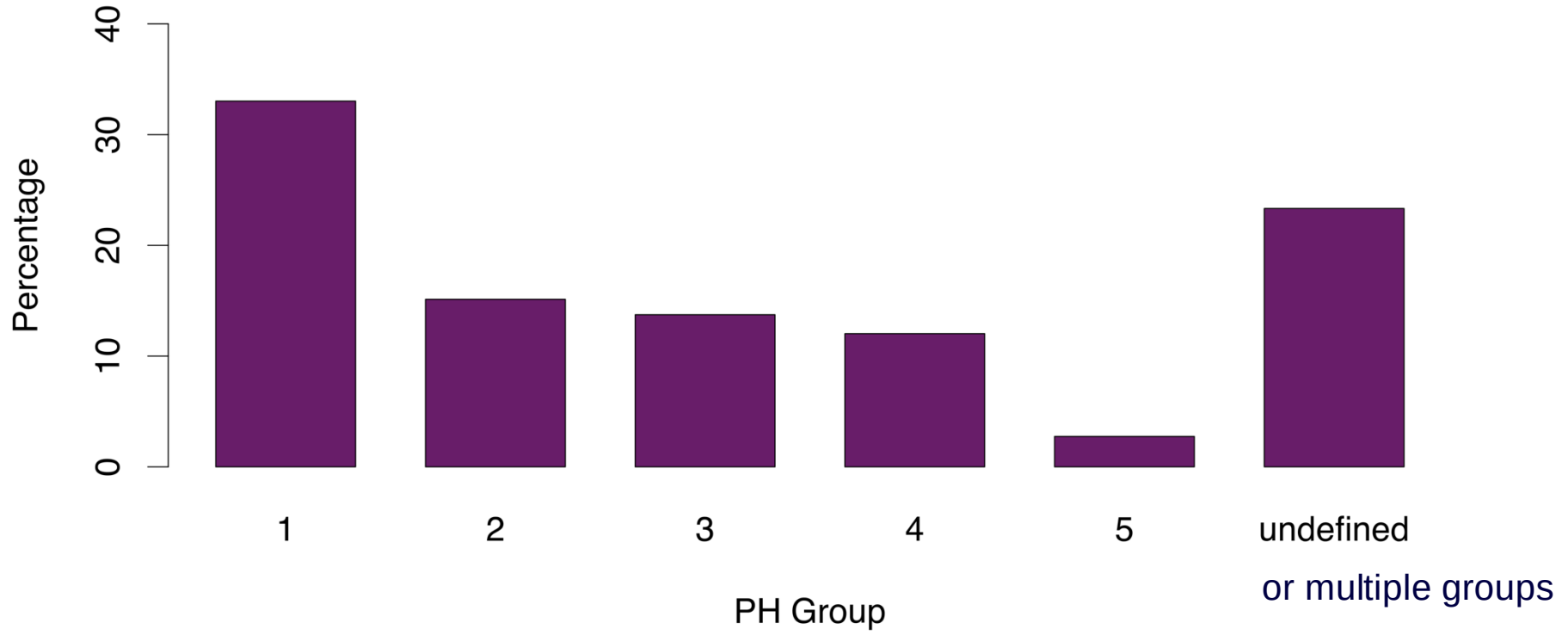
PVRI GoDeep contributing centers 1/2025 (42)



> 35,000 enrollees
> 8 million data points

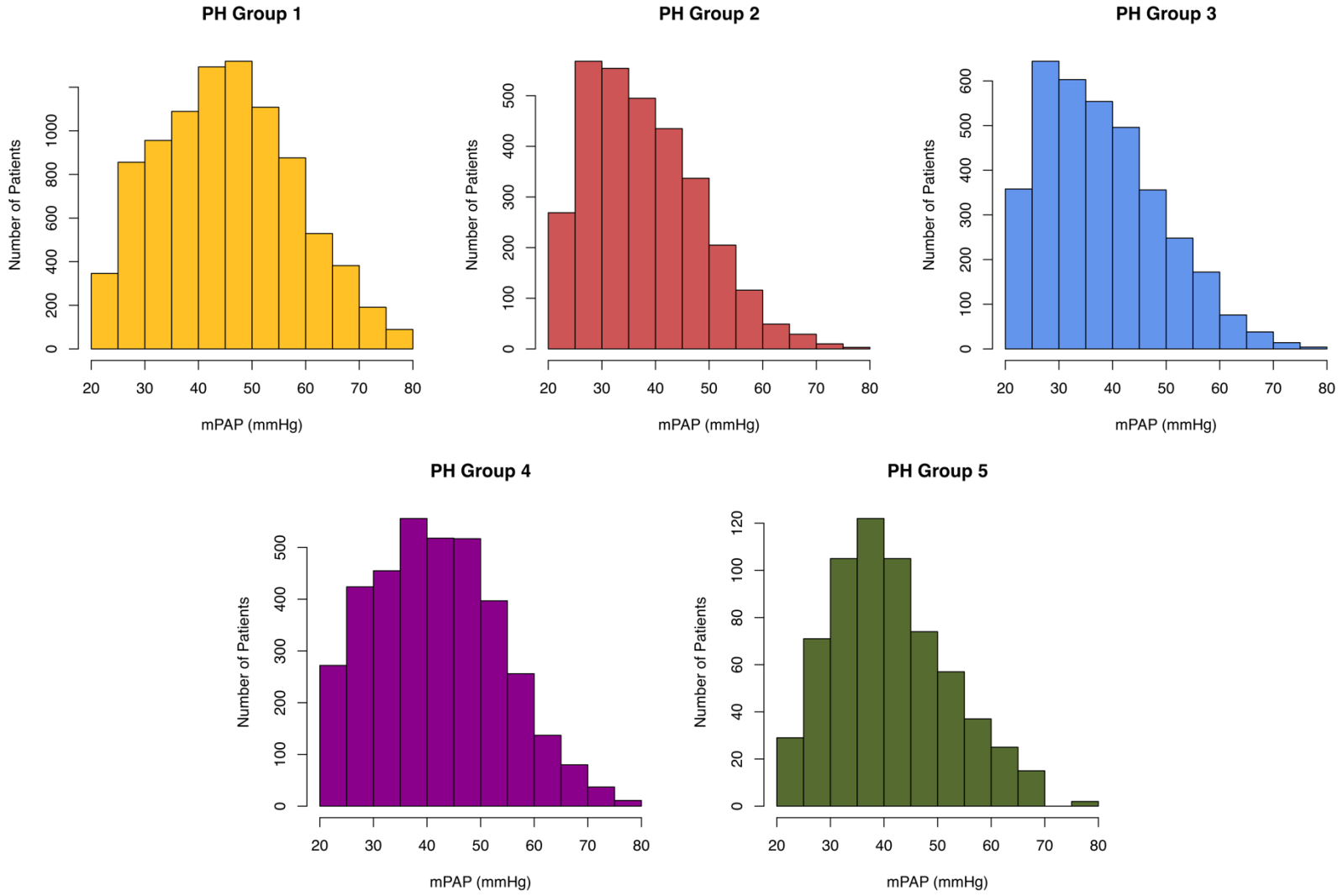
28 PH centers having entered data into GoDeep
14 centers within the process of data transfer
30 centers in negotiation

PH Patients by PH Group

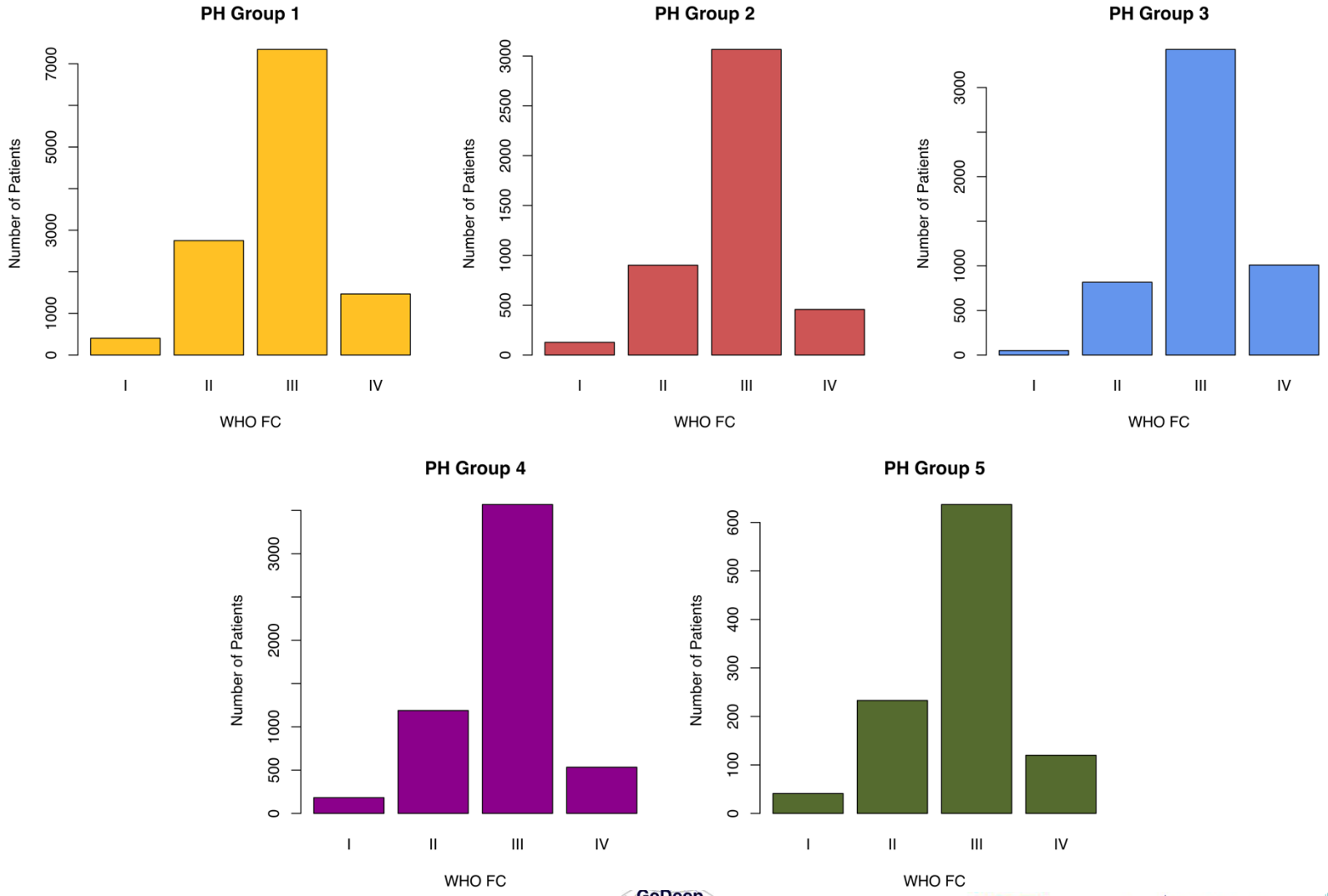


or multiple groups

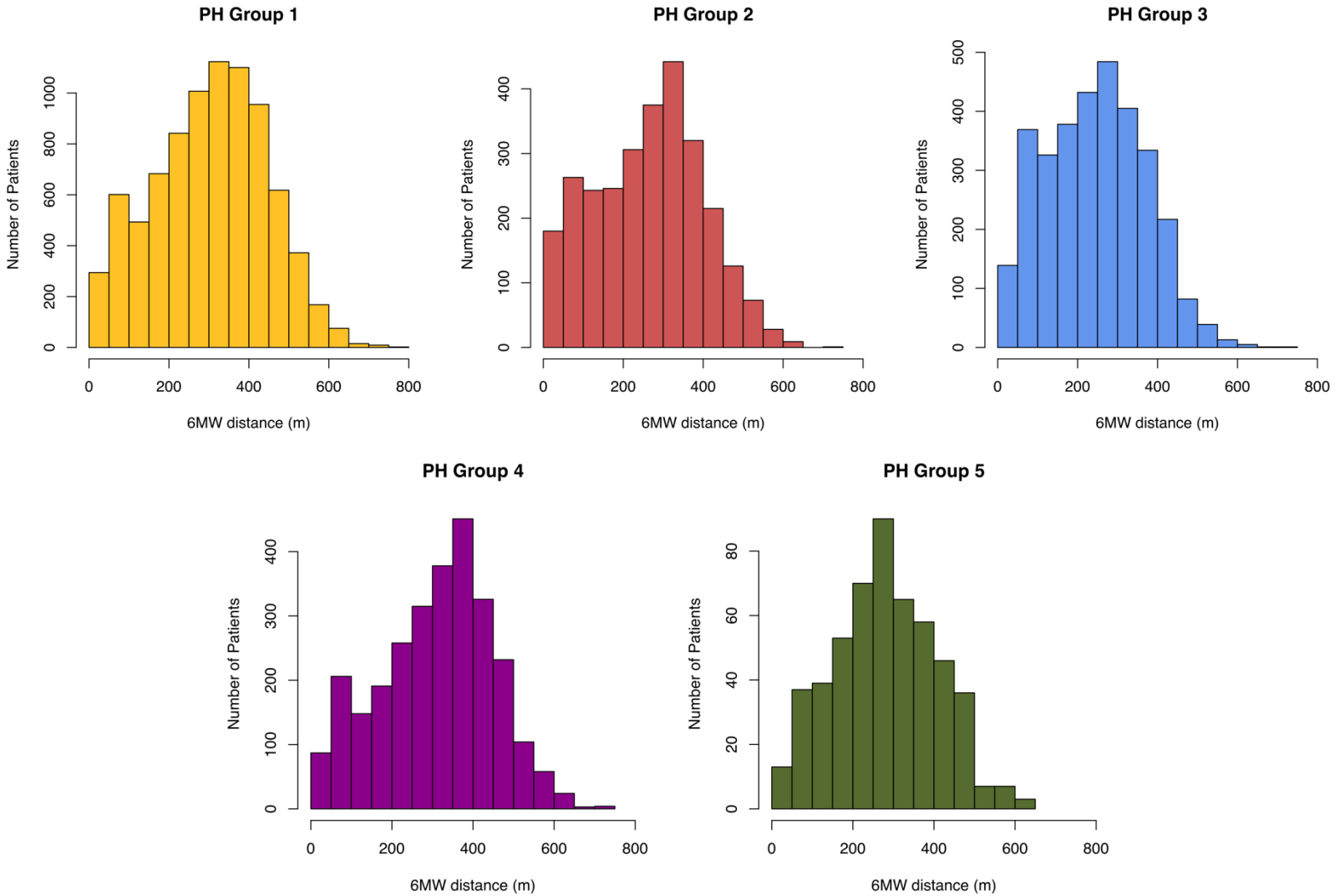
mPAP distribution at diagnosis



WHO FC distribution at diagnosis



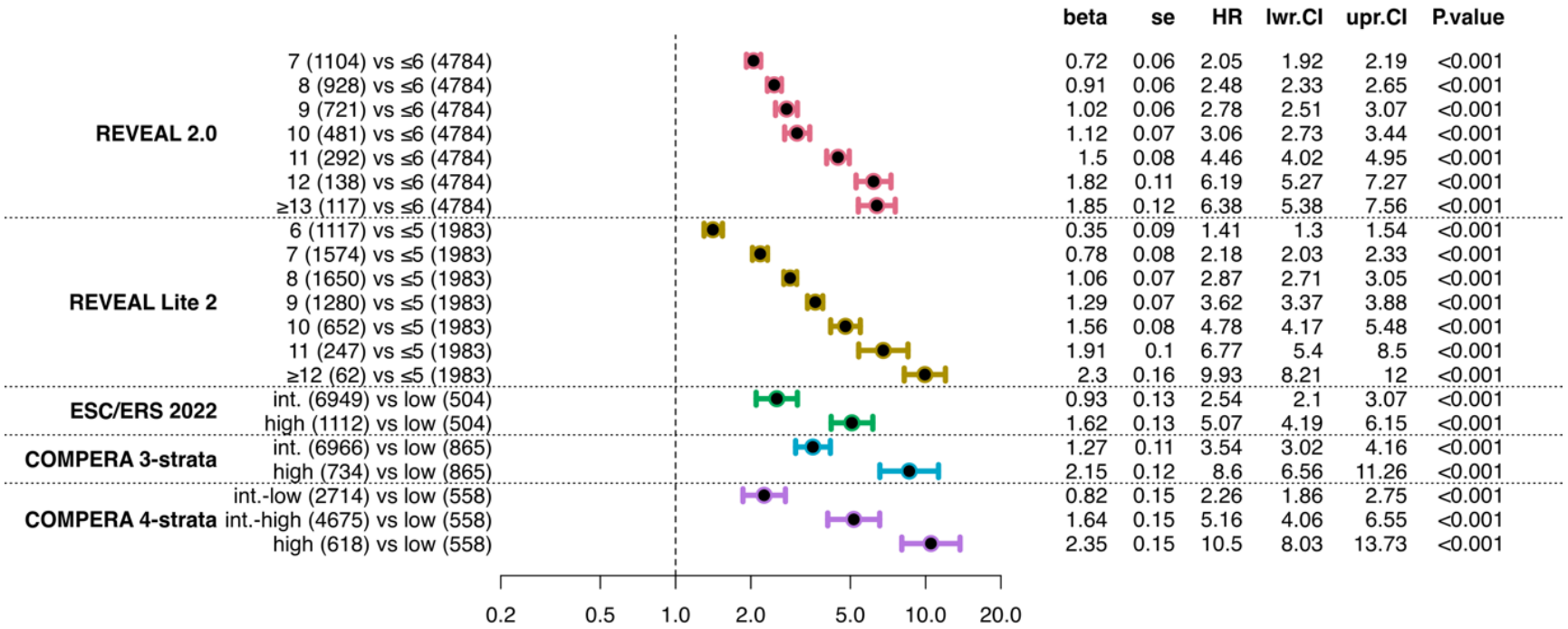
6MW distance distribution at diagnosis



Categories of evaluation

1. “Classical “ PAH (group 1) focus
   - Example: Risk Scores
2. Specific PAH subgroups
   - Example: “Mild PAH”
   - Example: PoPH
3. Non-PAH PH
   - Example: PH-COPD
   - Example: PH-ILD
4. The global PH view
   - Example: Impact of Sex and Race
5. In-silico Trials

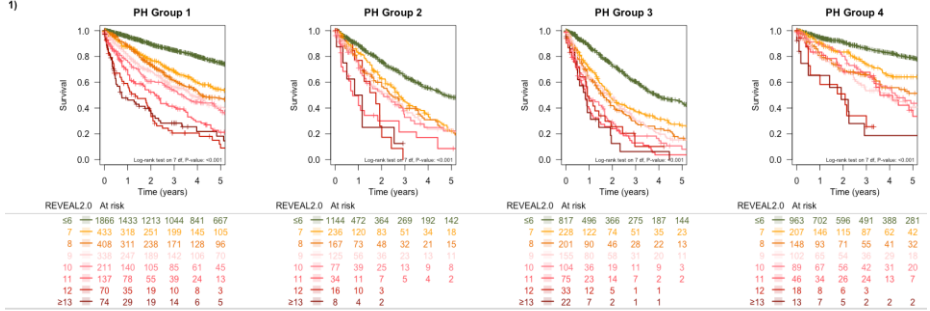
Comparison of Risk Scores in P(A)H



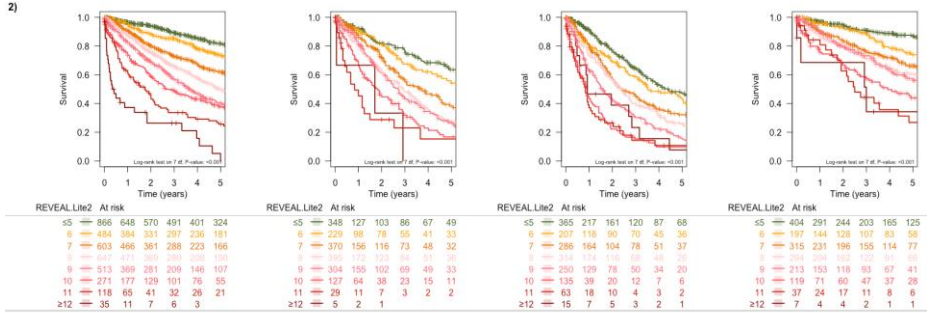
		Reveal 2.0	Reveal Lite 2	ESC/ERS 2022	COMPERA 3-strata	COMPERA 4-strata
PH overall	ΔAIC	558	491	0	182	417
	C-Index	0.65*	0.66*	0.57	0.58*	0.63*
Group 1	ΔAIC	294	261	0	64	191
	C-Index	0.68*	0.68*	0.58	0.59	0.65*
Group 2	ΔAIC	39	37	0	14	32
	C-Index	0.61*	0.61*	0.56	0.57	0.58
Group 3	ΔAIC	90	73	0	17	54
	C-Index	0.63*	0.63*	0.56	0.57	0.60*
Group 4	ΔAIC	60	38	0	16	38
	C-Index	0.66*	0.66*	0.58	0.59	0.63*

Yogeswaran et al., Chest, 2024

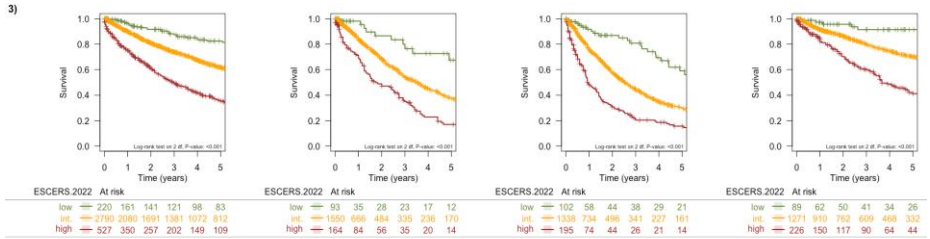
Comparison of Risk Scores in PH



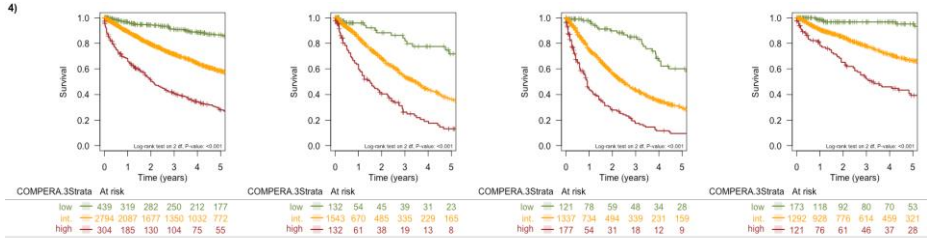
Reveal 2.0



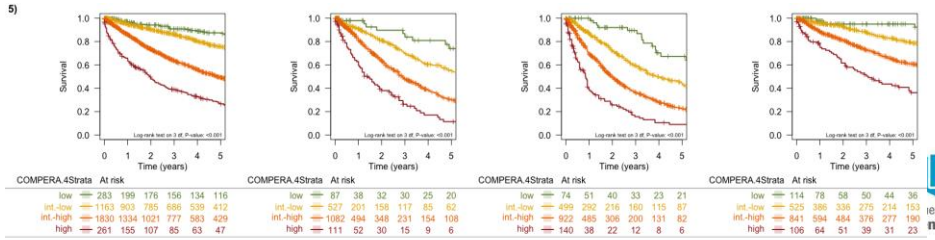
Reveal lite2



ESC/ERS 2022



COMPERA 3 Strata



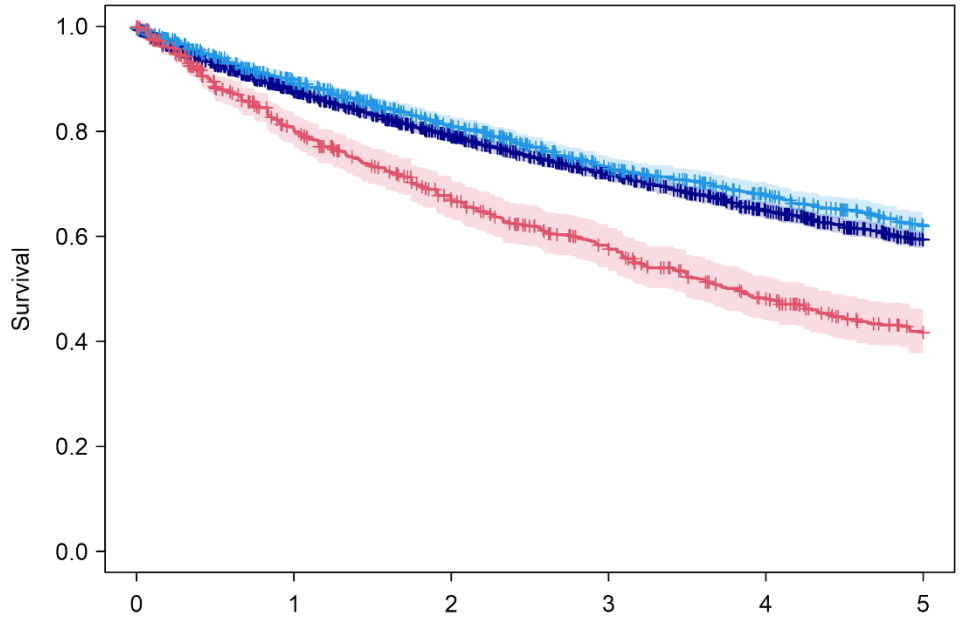
COMPERA 4 Strata

Yogeswaran et al., Chest, 2024

Categories of evaluation

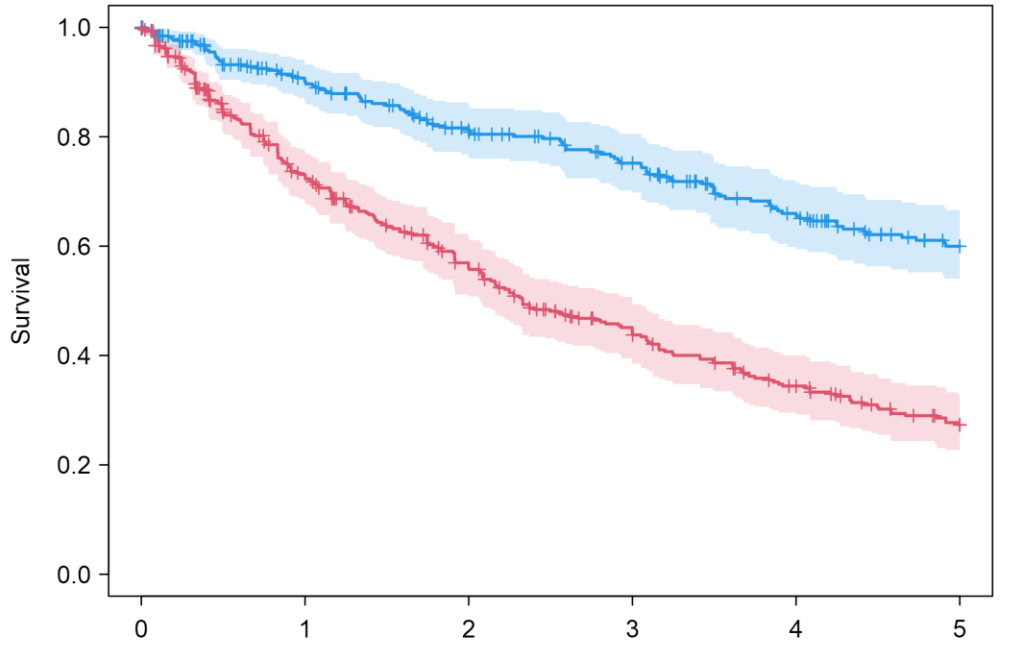
1. “Classical “ PAH (group 1) focus
   - Example: Risk Scores
2. Specific PAH subgroups
   - Example: “Mild PAH”
   - Example: PoPH
3. Non-PAH PH
   - Example: PH-COPD
   - Example: PH-ILD
4. The global PH view
   - Example: Impact of Sex and Race
5. In-silico Trials

PAH-targeted therapy in PH-COPD



At risk						
PH Group	0	1	2	3	4	5
PAH (non-IPAH)	5035	3684	3074	2574	2087	1681
IPAH	2216	1676	1408	1181	981	807
PH-COPD	836	519	397	314	239	175

Log-rank test on 2 df, P-value: <0.001



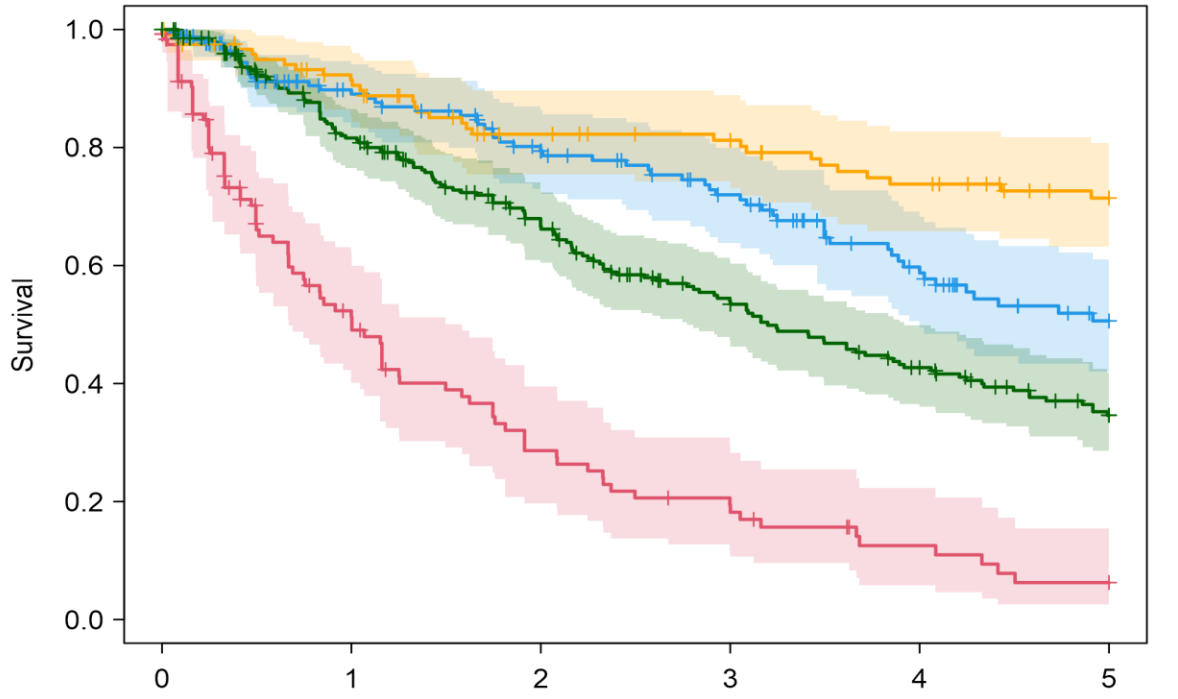
At risk						
PVR	0	1	2	3	4	5
≤5 WU	388	254	211	182	144	111
>5 WU	448	265	186	132	95	64

Log-rank test on 1 df, P-value: <0.001

Tello et al., CHEST 2024

PAH-targeted therapy in PH-COPD

PVR	≤5 WU	>5 WU	Overall
N	388	448	836
PDE5i	130 (34%)	288 (64%)	418 (50%)
ERA	22 (5.7%)	90 (20%)	112 (13%)
sGC stimulators	1 (0.26%)	10 (2.2%)	11 (1.3%)
PGI2	46 (12%)	60 (13%)	106 (13%)
PDE5i & ERA	16 (4.1%)	71 (16%)	87 (10%)
ERA & PGI2	6 (1.5%)	24 (5.4%)	30 (3.6%)
PDE5i & PGI2	21 (5.4%)	47 (10%)	68 (8.1%)
PDE5i & ERA & PGI2	4 (1%)	21 (4.7%)	25 (3%)
One or more PH drugs	160 (41%)	319 (71%)	479 (57%)



At risk

Treatment, PVR	0	1	2	3	4	5
untreated, ≤5 WU	228	124	102	84	59	39
untreated, >5 WU	129	47	25	16	8	4
PDE5i, ≤5 WU	130	103	85	79	69	59
PDE5i, >5 WU	288	202	149	107	81	56

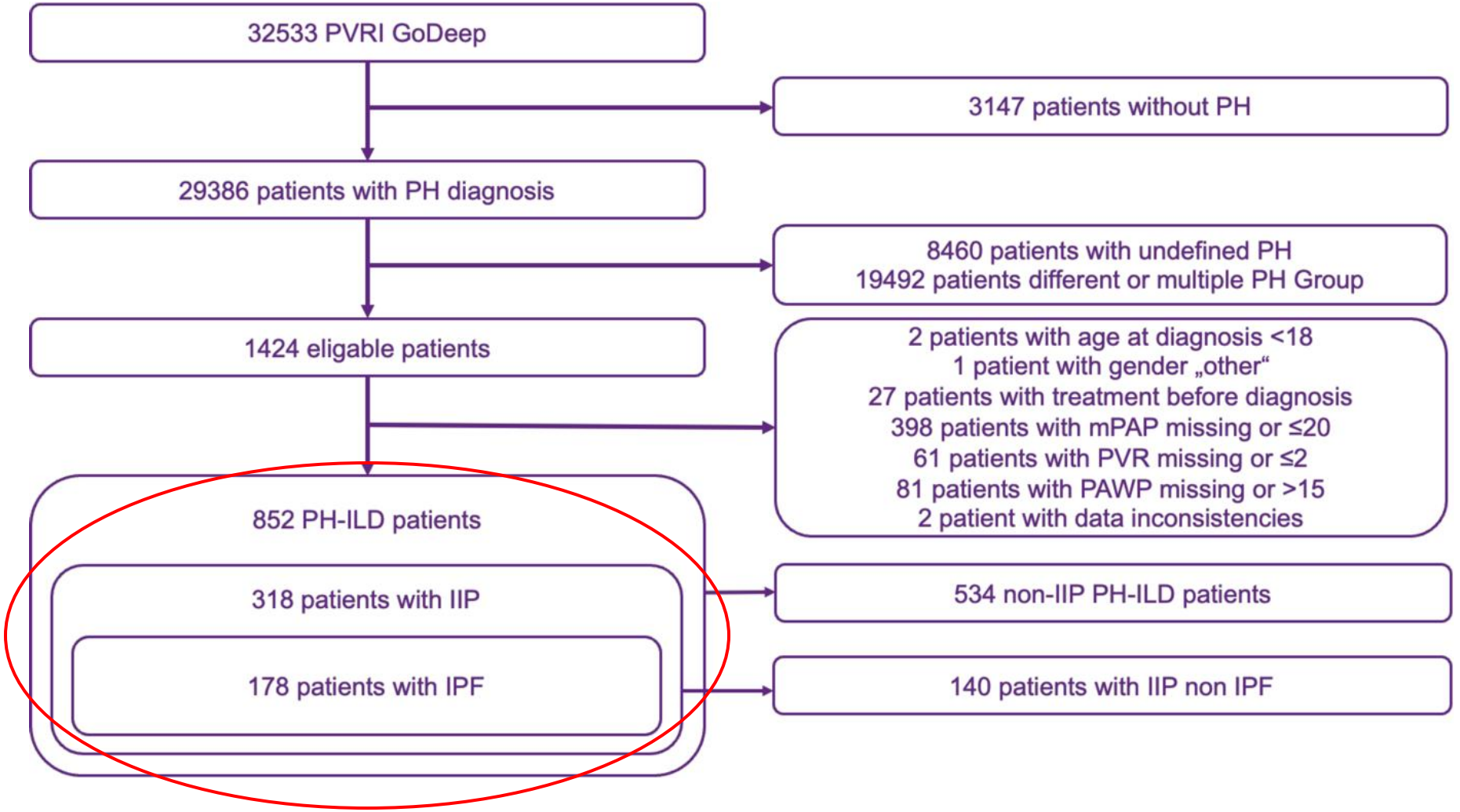
Log-rank test on 3 df, P-value: <0.001

Tello et al., CHEST 2024

Categories of evaluation

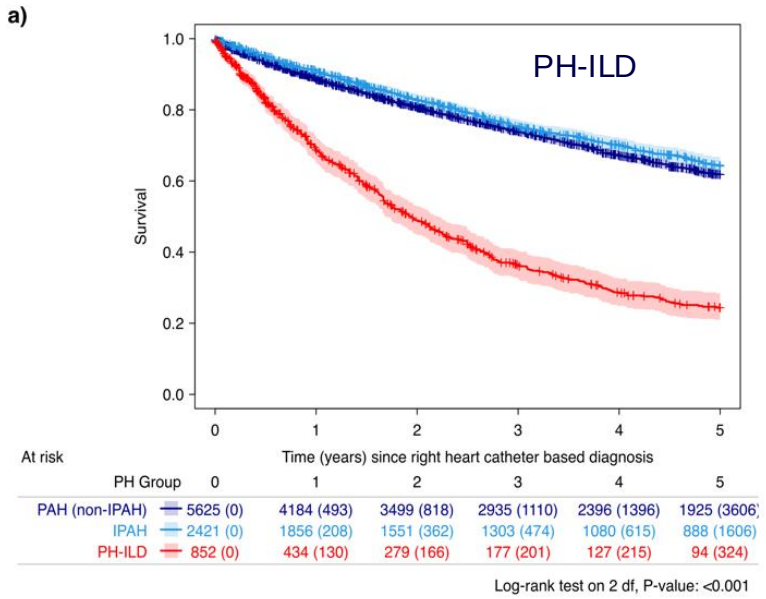
1. “Classical “ PAH (group 1) focus
   - Example: Risk Scores
2. Specific PAH subgroups
   - Example: “Mild PAH”
   - Example: PoPH
3. Non-PAH PH
   - Example: PH-COPD
   - Example: PH-ILD
4. The global PH view
   - Example: Impact of Sex and Race
5. In-silico Trials

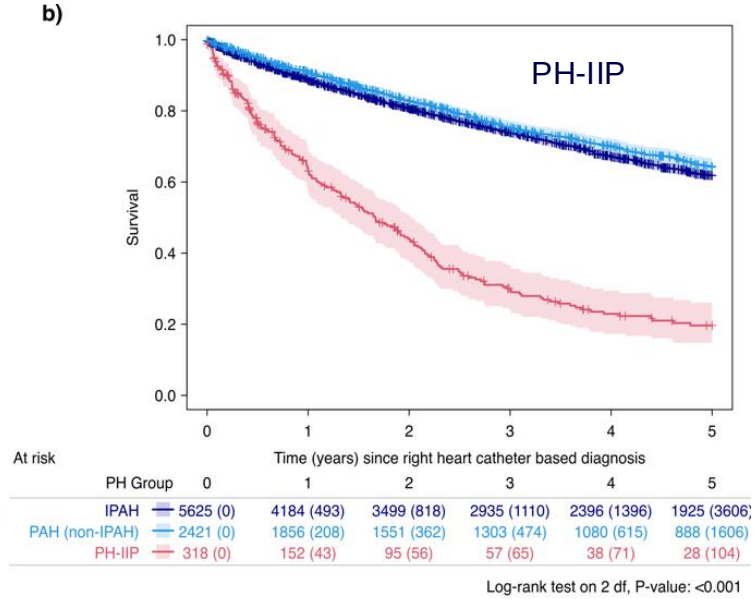
Flow Chart

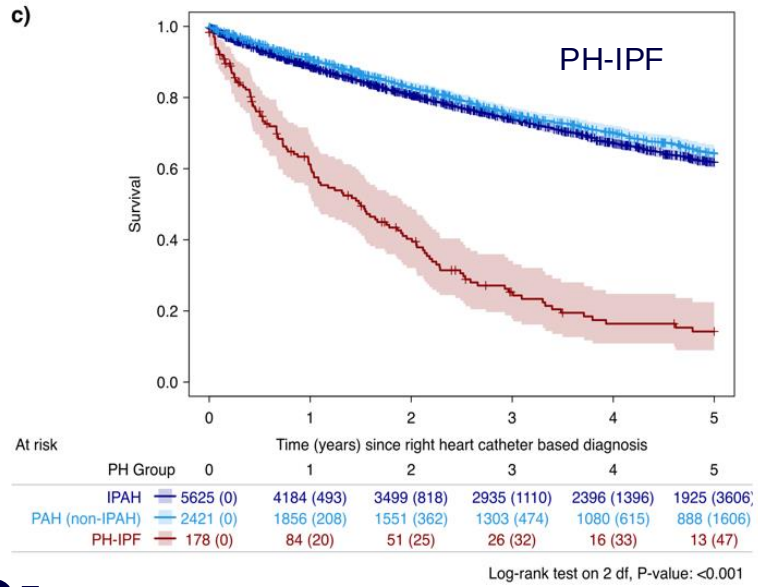


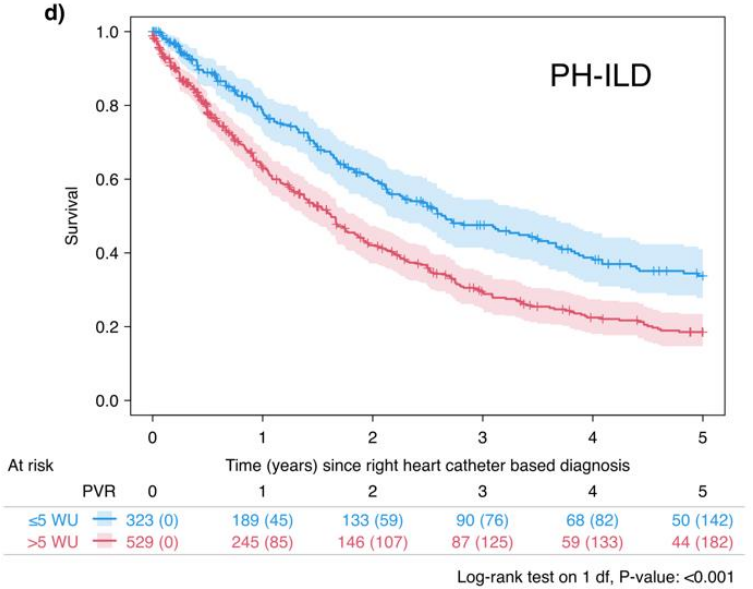
under review

Kaplan Meier Survival Analysis







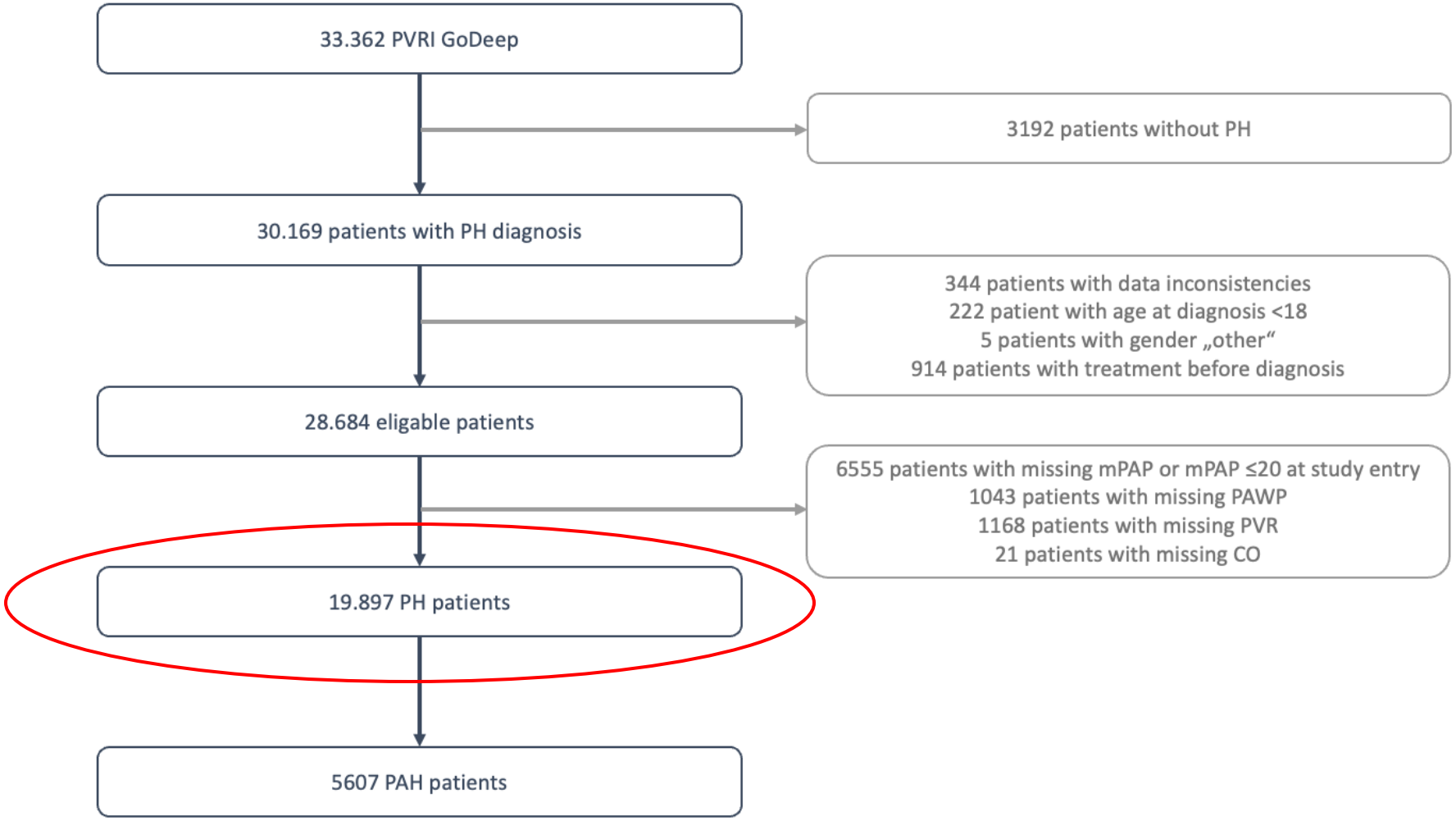


under review

Categories of evaluation

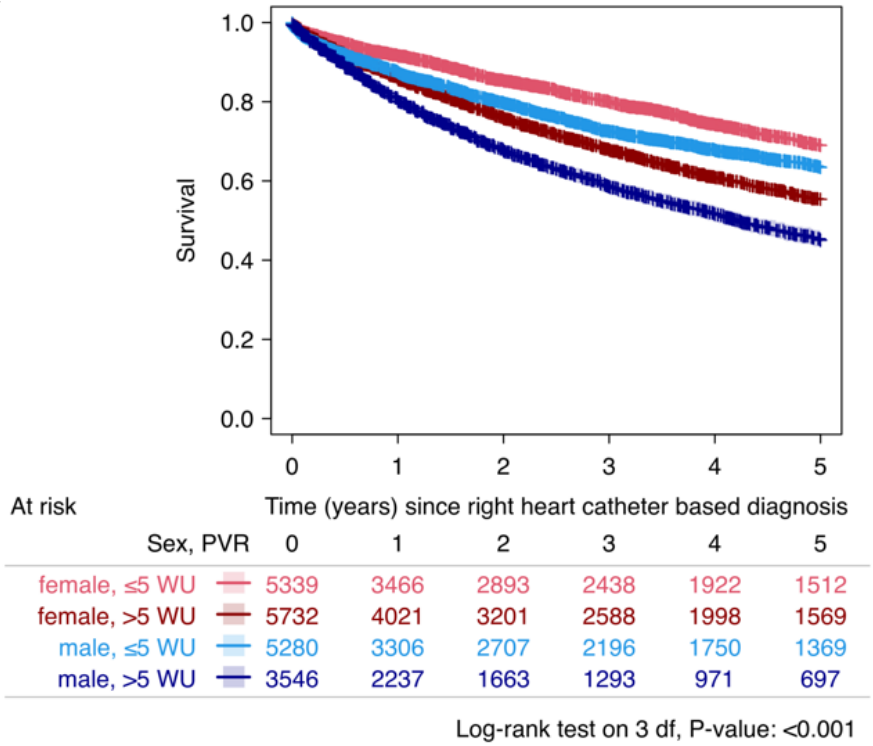
1. “Classical “ PAH (group 1) focus
   - Example: Risk Scores
2. Specific PAH subgroups
   - Example: “Mild PAH”
   - Example: PoPH
3. Non-PAH PH
   - Example: PH-COPD
   - Example: PH-ILD
4. The global PH view
   - Example: Impact of Sex and Race
5. In-silico Trials

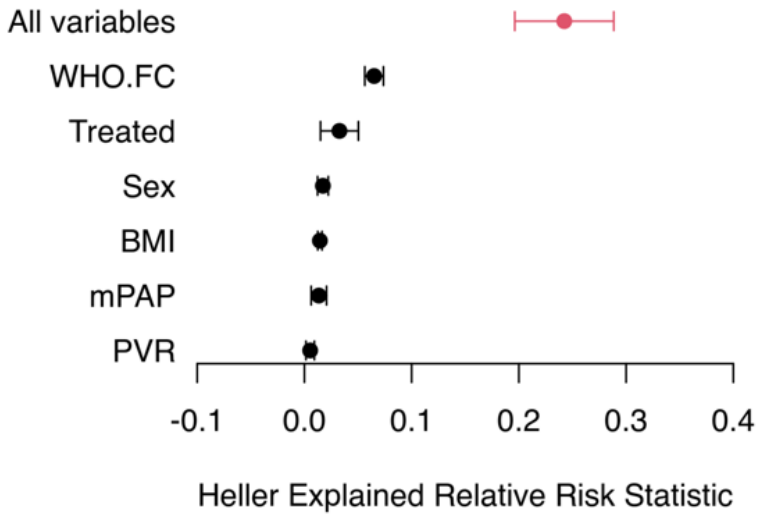
Male survival disadvantage in PH: independent of etiology, age, PH-treatment and comorbidities, but dependent on race

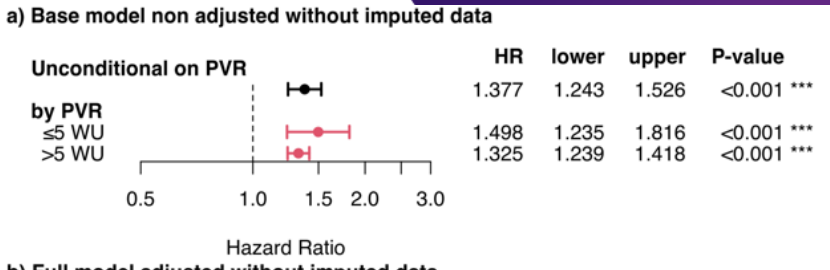


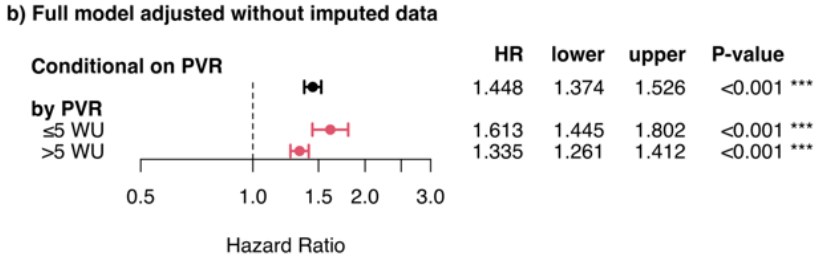
under review

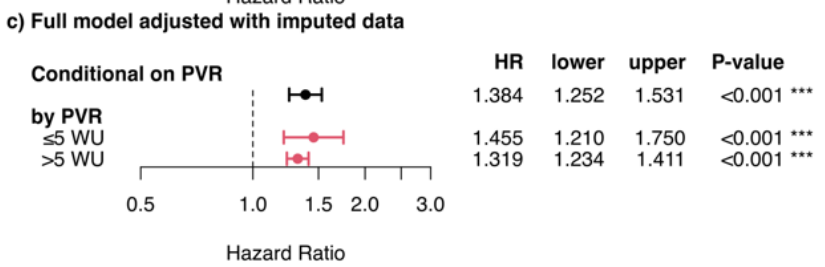
Overall Survival

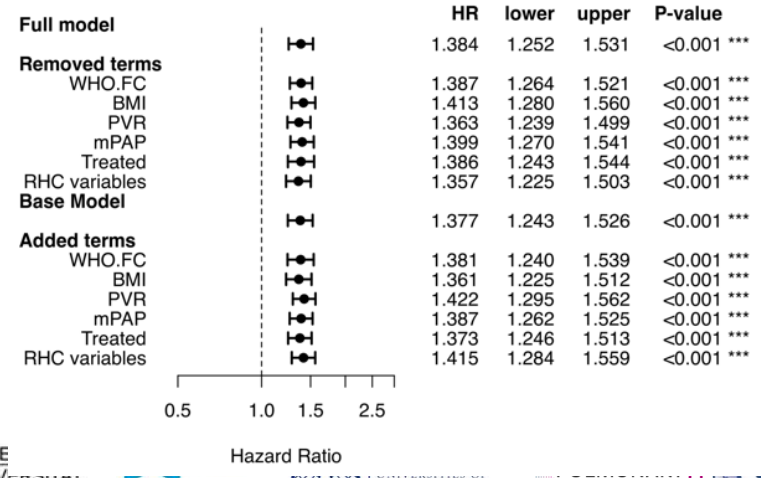






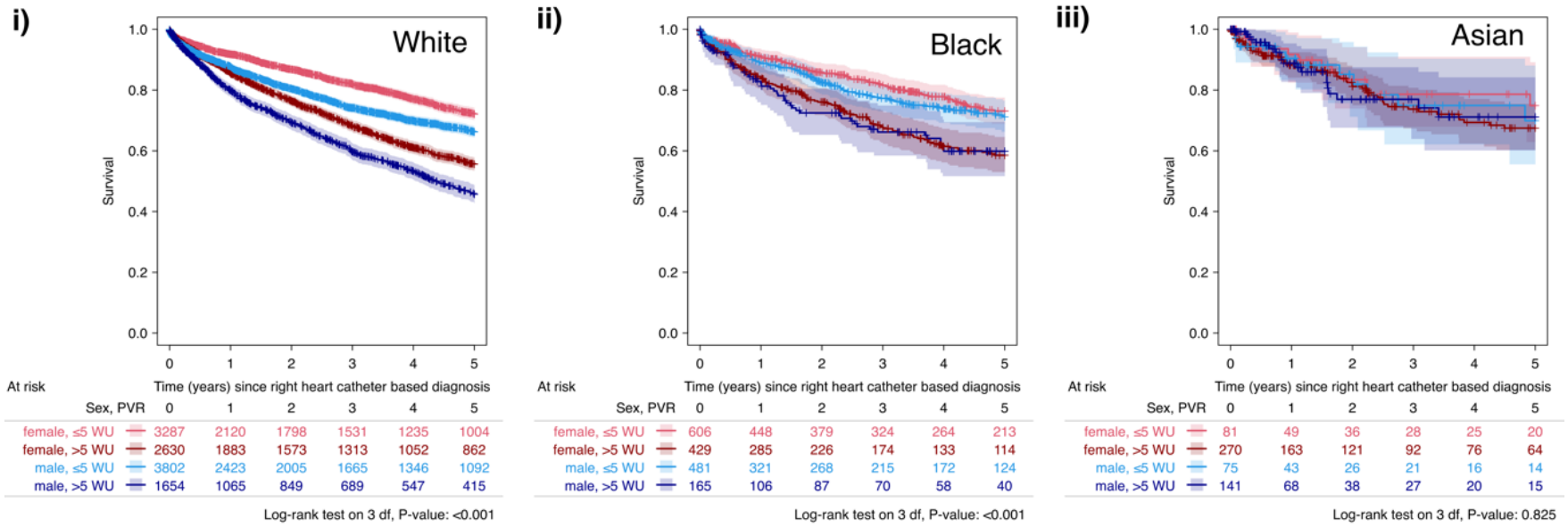




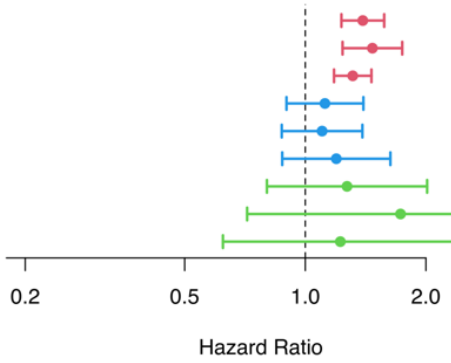


under review

Dependent on Race



Race	N	male (%)	HR	lower	upper	P-value
White Overall	11373	0.480	1.392	1.231	1.574	<0.001 ***
White with PVR ≤5 WU	7089	0.536	1.471	1.239	1.746	<0.001 ***
White with PVR >5 WU	4284	0.386	1.313	1.179	1.463	<0.001 ***
Black Overall	1681	0.384	1.119	0.898	1.396	0.317
Black with PVR ≤5 WU	1087	0.443	1.101	0.873	1.388	0.415
Black with PVR >5 WU	594	0.278	1.195	0.876	1.631	0.261
Asian Overall	567	0.381	1.271	0.802	2.014	0.307
Asian with PVR ≤5 WU	156	0.481	1.729	0.716	4.174	0.224
Asian with PVR >5 WU	411	0.343	1.223	0.623	2.402	0.559



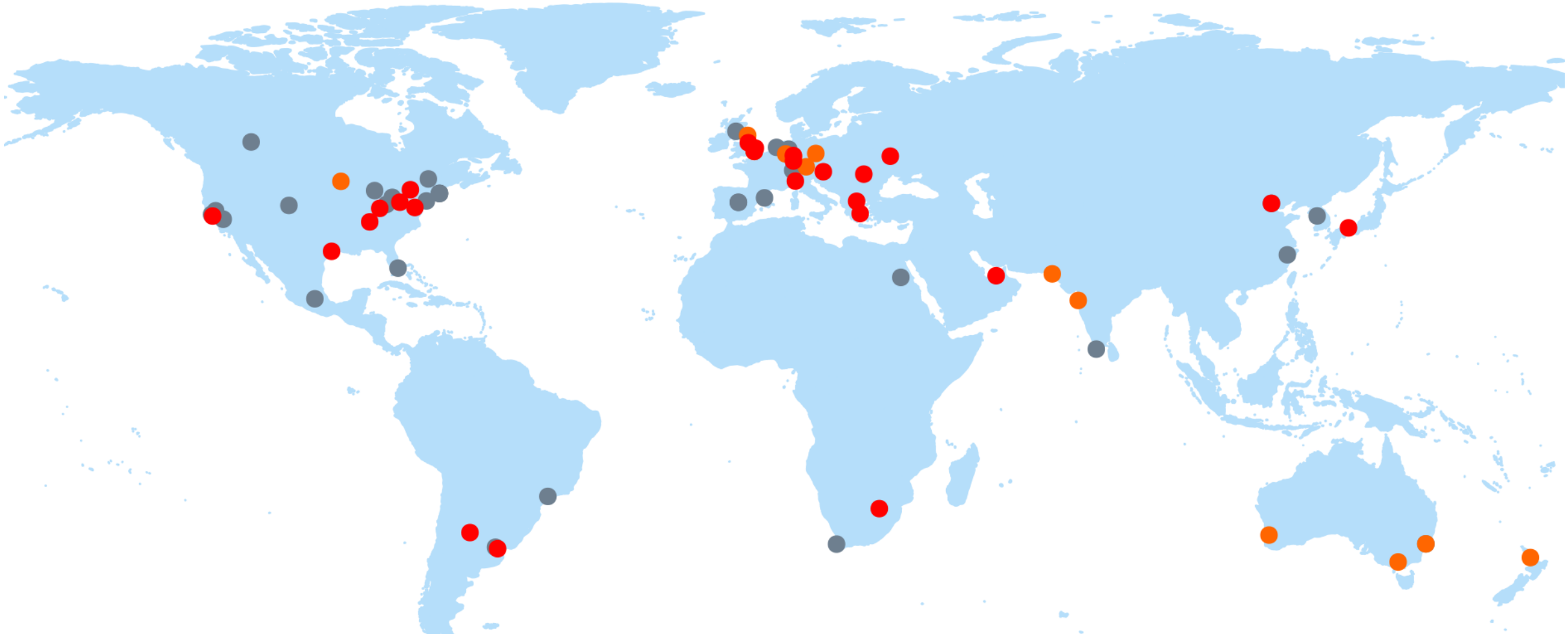
Sex	female	male	Overall
N	11071	8826	19897
Race			
Asian	351 (4.7%)	216 (3.4%)	567 (4.1%)
Black	1035 (14%)	646 (10%)	1681 (12%)
Other	113 (1.5%)	55 (0.86%)	168 (1.2%)
White	5917 (80%)	5456 (86%)	11373 (82%)
Missing	3655 (33%)	2453 (28%)	6108 (31%)

under review

Summary

- Registries provide real life information about phenotypes, disease severity, prognosis, treatments, etc.
- Single center registries are limited by low numbers, referral biases, local/regional prescription habits
- Only few registries provide comprehensive group sizes, some are national, some international with heavy country biases
- Meta-registries e.g. PVRI GoDeep allow for collection of large sample sizes and global outreach
- Quality assurance and harmonization of data-sets are challenging, however manageable
- PVRI GoDeep oversees approx. 35,000 patients, > 8,000,000 data points, prospective data capturing
- First series of papers have been published, more to come
- Inclusion of additional sites ongoing process; started including imaging and biomaterial-repositories

Thanks to all contributing centers...



and the **Giessen GoDeep team** Athiththan Yogeswaran, Khodr Tello, Raphael Majeed, Meike Fuenderich, Farhan Mubashir, Kurt Marquardt, Philipp Krieb, Werner Seeger

PVRi