Clinical and genetic markers of prehypertension in North-Western Russian population

A. Erina[1], U. Usoltsev[1], N. Kolosov[1], V. Solntsev[1], A. Kostareva[1], A. Palotie[2], M.J. Daly[3], A. Konradi[1], O. Rotar[1], M. Artomov[1]

[1]*Almazov National Medical Research Centre, Saint Petersburg, Russian Federation;* [2]*Institute for Molecular Medicine Finland (FIMM), Helsinki, Finland;* [3]*Broad Institute, Cambridge, United States of America*

Introduction: Prehypertension is a medical classification for patients with above normal blood pressure (BP) but insufficient for confirming hypertension diagnosis. Condition is often asymptomatic as it gradually develops over the years, yet recent meta-analyses suggest that prehypertension is a significant risk factor for stroke and other cardiovascular diseases.

Methods: We analyzed phenotypic data from 879 (age 25–64) individuals without hypertension from a population based-sampling cohort of St. Petersburg region in the North-West of Russia to identify clinical risk factors associated with prehypertension condition. All patients were divided in two groups – optimal BP (systolic BP <120 mmHg and diastolic BP <80; N=426) and prehypertension (systolic BP in range 120–140 mmHg and diastolic BP in range 80–90 and not on antihypertensive therapy; N=453).

Results: Phenotypic analysis with linear regression was corrected for age, sex, smoking status, BMI and levels of LDL and HDL cholesterol (Figure 1). Interestingly, blood level of insulin was significantly associated with prehypertension status along with insulin resistance index, however, presence of diabetes diagnosis in medical history was not significant. Phenotypes associated with prehypertension suggest that prehypertension is often developing along with hyperinsulinemia.

Finally, we estimated polygenic risk scores (PRS) for hypertension using UK biobank GWAS summary statistics and confirmed that prehypertension is more frequent at earlier age in patients with higher genetic susceptibility (Figure 1, Figure 2).

Conclusions: Hyperinsulinemia and genetic susceptibility to hypertension are strong risk factors for prehypertension.

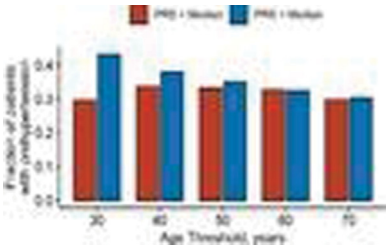| Phenotypic feature	Beta (SE)	P
Glucose	0.043 (0.024)	0.07
Insulin	9×10^{-4} (3×10^{-4})	4.84×10^{-3}
HOMA-IR	0.024 (0.008)	5.4×10^{-3}
Diabetes	0.006 (0.011)	0.59
Heart Rate	0.0047 (0.0018)	8.8×10^{-3}

Figure 1. Clinical markers of prehypertension

Figure 2. Genetic markers of prehypertension