Supplemental Digital Content 4

New RA equation with SBP and new alternative RA equation with systolic blood pressure

In the process of developing the final RA equation and alternative RA equation, we also developed two equations containing the systolic blood pressure (SBP). We chose not to use these equations in the final estimation model, since the SBP makes the equation less relevant for persons with RA not having easy access to their SBP. Because R^2 was somewhat higher and graphs of observed vs. predicted VO$_{2peak}$ and Bland-Altman plots were almost similar to the graphs from our final model, these equations are included here. Details are given in the Supplemental Table 1.

The final new RA equation with SBP (female=0, male=1; never smoked=0, ever smoked=1) (R^2=0.82, RMSE=4.31): eCRF = 82.255 + (sex × 31.006) - (age × 0.341) - (age x sex interaction × 0.361) - (body mass index (BMI) × 0.615) - (RHR × 0.107) - (smoking × 2.005) + (PA index × 0.224) - (systolic blood pressure(SBP) × 0.073) - (patient global RA assessment (PGA) × 0.067).

The alternative new RA equation with SBP (for use in population-based studies where SBP is known) (female=0, male=1; never smoked=0, ever smoked=1) (R^2=0.80, RMSE=4.48): eCRF = 82.487 + (sex × 28.053) - (age × 0.361) - (age × sex interaction × 0.296) - (BMI × 0.648) - (RHR × 0.095) - (smoking × 2.299) + (PA index × 0.223) - (SBP × 0.079).

Table: New RA equation and new alternative RA equation when the systolic blood pressure is known

New RA equation with SBP

(R²=0.82, RMSE=4.31)	Coefficient	SE	*P*	Confidence interval
Sex (female=0, male=1)	31.006	6.315	<0.001	18.445 - 43.567
Age (years)	-0.341	0.049	<0.001	-0.437 - -0.244
Age × sex	-0.361	0.107	0.001	-0.573 - -0.149
Body mass index (m/kg²)	-0.615	0.126	<0.001	-0.867 - -0.364
Resting heart rate (beats per minute)	-0.107	0.049	0.032	-0.204 - -0.010
Smoking (never=0, ever=1)	-2.005	0.992	0.046	-3.978 - -0.033
Physical activity summary index	0.224	0.056	<0.001	0.112 - 0.335
Systolic blood pressure (mm Hg)	-0.073	0.030	0.016	-0.132 - -0.014
Patient global RA assessment	-0.067	0.024	0.006	-0.115 - -0.020
Constant	82.255	5.562	<0.001	71.193 - 93.316

Nev alternative RA equation

with SBP (R²=0.80, RMSE=4.48)	Coefficient	SE	*P*	Confidence interval
Sex (female=0, male=1)	28.053	6.476	<0.001	15.175 - 40.931
Age (years)	-0.361	0.050	<0.001	-0.461 - -0.262
Age × sex	-0.296	0.108	0.008	-0.511 - -0.081

Body mass index (m/kg^2)	-0.648	0.131	<0.001	-0.909 - -0.388
Resting heart rate[1] (beats per minute)	-0.095	0.051	0.063	-0.196 - 0.005
Smoking (never=0, ever=1)	-2.299	1.026	0.028	-4.338 - -0.259
Physical activity summary index	0.223	0.059	<0.001	0.106 - 0.339
Systolic blood pressure (mm Hg)	-0.079	0.031	0.012	-0.140 - -0.018
Constant	82.487	5.783	<0.001	70.986 - 93.988

[1]Resting heart rate had $P = 0.063$ in the alternative RA equation but was kept in the equation to avoid deterioration in the overall model fit.
Abbreviations: RA, rheumatoid arthritis; SBP, systolic blood pressure.