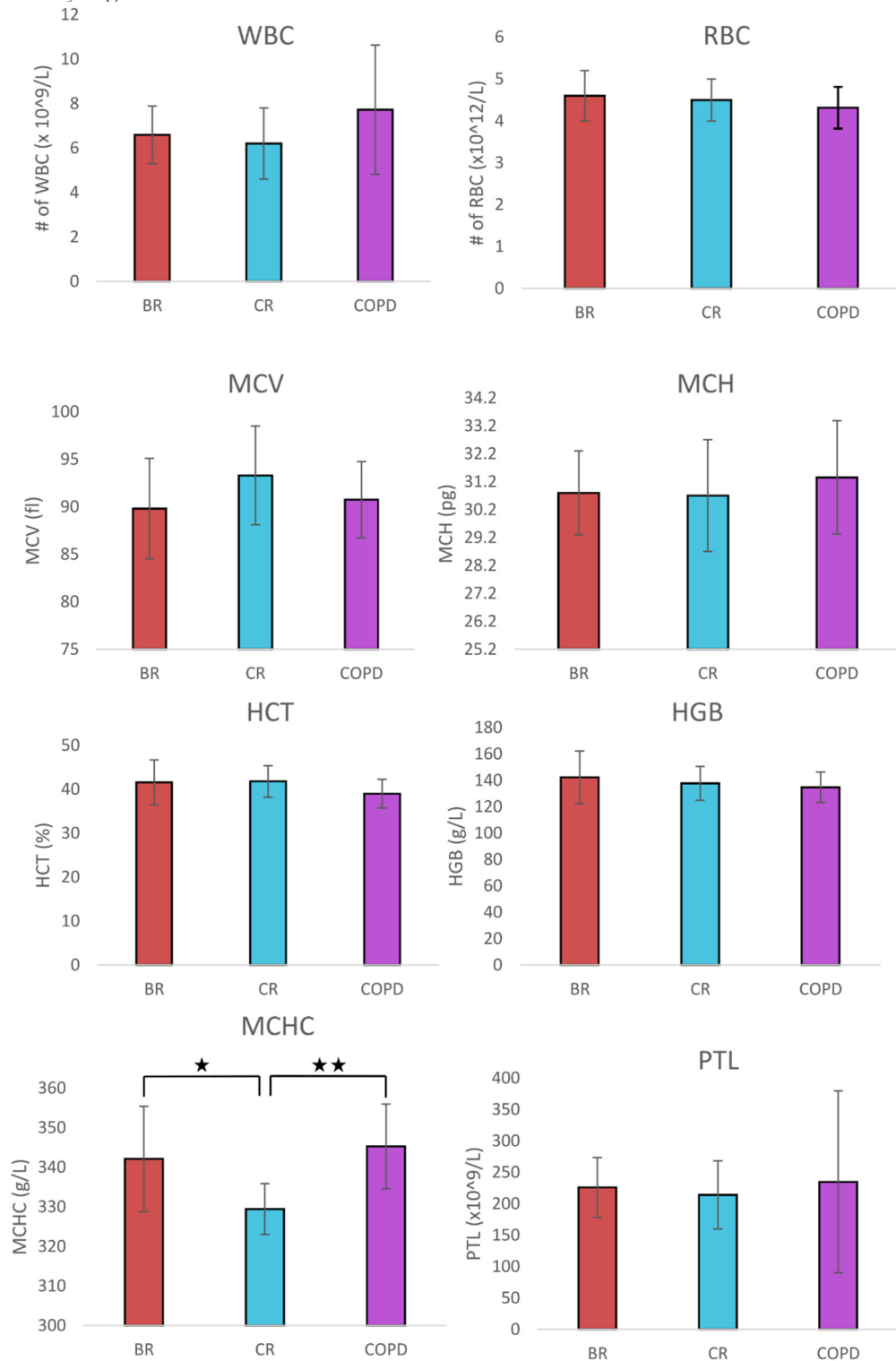


## Supplementary Figures and Tables

### Contents

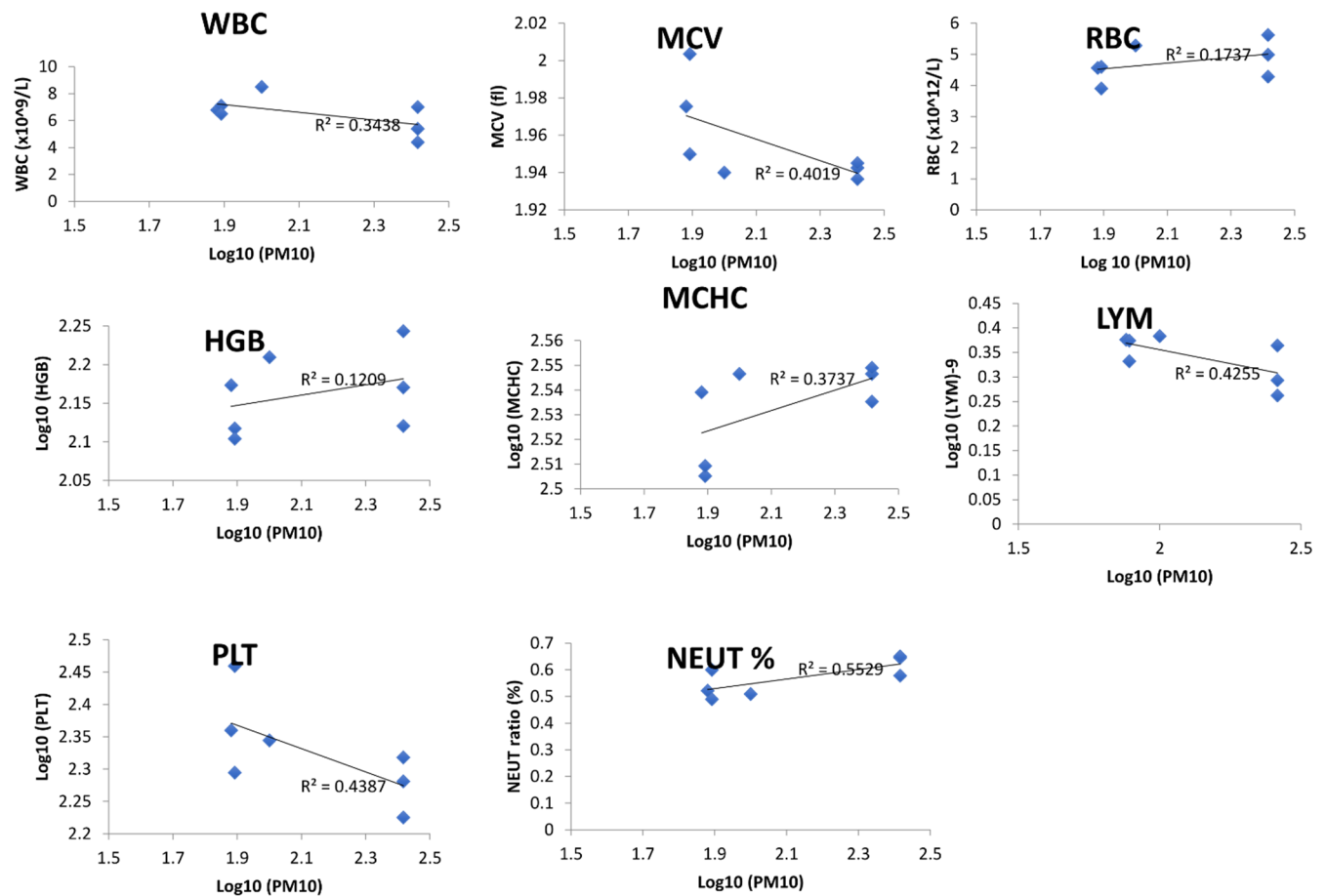
Supplementary Figure 1 .....	2
Supplementary Figure 2 .....	3
Supplementary Figure 3 .....	4
Supplementary Figure 4 .....	5
Supplementary Figure 5 .....	6
Supplementary Figure 6 .....	7
Supplementary Figure 7 .....	8
Supplementary Figure 8 .....	9
Supplementary Figure 9 .....	9
Supplementary Figure 10 .....	11
Supplementary Figure 11 .....	12
Table S1 .....	13
Table S2 .....	14
Table S3 .....	15
Table S4 .....	16
Table S5 .....	17

Supplementary Figure S1



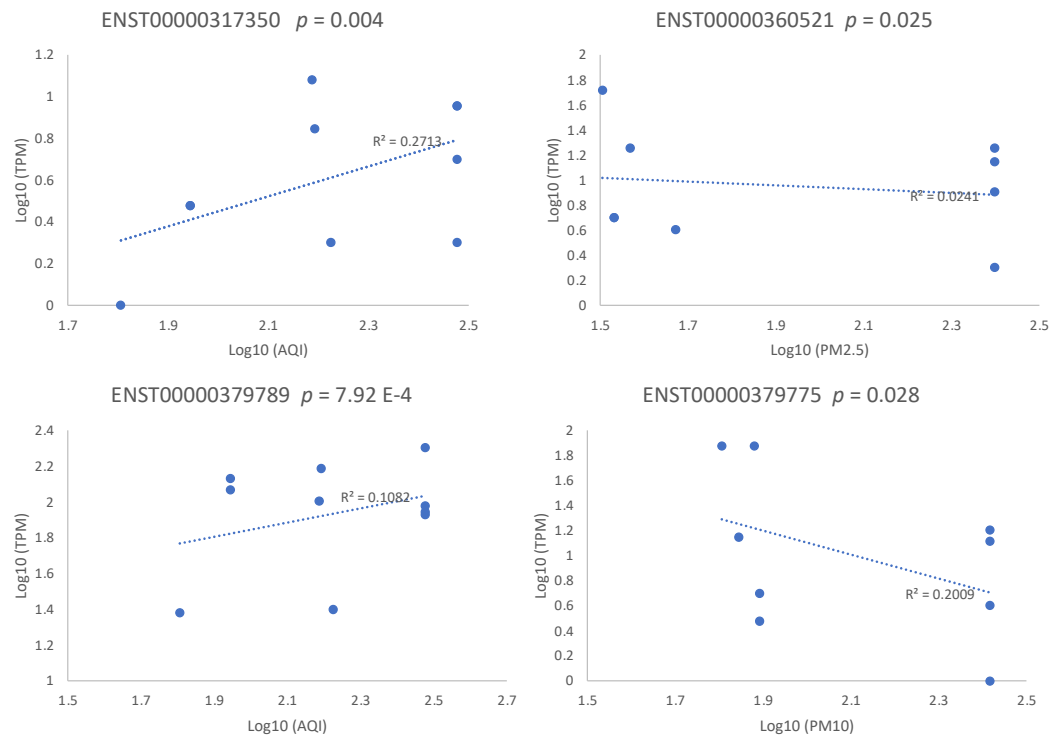
**Figure S1.** Comparison of different haematological indices among Beijing, Chengde and COPD recruits. WBC, white blood cell; RBC, red blood cell; HCT, hematocrit; HGB, hemoglobin; MCV, mean corpuscular volume; MCH, mean corpuscular hemoglobin; MCHC, mean corpuscular hemoglobin concentration; PTL, platelet; LYM, lymphocyte; NEUT: neutrophil; RDW, red blood cell volume distribution width; MPV, mean platelet volume; P-LCR, Platelet-large cell rate. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , t test.

Supplementary Figure S2



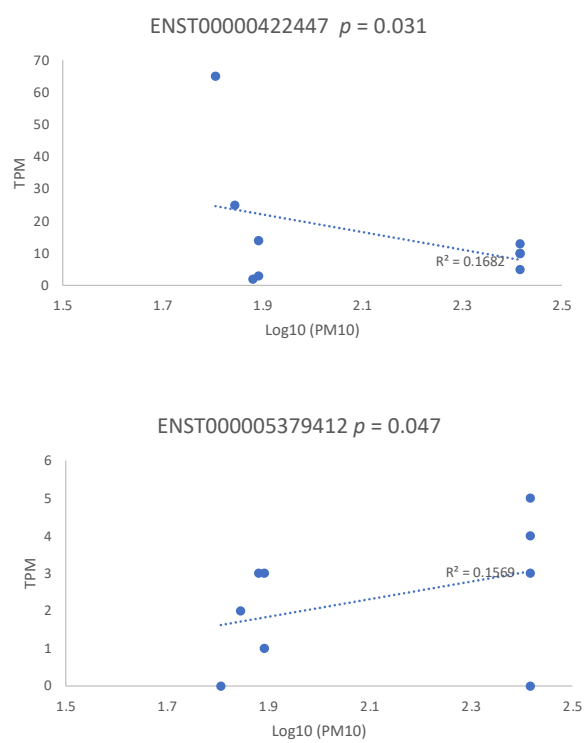
**Figure S2.** Correlation between each haematological index and  $\text{PM}_{10}$  concentration. Linear regression is conducted with  $R^2$  indicated. WBC, white blood cell; RBC, red blood cell; HCT, hematocrit; HGB, hemoglobin; MCV, mean corpuscular volume; MCH, mean corpuscular hemoglobin; MCHC, mean corpuscular hemoglobin concentration; PLT, platelet; LYM, lymphocyte; NEUT: neutrophil; RDW, red blood cell volume distribution width; MPV, mean platelet volume; P-LCR, Platelet-large cell rate.

# Supplementary Figure S3



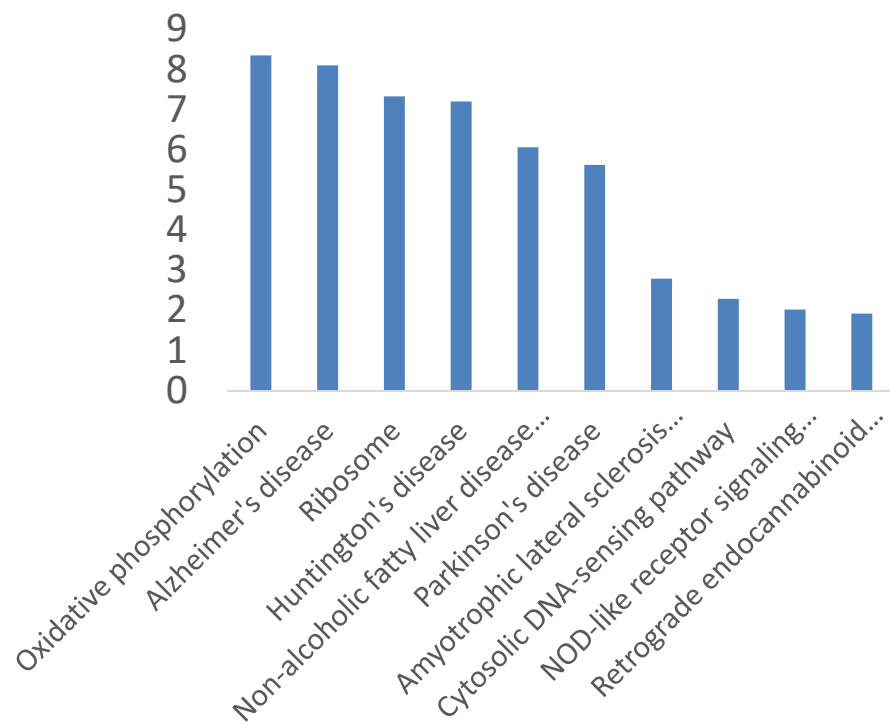
**Figure S3.** Expression levels of four *PFKFB3* isoforms show significant correlation with either PM10, PM2.5 and AQI.

# Supplementary Figure S4



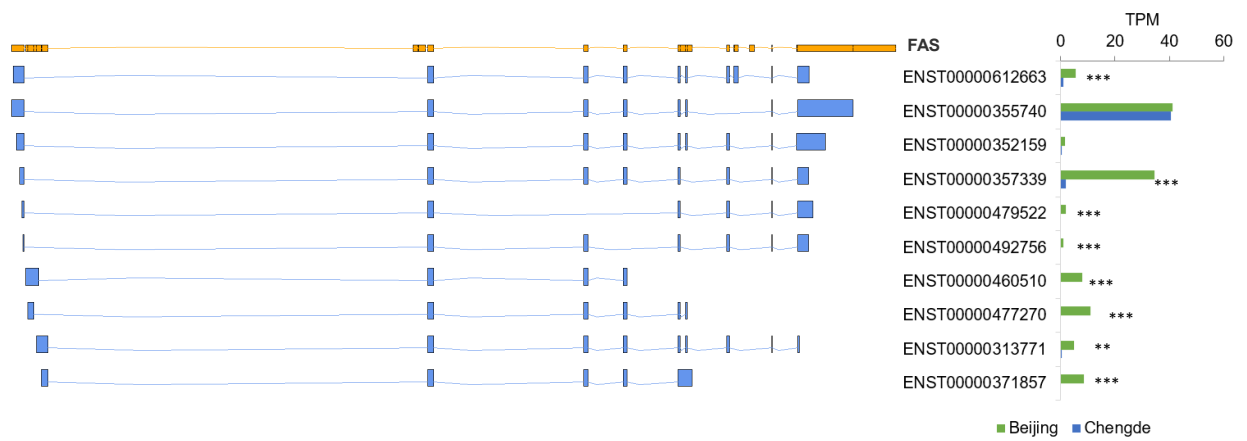
**Figure S4.** Expression levels of two *LDHA* isoforms show significant correlation with PM10.

Supplementary Figure S5



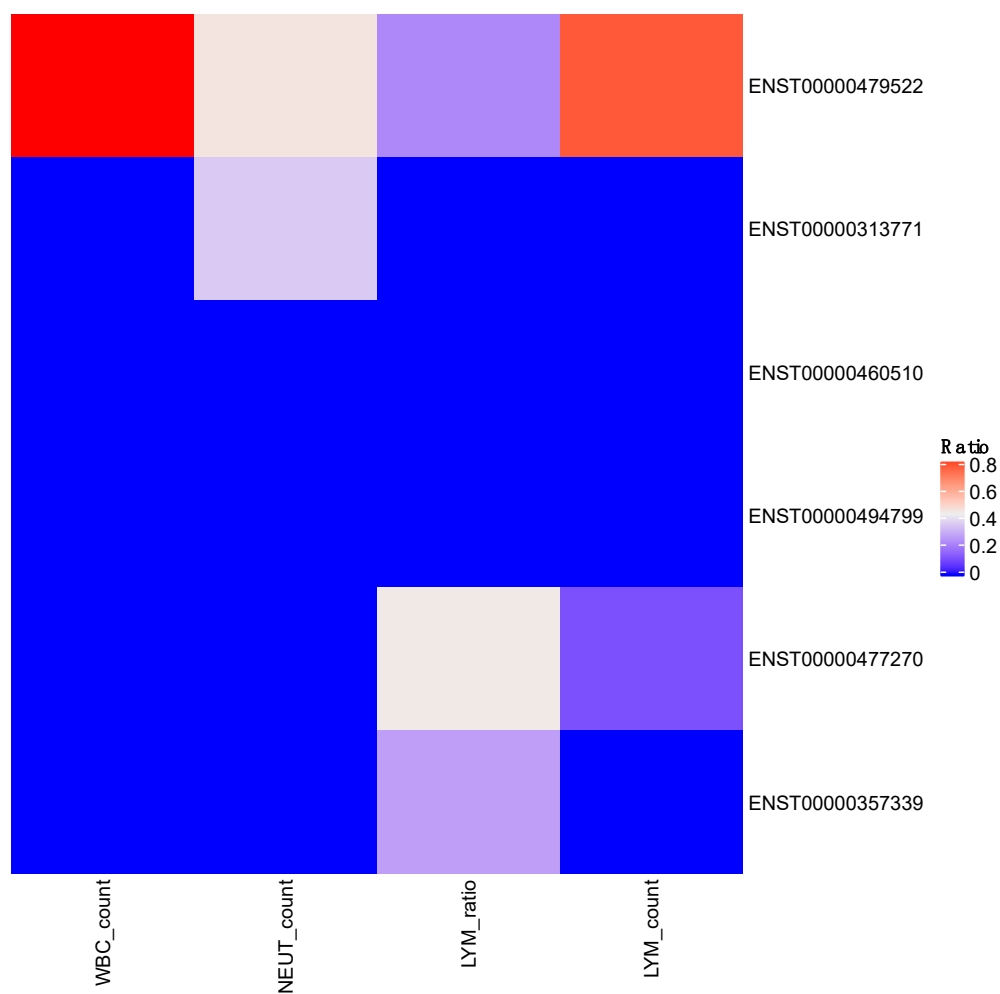
**Figure S5.** KEGG enrichment for differentially expressed transcripts down-regulated in Beijing recruits. x-axis represents the KEGG pathway names and y-axis is the log transformed  $p$ . Hypergeometric test is used.

# Supplementary Figure S6



**Figure S6.** Expression of the AS isoforms of FAS in Beijing and Chengde recruits. Orange/Blue box denotes exon. *TPM* is shown on the most right, with green BR and blue CR. \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  by t-test.

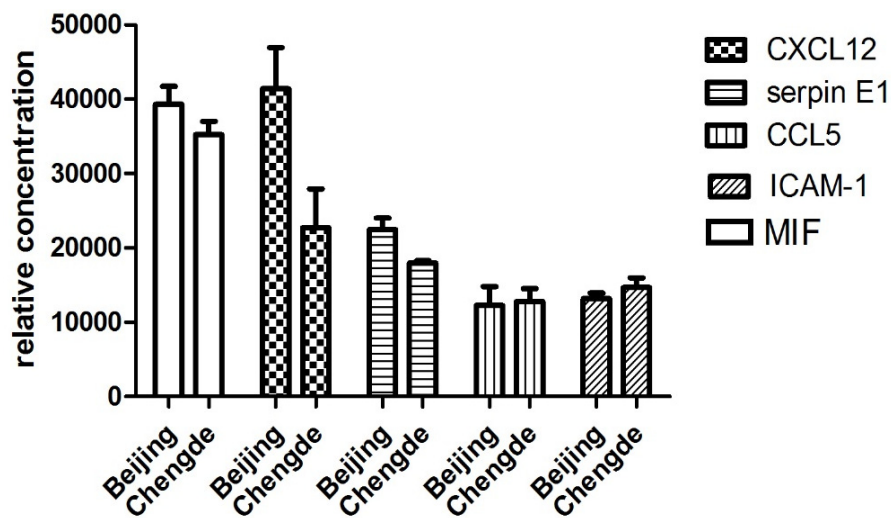
Supplementary Figure S7



**Figure S7.** Heatmap showing variance explanation of different FAS isoforms for different haematological indices.

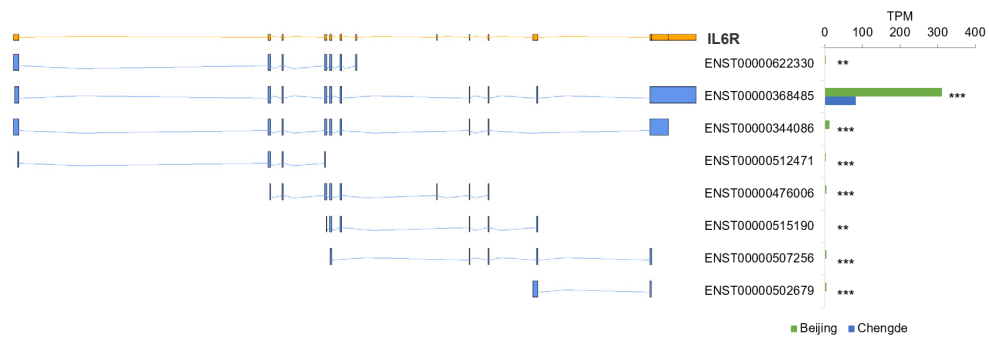


Supplementary Figure S8



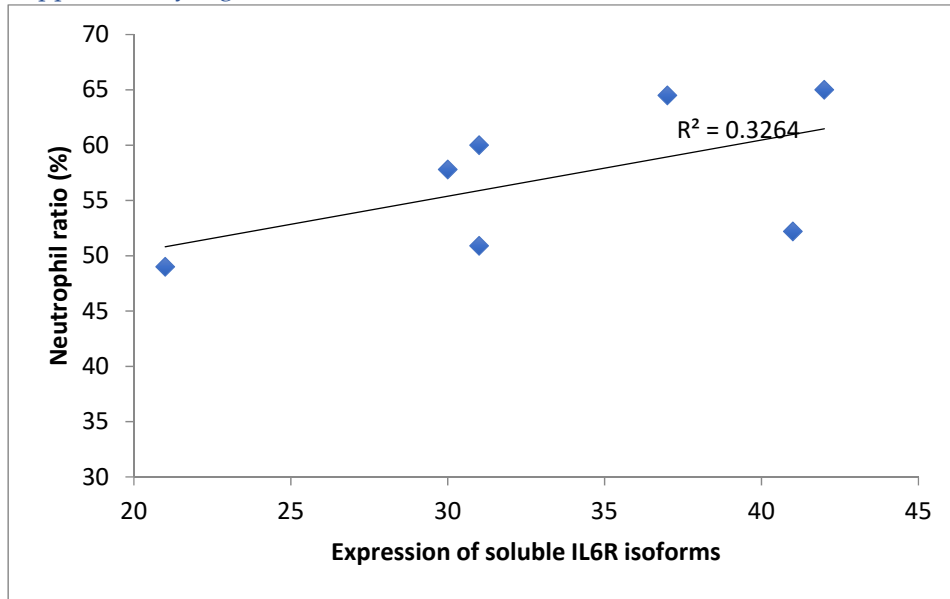
**Figure S8.** Relative concentration of plasma cytokine protein determined by cytokine array. There was a generalised increase in inflammation in Beijing subjects, whereby MIF was upregulated. There was no increase in soluble ICAM-1 but sICAM-1 was lower in the Beijing group when determined by ELISA ( $4.26 \pm 0.44$  ng/mL) versus Chengde volunteers ( $4.98 \pm 0.43$  ng/mL) however, was not statistically significant ( $p = 0.26$ ). CXCL12 (C-X-C motif chemokine 12), Serpin E1 (Serine Protease Inhibitor E1), CCL5 (Chemokine (C-C motif) ligand 5), ICAM-1 (Intercellular Adhesion Molecule 1) and MIF (Macrophage migration inhibitory factor).

Supplementary Figure S9



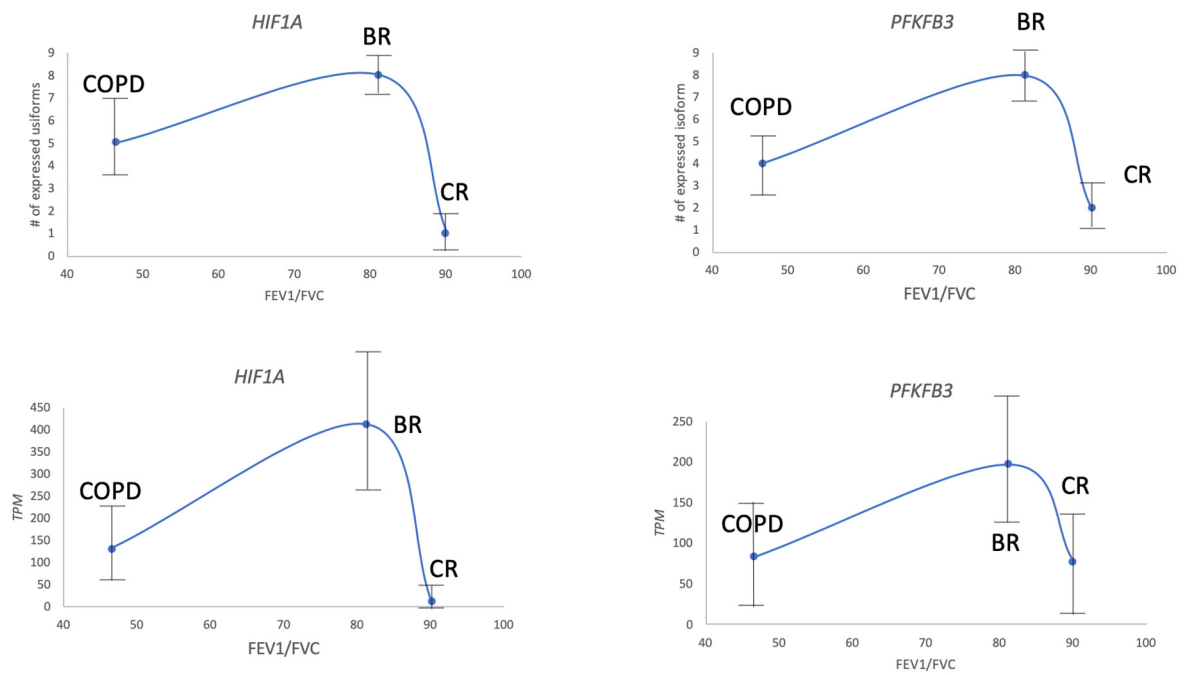
**Figure S9.** Expression of the AS isoforms of *IL6R* in Beijing and Chengde recruits. Orange/Blue box denotes exon. *TPM* is shown on the most right, with green BR and blue CR. \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  by t-test.

Supplementary Figure S10



**Figure S10.** Correlation of the expression of soluble *IL6R* isoforms and neutrophil ratio.

Supplementary Figure S11



**Figure S11.** The reverse “U” pattern of both AS number and expression of *HIF1A* and *PFKFB3* genes along with lung function decrease.

Table S1

**Table S1.** Spatial and temporal distribution, chemical characteristics, and sources of ambient particulate matter in the typical cities in the BTH region. Data for Chengde is not available.

	Secondary Inorganics	Industrial/Steel	Coal combustion	Soil/Crustal	Vehicle Emissions	Other
<b>Beijing</b>	40.3	6.7	8.6	11.5	20.8	12.1
<b>Tianjin</b>	40.6	16.9	10	10.1	17.4	5
<b>Baoding</b>	38.1	13.5	22.6	8.7	10.2	6.9
<b>Cangzhou</b>	39.1	10.7	17.1	16.7	11.9	4.5
<b>Shijiazhuang</b>	39.1	20.5	18.3	8	11	3.1
<b>Averages</b>	39.4	13.7	15.3	9.3	14.3	6.3

Table S2

**Table S2.** Daily air quality data of Beijing and Chengde averaged to produce an annual value. WHO (2005) air quality guidelines for comparison: PM<sub>2.5</sub>, 1 year 10 µg/m<sup>3</sup>, 24 h (99th percentile) 25 µg/m<sup>3</sup>; PM<sub>10</sub>, 1 year 20 µg/m<sup>3</sup>, 24 h (99th percentile) 50 µg/m<sup>3</sup>; SO<sub>2</sub> 24 h 20 µg/m<sup>3</sup>, 10 min 500 µg/m<sup>3</sup>; NO<sub>2</sub> 1 yr 40 µg/m<sup>3</sup>, 1 h 200 µg/m<sup>3</sup>; Ozone 8 h daily maximum 100 µg/m<sup>3</sup>. n/a = not applicable.

Date	City	AQI	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	CO	NO <sub>2</sub>	O <sub>3</sub> 8hr	PM <sub>2.5</sub> /PM <sub>10</sub>
2015	Beijing	115	72	108	13	1	48	103	0.68
	Chengde	85	42	87	21	1	33	102	0.47
2016	Beijing	114	73	101	10	1	49	96	0.76
	Chengde	83	39	82	17	1	35	101	0.49
2017	Beijing	101	56	92	8	1	45	101	0.54
	Chengde	79	35	85	17	1	34	96	0.41
2018	Beijing	92	50	78	6	1	41	100	0.62
	Chengde	77	32	78	13	1	33	98	0.41
2005	WHO	n/a	10	20	20	n/a	40	100	n/a

Table S3

**Table S3.** Functional enrichment of 6760 genes.

<b>Terms</b>	<b>Count</b>	<b><i>p</i> value</b>	<b>Adjust <i>p</i> Value</b>
mRNA splicing	61	$3.60 \times 10^{-16}$	$1.20 \times 10^{-14}$
mRNA processing	70	$6.80 \times 10^{-16}$	$1.90 \times 10^{-14}$
mRNA splicing via Spliceosome	46	$5.70 \times 10^{-9}$	$1.10 \times 10^{-5}$
Spliceosomal complex	20	$8.70 \times 10^{-6}$	$3.10 \times 10^{-3}$
Catalytic step 2 spliceosome	18	$6.10 \times 10^{-4}$	$1.60 \times 10^{-2}$

Table S4

**Table S4.** Variance explanation of each isoform of *HIF1A*, *HIF1B* (also referred as *ARNT*) and *IL6R* for each physiological index.

	<b>LYM ratio</b>	<b>NEUT ratio</b>	<b>RBC count</b>	<b>MCH</b>	<b>HGB</b>	<b>RDWfl</b>
ENST00000394997	0	0.061	0.375	0.716	0	0
ENST00000323441	0	0.029	0	0	0	0
ENST00000553999	0	0.839	0	0	0	0
ENST00000547430	0	0.071	0.005	0	0	0
ENST00000337138	0	0	0.326	0	0.421	0
ENST00000556237	0	0	0	0	0	0
ENST00000557446	0	0	0	0	0	0.607
ENST00000505755	0	0	0	0	0	0
ENST00000358595	0.313	0	0	0	0	0
ENST00000505979	0.3	0	0	0	0	0
ENST00000507256	0	0	0.201	0	0	0



Table S5

**Table S5.** Variance explanation of different *FAS* isoforms for different haematological indices.

		<b>WBC count</b>	<b>NEUT count</b>	<b>LYM ratio</b>	<b>LYM count</b>
<i>Fas</i>	ENST00000479522	0.859	0.454	0.225	0.771
	ENST00000357339	0	0	0.269	0
	ENST00000313771	0	0.358	0	0
	ENST00000460510	0	0	0	0
	ENST00000494799	0	0	0	0
	ENST00000477270	0	0	0.443	0.114