General Practice in China

Volume 1 | Issue 1 Article 10

2022

General Practitioners Should Understand the Subtype of Essential Hypertension-Longitudinal Hypertension

Liantao Nie co-first authors
Department of Electrocardiography , the Second Affiliated Hospital of Zhengzhou University , Zhengzhou 450014 , China

Bingxin Ruan co-first authors
Department of Electrocardiography , Nanning First People's Hospital , Nanning 530022 , China

Fangfang Zhang
Department of Electrocardiography , the Second Affiliated Hospital of Zhengzhou University , Zhengzhou 450014 , China

Yan Jing
Department of Electrocardiography , the Second Affiliated Hospital of Zhengzhou University , Zhengzhou 450014 , China

See next page for additional authors

Recommended Citation

Liantao Nie, Bingxin Ruan, Fangfang Zhang, . General Practitioners Should Understand the Subtype of Essential Hypertension "Longitudinal Hypertension" . Chinese General Practice, 2021, 24(11): 1389-1393.

General Practitioners Should Understand the Subtype of Essential Hypertension-Longitudinal Hypertension

Authors

Liantao Nie co-first authors, Bingxin Ruan co-first authors, Fangfang Zhang, Yan Jing, Juxiang Huang, Qiongwen Yan, Yuhan Zhou, Shifeng Li, and Zhongjian Li

GENERAL PRACTICE IN CHINA

General Practitioners Should Understand The Subtype Of Essential Hypertension-Longitudinal Hypertension

NIE Liantao[1]，ZHANG Fangfang[1]，JING Yan[1]，HUANG Juxiang[1]，YAN Qiongwen[1]，ZHOU Yuhan[1]，LI Shifeng[1]，LI Zhongjian[1]，RUAN Bingxin[2]

1.Department of Electrocardiography，the Second Affiliated Hospital of Zhengzhou University，450014，China

2.Department of Electrocardiography，Nanning first people's Hospital，530022，China

*Corresponding author:LI Zhongjian，Professor，chief technologist; E-mail: lizhongjian56@126.com

Recommended Citation

NIE L T，RUAN B X，ZHANG F F，et al. General Practitioners Should Understand the Subtype of Essential Hypertension "Longitudinal Hypertension"　[J]. Chinese General in China

Available at: https://gpinchina.net

General Practitioners Should Understand The Subtype Of Essential Hypertension-Longitudinal Hypertension

NIE Liantao[1]，ZHANG Fangfang[1]，JING Yan[1]，HUANG Juxiang[1]，YAN Qiongwen[1]，ZHOU Yuhan[1]，LI Shifeng[1]，LI Zhongjian[1]，RUAN Bingxin[2]

【**Abstract**】In clinical work and daily life，target organ damage caused by blood pressure ≥ 140/90mmHg（1mmHg=0.133kPa）usually attracts attention，but target organ damage caused by blood pressure <140/90mmHg will often be ignored.Therefore，in order to improve the innovative concept and research orientation of hypertension，the research team proposed "longitudinal hypertension".This article found that the transverse hypertension emphasizes the “quantity” change caused by blood pressure≥140/90mmHg，while the “longitudinal hypertension” emphasizes both "quantity" change and "quality" change of each individual through the introdution of the concept，diagnostic criteria and advantages of "longitudinal hypertension"，similarities and differences between “longitudinal hypertension” and transverse hypertension.Therefore，as primary health caregivers，general practitioners should understand and master the essence，concept，diagnosis and treatment methods of "longitudinal hypertension".At the same time，the research team also hopes to discuss and improve the existence and application value of "longitudinal hypertension" with colleagues.

【**Key words**】 general practitioner，essential hypertension，transverse hypertension，longitudinal hypertension，electrocardiography，morphology

Five thousand years of traditional Chinese Medicine has the concept and characteristics of "one person，one pulse diagnosis" and "one person，one prescription".That is to say，the method and traditional idea of syndrome differentiation and treatment according to people are in the same line with the idea of modern evidence-based medicine.In clinical work and daily life，the damage of heart，brain，kidney，eyes，ears (sudden deafness/tinnitus) and other target organs caused by blood pressure≥140/90mmHg (1mmHg=0.133 kPa) often attracts people's attention.However，the target organ damage caused by blood pressure <140/90mmHg is not recognized，understood or even valued by people，but it can also lead to the same outcomes as the target organ damage caused by blood pressure≥140/90mmHg，such as cerebral thrombosis，cerebral hemorrhage，myocardial infarction and even sudden cardiac death.Based on this，our team proposes the concept and diagnostic method of "longitudinal hypertension"(or atypical hypertension) for the first time.That is to say，the patient's blood pressure increases 20-30mmHg compared with that at the age of 18 years old，accompanied by clinical manifestations of hypertension and objective examination indications of target organ damage，which can be diagnosised "longitudinal hypertension".Why does "longitudinal hypertension" cause damage to human target organs? Because everyone's appearance，height，weight，appetite，sleep and so on are different，so the basic blood pressure (blood pressure at the age of 18 years old) and blood pressure with age (adult) will be different.How to determine，judge and "customize" one person's "longitudinal hypertension"?Clinically，it can be combined with the subjective and objective indicators of patients.Subjective indicators-hypertension symptoms:headache，dizziness，head discomfort，blurred vision，stiff neck，fatigue，etc.Objective indicators-functional examinations (occasional blood pressure measurement，ambulatory blood

1.Department of Electrocardiography，the Second Affiliated Hospital of Zhengzhou University，450014，China

2.Department of Electrocardiography，Nanning first people's Hospital，530022，China

**Corresponding author:LI Zhongjian，Professor，chief technologist; E-mail: lizhongjian56@126.com*

pressure measurement，home self-test blood pressure measurement，cardiac function examination，etc.)，electrical examinations (ECG，vectorcardiogram，Holter，etc.)，morphological examinations (echocardiography，X-ray，CT，MRI，etc.) andlaboratory examinations.As an innovative idea and research direction to improve hypertension，longitudinal hypertension proposed in this paper is essentially different from transverse hypertension. For example，transverse hypertension emphasizes the change of "quantity" of blood pressure≥140/90mmHg，while longitudinal hypertension emphasizes not only the change of "quantity"， but also the change of "quality" of each individual.Therefore，general practitioners should understand and master the essence，concept，diagnosis and treatment of "longitudinal hypertension"，so as to contribute to the prevention and control of cardiovascular and cerebrovascular diseases in healthy China 2030.

1.What is the globally accepted blood pressure assessment method?

1.1 Blood pressure measurement At present，there are three main methods for blood pressure diagnosis，level classification and evaluation of antihypertensive effect in the world，including clinic blood pressure，ambulatory blood pressure and home self-test blood pressure. However，the European hypertension guidelines[1] no longer recommend clinic blood pressure as the only standard for screening and diagnosis of hypertension，but pay attention to ambulatory blood pressure and home blood pressure monitoring for the detection and identification of white coat hypertension and cryptorchidism Occult hypertension. The new guidelines for hypertension in the United States[2] also agree with this view.

1.2 Diagnostic criteria of hypertension At present，the diagnostic criteria of hypertension (Europe，China[1，3]): (1) the diagnostic criteria of clinic blood pressure:≥140/90mmHg without using antihypertensive drugs measured three times on different days; (2) the diagnostic criteria of ambulatory blood pressure: 24h ambulatory mean blood pressure≥130/80mmHg，daytime≥135/85mmHg，night≥120/70mmHg (3) the diagnostic criteria of home self-test blood pressure:≥135/85mmHg.American diagnostic criteria for hypertension:≥130/80mmHg without using antihypertensive drugs measured three times on different days.The continuous adjustment and change of the diagnostic criteria for hypertension is due to the continuous understanding of the harm of hypertension. From the first generation of hypertension criteria ≥160/95mmHg to the second generation of hypertension criteria ≥140/90mmHg，and then to the new American guidelines≥130/80mmHg，all lie in the prevention and control of cardiovascular and cerebrovascular events[4].Studies have shown that blood pressure >115/75 mmHg，blood pressure growth and the risk of cardiovascular and cerebrovascular events are log linear correlation.The concept put forward of prehypertension or high normotensive blood pressure（120~139/80~89mm Hg）demonstrates that the risk of hypertension and coronary heart disease in prehypertensive population is significantly higher compared with the population <120/80mmHg，which suggests that there may be early damage of target organs such as heart，brain，kidney，eye and blood vessel in prehypertensive patients[5].The epidemiological datas in China showed that 32.1% of the population aged 35-54 years has prehypertension，and the risk of stroke，coronary heart disease and cardiovascular events increases by 56.0%，44.0% and 52.0% respectively[6].There are more than 10 million people with hypotension in China[7].With the increase of blood pressure to a certain extent，there will be hypertension related clinical symptoms and target organ damage.Therefore，the adjustment of diagnostic criteria for hypertension should be based on evidence-based medicine，and there are differences in race，diet structure and living habits between China and foreign countries，which needs consistent and need more in-depth study.

1.3 Target of antihypertension Chinese guidelines[3] recommend that patients with low risk stratification of hypertension: <140/90mmHg，patients with high risk stratification of hypertension: < 130/80mmHg，consistenting with the new antihypertensive goal of the European guidelines[1]，but contrary to the 2017 USA guidelines[2]，The target of American blood pressure control is < 130/80mmHg for patients with stable coronary heart disease，chronic heart failure，chronic kidney disease，diabetes，even elderly patients in good condition aged over 65 years old .In

Chinese guidelines，on the basis of the above，there are age stratification: (1) for patients over 80 years old with hypertension，the blood pressure is reduced to <150/90mmHg first，and then to <140/90mm Hg if they can tolerate it; (2) for elderly weakened patients with hypertension，the systolic blood pressure control target is < 150 mm Hg，but not less than 130 mm Hg as far as possible.According to the 2018 European hypertension guidelines[1]，the lower limit of blood pressure control should be ≥120/70mmHg for general hypertensive patients，and ≥130/70mmHg for chronic kidney disease patients and elderly patients over 65 years old. The new guidelines of China，the United States，and Europe define the goal of reducing blood pressure in hypertension，which aims to avoid the risk of excessive blood pressure and adverse cardiovascular events.

In conclusion，the guidelines and diagnostic criteria for hypertension at home and abroad are still imperfect.For example: (1) the diagnosis and treatment of hypertension (transverse hypertension) only emphasizes the value of blood pressure，age，risk factors and so on to start antihypertensive treatment and effect evaluation，but does not fully evaluate the objective indicators of clinical symptoms and target organ damage; "Longitudinal hypertension" ，the special subtype of essential hypertension (blood pressure≥140/90mmHg)，is not covered or ignored / not recognized，or blood pressure<140/90mmHg is not covered，but patients do have objective evidence of clinical symptoms and target organ damage of hypertension.Therefore，our research team first innovatively put forward the concept of "longitudinal hypertension" (or atypical hypertension)，with the purpose of improving the current deficiencies in the diagnosis and treatment of hypertension at home and abroad，so as to promote the health of the whole people and achieve the grand goal of a healthy world.

2.What is longitudinal hypertension (atypical hypertension)?

2.1 Origin of "longitudinal hypertension" Hypertension is divided into primary hypertension and secondary hypertension. Secondary hypertension is caused by other diseases，drug treatment effect is poor or invalid.With primary disease cured，blood pressure then becomes normal.While，the primary hypertension cann't determine the causes through a variety of examination methods，nor be radically cured，but drug treatment is effective.Our research team believes that primary hypertension and secondary hypertension with blood presure≥140/90mmHg are transverse hypertension，which can also be called typical hypertension.The main results are as follows: (1) In the absence of antihypertensive drugs，the blood pressure measured in three clinics on different days is ≥140/90 mm Hg (Europe，China);(2) According to the 2017 American hypertension standard，blood pressure≥130/80mmHg，which is the scope of hypertension recommended by accepted guidelines.The "longitudinal hypertension" proposed by our research team should belong to primary hypertension，which is actually a subtype of primary hypertension (also known as atypical hypertension)，or a special type of hypertension.

2.2 Concept of "longitudinal hypertension" The patient has abnormal clinical manifestations and instrument examination of hypertension，whose blood pressure is less than 140/90 mmHg but increased by 20-30 mmHg compared with his own 18-year-old blood pressure (adult basic blood pressure) .Above conditions meet the individual diagnostic criteria of hypertension，which can also be called atypical hypertension / progressive hypertension / historical hypertension / temporal hypertension / progressive hypertension / individual precise hypertension / private customized hypertension.According to Article 11 of the civil code of the people's Republic of China[8]，18-year-old subjects are regarded as the baseline reference of "longitudinal hypertension". It is pointed out that citizens over 18 years old are adults. If minors (0-17 years old) are selected as the subjects，their age span is large，and it is not easy to operate or even error in the actual observation and comparison work.People who do not monitor their blood pressure at the age of 18 can obtain adult basic blood pressure by two methods: (1) clinical consultation:most people know that their basic blood pressure is low and often have a series of clinical manifestations caused by low blood pressure，which is easy for patients to know when they are young; (2) through 24-hour ambulatory blood pressure monitor:looking for the lowest values of systolic blood pressure and diastolic blood pressureb in 24-hour ambulatory

blood pressure，combined with the patients' clinical symptoms and abnormal changes related to the increase of blood pressure in routine electrocardiogram，can be determined.

2.3 Diagnostic criteria of "longitudinal hypertension" (1) The patient's blood pressure is less than 140/90mmHg，but with 20-30mmHg higher than that of 18 years old; (2) The patient has clinical manifestations of hypertension; (3) special examination (functional / electrical / morphological / biochemical examination，etc.) showes abnormal indications of target organ damage in hypertension.

2.4 Diagnostic methods and key points of "longitudinal hypertension" (1) functional examination: occasional blood pressure / whole day mean blood pressure increased by 20-30 mmHg compared with that at the age of 18; (2) electrical examination: ECG / vectorcardiogram / Holter diagnosis: ①left atrium / left ventricle hypertrophy; ②myocardial ischemia (ST-T change); ③arrhythmia; (3) morphological examination: color Doppler ultrasound / X-ray / CT / MRI diagnosis: ① left atrium/ Left ventricular hypertrophy; ② arrhythmia; ③ abnormal cardiac function; (4) biochemical examination: hypertension related indicators are abnormal.

3.What are the advantages of longitudinal hypertension monitoring? What should general practitioners do?

3.1 Advantages of "longitudinal hypertension" monitoring Based on the origin，concept，diagnostic criteria，diagnostic methods and key points of "longitudinal hypertension"，as general practitioner，we should change our thinking，change the traditional medical concept，change the point of view that clinical and medical technology can not communicate，and adopt specific diagnosis and treatment methods for specific patients.Through the introduction of primary hypertension，secondary hypertension and "longitudinal hypertension"(atypical hypertension / progressive hypertension / historical hypertension / temporal hypertension / progressive hypertension / individual precise hypertension / private customized hypertension) proposed by our research team，General practitioners have a preliminary understanding of "longitudinal hypertension"，especially the practicability，rationality and scientificity of "longitudinal hypertension" in clinical diagnosis and treatment of hypertension，and it is significant to enrich the theory and practice system of hypertension，especially based on evidence-based medicine.It is concluded that the definition and nomenclature of "longitudinal hypertension" is more conducive to the development of clinical hypertension work.In order to keep "longitudinal hypertension" in mind，the advantages of monitoring "longitudinal hypertension" are described as follows: (1) "longitudinal hypertension" has the characteristics of atypical hypertension / progressive hypertension / historical hypertension / temporal hypertension / progressive hypertension / individual precise hypertension，and more has the characteristics of "private customized hypertension" diagnosis and treatment，which is relative to transverse hypertension.(2) Transverse hypertension focuses on group and individual blood pressure >140/ 90 mmHg，which emphasizes the change of "quantity" but ignores the change of "quality" (clinical manifestation and target organ damage of hypertension);"Longitudinal hypertension" emphasizes that blood pressure of the group and individual is 20-30mmHg larger than themselves，which not only emphasizes the change of "quantity" of each individual，but also emphasizes the change of "quality" of each individual.

3.2 general practitioners As a general practitioner，he should master the following skills: (1) he should be familiar with the symptoms and manifestations of hypertension; (2) he should be familiar with ECG / vectorcardiogram / ambulatory ECG / ambulatory blood pressure / ultrasound，X-ray，CT，MRI / laboratory examination and other hypertension diagnosis and treatment skills，and conduct ECG / vectorcardiogram / ambulatory ECG / ambulatory blood pressure examination for individuals / groups.In particular，the routine ECG can be used as a screening test for hypertension，which is not only a green test，but also can be widely used，because the ECG examination is cheap，and can be repeated for many times. It is not harmful to the human body，and the subjects are more willing to accept it，which has guiding significance for the diagnosis and treatment of "longitudinal high blood pressure";(3) he should understand and recognize that hypertension is a syndrome that causes damage to multiple organs (heart，brain，kidney，eyes，ears，etc.).

4.What are the similarities and differences between transverse hypertension and "longitudinal hypertension"?

4.1 Similarities and differences between transverse hypertension and longitudinal hypertension

4.1.1 Differences between transverse hypertension and longitudinal hypertension (1) Transverse hypertension，whose blood pressure≥140/90mmHg，increases by 20-30mmHg or even higher on the basis of 18 years old;"Longitudinal hypertension"，whose blood pressure < 140/90mmHg，increases by 20-30mmHg or even higher on the basis of 18-year-old blood pressure，but the blood pressure is always <140/90mmHg.

4.1.2 Common points of transverse hypertension and "longitudinal hypertension" (1) Both types of hypertension have symptoms of hypertension，such as headache，dizziness，blurred vision，deafness，tinnitus，and fatigue; (2) both types of hypertension have ECG changes caused by target organ damage: left atrial / left ventricular hypertrophy，myocardial ischemia (ST-T change)，arrhythmia.

4.2 Diagnosis and evaluation of transverse hypertension and "longitudinal hypertension" Both transverse hypertension and longitudinal hypertension can cause abnormal changes in the function，electricity，morphology，biochemistry and clinical symptoms of target organs such as heart，brain，kidney，eyes and ears.According to this，we can apply functional examination (clinic blood pressure，ambulatory blood pressure，cardiac function;cardiac electrical examination: routine electrocardiogram，vectorcardiogram，dynamic electrocardiogram) combined with clinical symptoms to comprehensively analyze and judge，accurately diagnose transverse hypertension and "longitudinal hypertension". At the same time，we can apply the above examination methods to accurately evaluate the treatment effect of transverse hypertension and "longitudinal hypertension" .According to the observation and research of ECG Department of the Second Affiliated Hospital of Zhengzhou University in the past 20 years，it is found that the application of ECG technology can early detect and accurately diagnose the ECG changes caused by transverse hypertension and "longitudinal hypertension" cardiac electrical damage，such as left atrial / left ventricular hypertrophy，myocardial ischemia (ST-T change)，arrhythmia.The application of ECG technology can also accurately evaluate the treatment effect of transverse hypertension and "longitudinal hypertension"，such as atrial / ventricular depolarization wave and repolarization wave: Ptfv1 disappeared / QRS wave voltage decreased / ST segment depression returned to normal / T wave abnormal change improved / arrhythmia improved after treatment.

4.3 Relationship between "longitudinal hypertension" and physiological hypertension caused by aging system The blood pressure rise caused by longitudinal hypertension includes: (1) 20-30 mm Hg increase on the basis of the blood pressure at the age of 18; (2) symptoms of hypertension，such as headache，distension，dizziness，blurred vision，deafness，tinnitus and fatigue; (3) electrical changes of the heart (ECG changes) caused by target organ damage of hypertension: left atrium/ Left ventricular hypertrophy，myocardial ischemia (ST-T change)，arrhythmia.Physiological blood pressure elevation is characterized by: (1) there may be a slow increase of blood pressure with age，but never a sudden increase of 20-30 mm Hg; (2) no symptoms of hypertension; (3) no changes of ECG caused by target organ damage of hypertension.

4.4 Treatment goals of transverse hypertension and "longitudinal hypertension" In terms of treatment，the goals of transverse hypertension and "longitudinal hypertension" are the same，and there is no difference.The specific manifestations are: (1) ambulatory blood pressure examination: mean systolic / diastolic blood pressure reduces 20-30mmHg than before，even more;(2) The clinical symptoms are relieved or disappeared;(3) Cardiac electrical examination: atrial / ventricular depolarization wave and repolarization wave: Ptfv1 disappeared / QRS wave voltage decreased / ST segment depression returned to normal / T wave abnormal change improved / arrhythmia improved after treatment.

5 What is the application prospect of longitudinal hypertension?

5.1 The origin，concept，diagnostic criteria，diagnostic methods and key points，diagnostic difference and common

ground between longitudinal hypertension and transverse hypertension proposed by our research team，which expectes colleagues to discuss and improve the existence and application value of "longitudinal hypertension".

5.2 Our research team has carried out "longitudinal hypertension" for 20 years，and has accumulated a large number of cases and experience in diagnosis and treatment，but lack of multi center，big data and other evidence-based medicine verification and support.To carry out the research work of "longitudinal hypertension" can realize the normal blood pressure of the whole people，reduce the damage to human target organs caused by hypertension，promote the physical and mental health of the whole people，and build a "2030 healthy China".

The author's contribution: Li Zhongjian is responsible for the conception and design of the article，the overall supervision and management of the article; Zhang Fangfang，Yan qiongwen and Zhou Yuhan are responsible for the implementation and feasibility analysis of the research; Nie liantao and Ruan Bingxin are responsible for writing the paper; Jing Yan and Huang Juxiang are responsible for the revision of the paper; Li Shifeng is responsible for the quality control and review of the article.

There is no conflict of interest in this article

Feference

[1] WHELTON P，CAREY R，ARONOW W，et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention，Detection，Evaluation，and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines[J] .J Am Coll Cardiol，2018，71(19): e127-e248.DOI：10.1016/j.jacc.2017.11.006

[2] WILLIAMS B，MANCIA G，SPIERING W，et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension.[J] .Eur Heart J，2018，39(33)：3021-3104.DOI：10.1093/eurheartj/ehy339

[3] Hypertension Alliance (China)，hypertension branch of China Association for the promotion of international exchange in health care，revision committee of Chinese guidelines for the prevention and treatment of hypertension，etc. Chinese guidelines for the prevention and treatment of hypertension (revised in 2018) [J]. Chinese Journal of Cardiology，2019，24(1):25-56.DOI：10.3969/j.issn.1007-5410.2019.01.002 http://rs.yiigle.com/CN113805201901/1118901.htm

[4] VASAN R，LARSON M，LEIP E，et al. Impact of high-normal blood pressure on the risk of cardiovascular disease.[J] .N Engl J Med，2001，345(18):1291-1297. DOI: 10.1056/NEJMoa003417

[5] GILES T，MATERSON B，COHN J，et al. Definition and classification of hypertension: an update.[J] .J Clin Hypertens (Greenwich)，2009，11(11): 611-614.DOI：10.1111/j.1751-7176.2009.00179.x

[6] SUN X，YUAN H.Review of sub-clinical Lesions in prehypertension[J].Advances in cardiovascular diseases，2010，31(2)：197-200.DOI：10.3969/j.issn.1004-3934.2010.02.015

[7] XIAO Y，LIU Z，YANG T.Thoughts on the changes of diagnostic criteria of hypertension in the past century[J]. Chinese Journal of Hypertension，2017，25(3):204-206.DOI：CNKI:SUN:ZGGZ.0.2017-03-003

[8] China legal system press. Civil code of the people's Republic of China [M]. Beijing: China legal system press，2020：2-10

Appendix: Interview with the author about the aticle:general practitioners should understand the subtype of essential hypertension "longitudinal hypertension"

Problem 1: The diagnostic criteria for hypertension is determined by a large amount of evidence-based medicine in the world. An important reason for not lowering the diagnostic criteria in China is that if the diagnostic criteria is lowered a little，the management population will increase significantly. At present，the main contradiction in China is the low awareness rate and treatment rate of hypertension. How to balance this problem?

1.The new guidelines in the United States have been similarly questioned，but there is an account in the guidelines. The cost of reducing the standard of hypertension and expanding the treatment population is far less than the cost of target organ damage caused by elevated blood pressure，and the direct beneficiaries are the patients themselves and the health of the national population. Therefore，the new guidelines in the United States recommend that the blood pressure should be controlled below 130/80mmHg (1 mmHg=0.133kPa) in a tolerable situation.

2.There is no change in the diagnostic criteria of hypertension in China，which is due to the consideration of race，diet structure，lifestyle and other reasons. It is also the goal of Chinese experts to find the criteria suitable for the Chinese population. However，in clinical work，blood pressure <140/90mmHg，patients with symptoms and abnormal changes of target organ damage by instrument examination are many.We can't ignore this kind of people just because we are worried about the expansion of the management population，which will lose the significance of individual diagnosis and treatment of doctors，nor can we achieve the grand goal of healthy China.

3. The low awareness rate can be made up by increasing the popularization of science and other measures，the low treatment rate is due to the single diagnosis of hypertension in the world，which is basically diagnosed only by measuring the blood pressure in the clinical room.The lack of ambulatory blood pressure monitoring and a variety of instruments to evaluate the diagnosis and treatment of target organ damage caused by hypertension makes it difficult for patients to understand the damage caused by hypertension.We propose that "longitudinal hypertension" is a subtype of essential hypertension，which is a supplement and improvement to essential hypertension. To summarize the characteristics and diagnosis process of this kind of population is not only the need of clinical practice，but also the need of patients，but also the need of healthy China.

Problem 2: Hidden hypertension and white coat hypertension exist in hypertension，which are related to target organ damage.What is the difference between longitudinal hypertension and the above two types of hypertension?

Hidden hypertension is high blood pressure (blood pressure >140/90mmHg) measured by family and normal blood pressure in clinical room. White coat hypertension is high blood pressure (blood pressure>140/90mmHg) measured in clinical room and normal blood pressure at home. Both of them are high blood pressure (blood pressure>140/90mmHg) and can lead to target organ damage. Our "longitudinal hypertension" is different from the above two kinds of hypertension. The blood pressure is less than 140/90mmHg，and it also has target organ damage.

Problem 3: The symptoms of hypertension are not specific. The ECG of tall and thin people shows high voltage in the left ventricle and the left atrium increased with age.How to judge whether it is physiological or caused by blood pressure fluctuation?

1. Although the symptoms of hypertension are not specific，that reflect the clinical symptoms of some patients with hypertension，which has certain guiding significance for the diagnosis of hypertension;

2.High and thin people can show high voltage of left ventricle，but it may be: (1) it is related to thin chest wall; (2) it is related to hypertension; (3) the two coexist;

3.The increase of age is not the enlargement of left atrium，but the prolongation and broadening of ECG P wave duration.The prolongation and broadening of P wave duration can be seen in two cases，one is the abnormal conduction caused by atrial block，the other is the enlargement of left atrium caused by hypertension，the stretching of atrial myocytes and the dilatting or thinning of atrial wall.The former is caused by atrial block，ECG manifestations the extension of P-wave duration and the decrease of P-wave amplitude.The latter is caused by the increase of blood pressure and atrial enlargement，ECG manifestations P-wave amplitude is higher than that of atrial block，P-wave bimodal，Ptfv1 abnormality，left ventricular high voltage，left ventricular hypertrophy，ST-T abnormality，arrhythmia，etc.

Question 4: what the article wants to emphasize is that everyone needs different blood pressure and different blood pressure threshold. The article should put forward a calculation method for individuals，which is similar to risk assessment. Is this more reasonable?

We emphasize that the blood pressure threshold of each person is different，and put forward the specific diagnosis basis and process of longitudinal hypertension: (1) the blood pressure in the clinical room is less than 140/90mmHg or the 24-hour ambulatory mean blood pressure is less than 130/80mmHg; (2) the patients have symptoms of hypertension; (3) the blood pressure of the patient increases 20-30 mmHg over his blood pressure when 18 years old; (4) The instrument examination has the basis of hypertension target organ damage，such as: ① ECG examination: A. left atrial / left ventricular hypertrophy，B. myocardial ischemia (ST-T change)，C. arrhythmia; ② eye and ear examination showed changes of hypertension damage.

Of course，we can also evaluate the score of patients with longitudinal hypertension，such as: ECG abnormal change 1 item 1 point，2 items 2 points，3 items 3 points; clinical symptoms:1 item 1 point，2 items 2 points，3 items 3 points; blood pressure increment: younger basal blood pressure increased by 10mmHg 1 point，increased by 20mm Hg 2 points，increased by 30mmHg 3 points and other specific quantitative indicators.

Question 5: it is mentioned in this paper that the blood pressure level of "longitudinal hypertension" should be compared with the blood pressure level of 18-year-old people. How can people who do not monitor their blood pressure at 18-year-old diagnose "longitudinal hypertension"?

People who do not monitor their blood pressure at the age of 18 can obtain adult basic blood pressure by two methods: (1) clinical consultation:most people know that their basic blood pressure is low and often have a series of clinical manifestations caused by low blood pressure，which is easy for patients to know when they are young; (2) through 24-hour ambulatory blood pressure monitor:looking for the lowest values of systolic blood pressure and diastolic blood pressureb in 24-hour ambulatory blood pressure，combined with the patients' clinical symptoms and abnormal changes related to the increase of blood pressure in routine electrocardiogram，can be determined.According to this method，our research team has been in clinical application for nearly 20 years.

To sum up，there are still many unsatisfactory places for our team to creatively put forward the concept of "longitudinal hypertension" in the world.However，our research team firmly believes that in the process of continuous improvement，it will bring gospel to the accurate diagnosis，treatment and effect evaluation of patients with hypertension around the world，which may have more long-term significance for the early prevention of patients with hypertension，and has far-reaching and evidence-based medicine strategic guiding significance for the realization of healthy China.

[Expert profile] Li Zhongjian，chief technician，professor，master's supervisor，special reviewer of American circulation magazine，international well-known ECG expert，and doctoral/Master's thesis review expert of the academic degree center of the Ministry of education in 2020.Director of Zhengzhou University institute of electrocardiology，director of Henan electrocardiology diagnosis and treatment center，Visiting professor of Xiamen University.Director of Henan key medical discipline (ECG diagnosis specialty)，former deputy director of China electrocardiographic information society/electrocardiographic consultation center，director of national and provincial electrocardiographic continuing education. Outstanding worker of electrocardiography in China，"my favorite health guard"and "outstanding person of scientific and technological innovation" in Henan Province.He obtained 17 scientific research achievements and projects，13 national patents and 200 papers.At the invitation of the National Space Center and many international conferences，he gave lectures on "ECG identification research" and "fetal ECG";He was invited to attend many international conferences such as "world heart conference" and "international society of ambulatory electrocardiography and noninvasive electrocardiography";In China，he is the first person to put forward the scientific idea of "adhering to the road of electrocardiology with Chinese characteristics"，leading the Department to win the national "youth civilization".