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HARVEST Study Group, Italy**

**ISOLATED SYSTOLIC HYPERTENSION IN THE  
YOUNG DOES NOT IMPLY AN INCREASED RISK OF  
FUTURE HYPERTENSION NEEDING TREATMENT**

**Mos L, Saladini F, Fania C, Mazzer A, Casiglia E,  
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# INTRODUCTION

- Isolated systolic hypertension (ISH) is the most common form of hypertension among young males but the clinical significance of this condition is still controversial. In a general male population, it has been shown that elevated pulse pressure has an important predictive capacity for cardiovascular disease among people  $\geq 60$  years, while among people  $< 60$  years of age, pulse pressure only had a marginal predictive value.
- One main confounding factor is the strong white-coat effect often observed in young ISH subjects

# Aim of the study

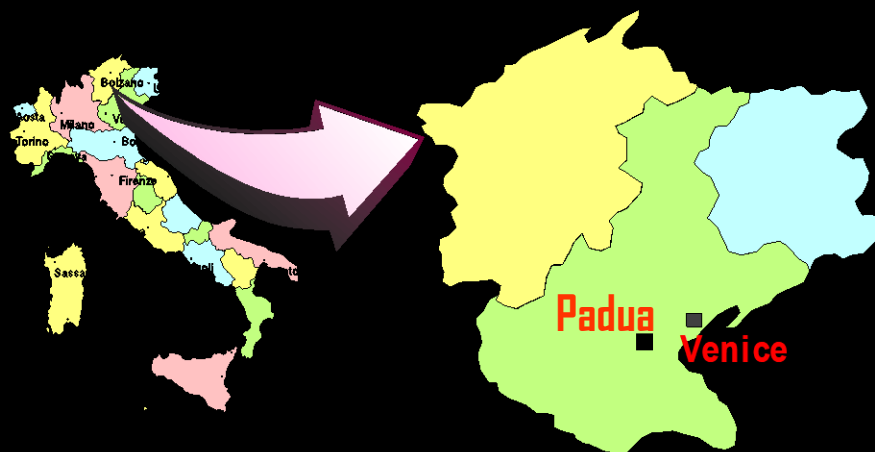
- The aim of this study was to investigate the risk of hypertension needing pharmacological treatment in ISH of the young identified with ambulatory 24h blood pressure



# HARVEST\*

## Hypertension and Ambulatory Recording Venetia Study

### Participating Centres



Belluno  
Conegliano V.  
Cremona  
Dolo  
Mirano  
Padova Cl.  
Padova S.  
Pieve di Sacco  
Pordenone  
Portogruaro  
Rovereto  
Rovigo  
S. Daniele del F.  
S. Donà di Piave  
Trento  
Treviso  
Vittorio Veneto

### SUBJECTS

- ① Age: 18-45 years
- ① SBP: 140-159 mmHg
- ① DBP: 90-99 mmHg
- ① Never treated

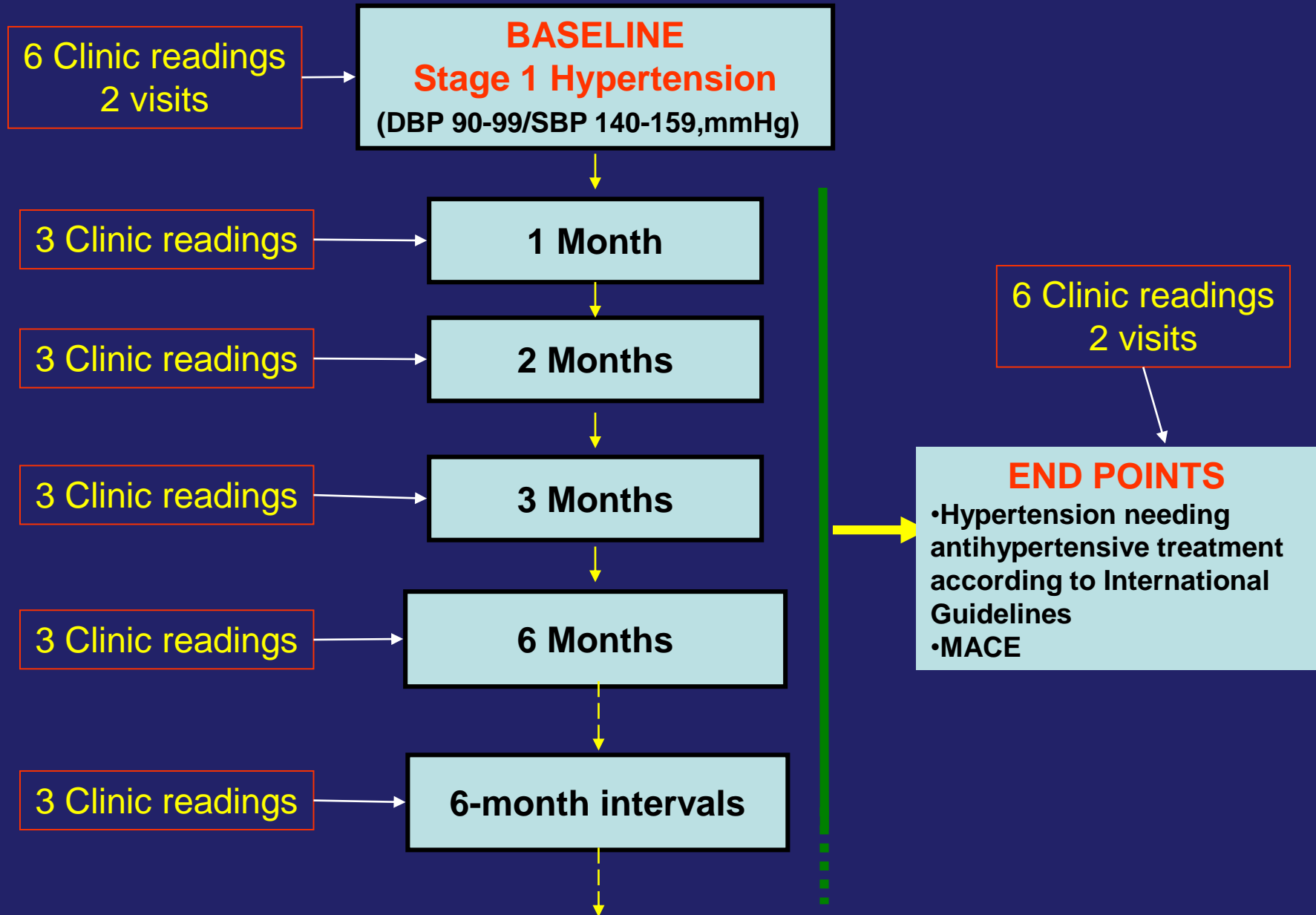
### METHODS

- ① Ambulatory BP Monitoring
- ① Echocardiography
- ① Low-level 24-h Urinary Albumin

\*Study initiated in 1990

# HARVEST Study Protocol

## Blood Pressure and Heart Rate Measurement



# Subjects' classification

- Participants were classified as having normotension (NT, N=269), ISH (N=209), DH, (N=277) or SDH (N=451) on the basis of their average 24h BP.
- NT was defined as a systolic BP <130 mm Hg and diastolic BP <80 mm Hg,
- ISH as a systolic BP > 130 mm Hg and diastolic BP <80 mm Hg,
- DH as a diastolic BP > 80 mm Hg and a systolic BP <130 mm Hg
- SDH was defined as a diastolic BP > 80 mm Hg and a systolic BP > 130 mm Hg.
  
- The 97 mmHg partition value was used to distinguish between subjects with high and with low 24h mean BP (diastolic BP + 1/3 pulse pressure).

# Baseline characteristics of 1206 study participants

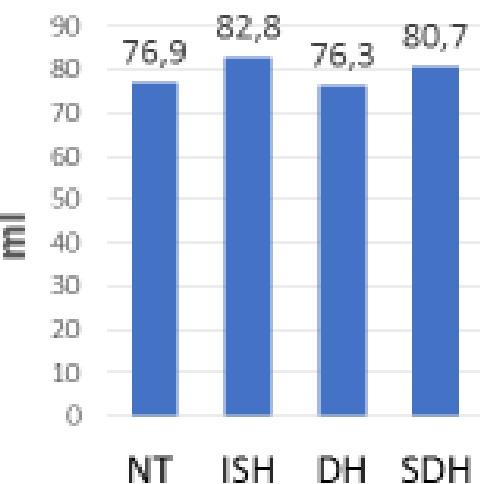
Variable	Normal 24h BP	ISH	DH	SDH	P value
Age, years	32.4±8.4	27.5±7.8	35.5±7.7	34.5±8.3	<0.001*
Sex (M), %	69.5	89.9	59.6	74.7	<0.0001‡
BMI, kg/m <sup>2</sup>	25.0±3.7	25.3±2.9	25.7±3.7	25.5±3.2	0.20
Smokers, %	17.8	24.4	17.0	23.9	0.043‡
Active in sports, %	28.2	35.4	15.9	21.1	<0.0001‡
SBP, mmHg	143.3±9.9	147.9±11.4	142.6±10.0	147.4±10.2	<0.001
DBP, mmHg	92.0±6.0	90.5±6.3	94.7±4.8	95.1±5.0	<0.001
PP, mmHg	51.3±10.7	57.3±12.8	47.9±9.6	52.3±9.9	<0.001
HR, bpm	75.7±9.3	73.1±9.8	75.7±10.1	74.0±9.2	0.018
24-h SBP, mmHg	120.0±7.0	137.4±5.7	123.4±5.1	139.6±7.4	<0.001
24-h DBP, mmHg	73.6±5.4	73.8±5.4	84.8±3.8	87.9±5.3	<0.001
24-h MBP, mmHg	89.1±4.5	95.0±4.0	97.7±3.4	105.1±4.8	<0.001
24-h PP, mmHg	46.3±8.3	63.7±8.2	38.6±5.5	51.7±7.8	<0.001
24-h HR, mmHg	71.7±8.2	69.9±7.5	75.1±7.8	73.6±8.1	<0.001
SBP dip, %	13.0±5.9	12.9±6.9	12.2±6.2	12.4±6.5	0.27
DBP dip, %	13.8±7.7	12.4±9.0	14.3±6.8	13.6±7.4	0.26
HR dip, %	16.3±8.3	17.3±8.8	16.0±7.7	16.1±8.1	0.84

Data are mean±SD. P values are adjusted for age and sex. \* adjusted for sex; ‡ unadjusted; ISH indicates isolated systolic hypertension; DH, isolated diastolic hypertension; SDH, systolic-diastolic hypertension; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; MBP, mean blood pressure; PP pulse pressure; HR, heart rate; BP Dip, nocturnal blood pressure decline; HR Dip, nocturnal heart rate decline; WCE, white-coat effect.

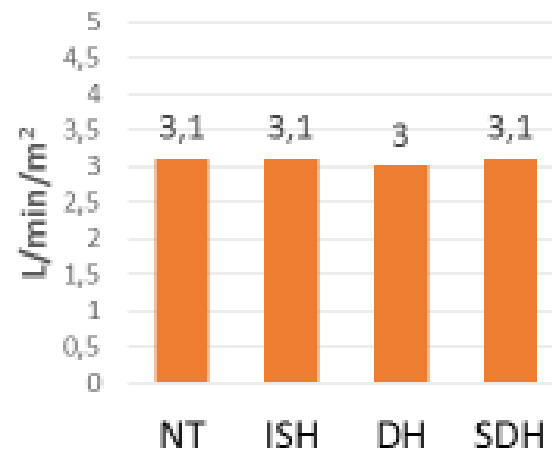
# Baseline hemodynamic variables in 826 study participants according to hypertension subtype

stroke volume

P=0.017

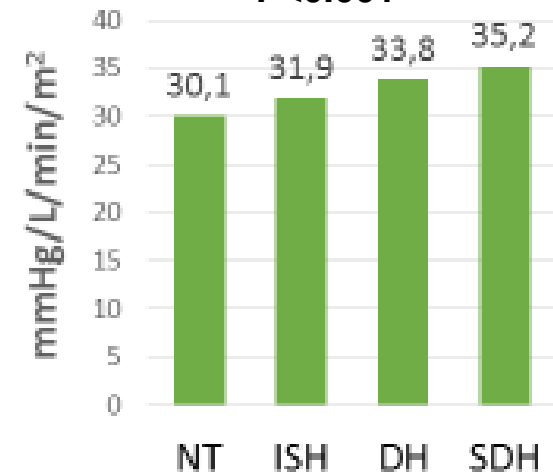


cardiac index



TPR

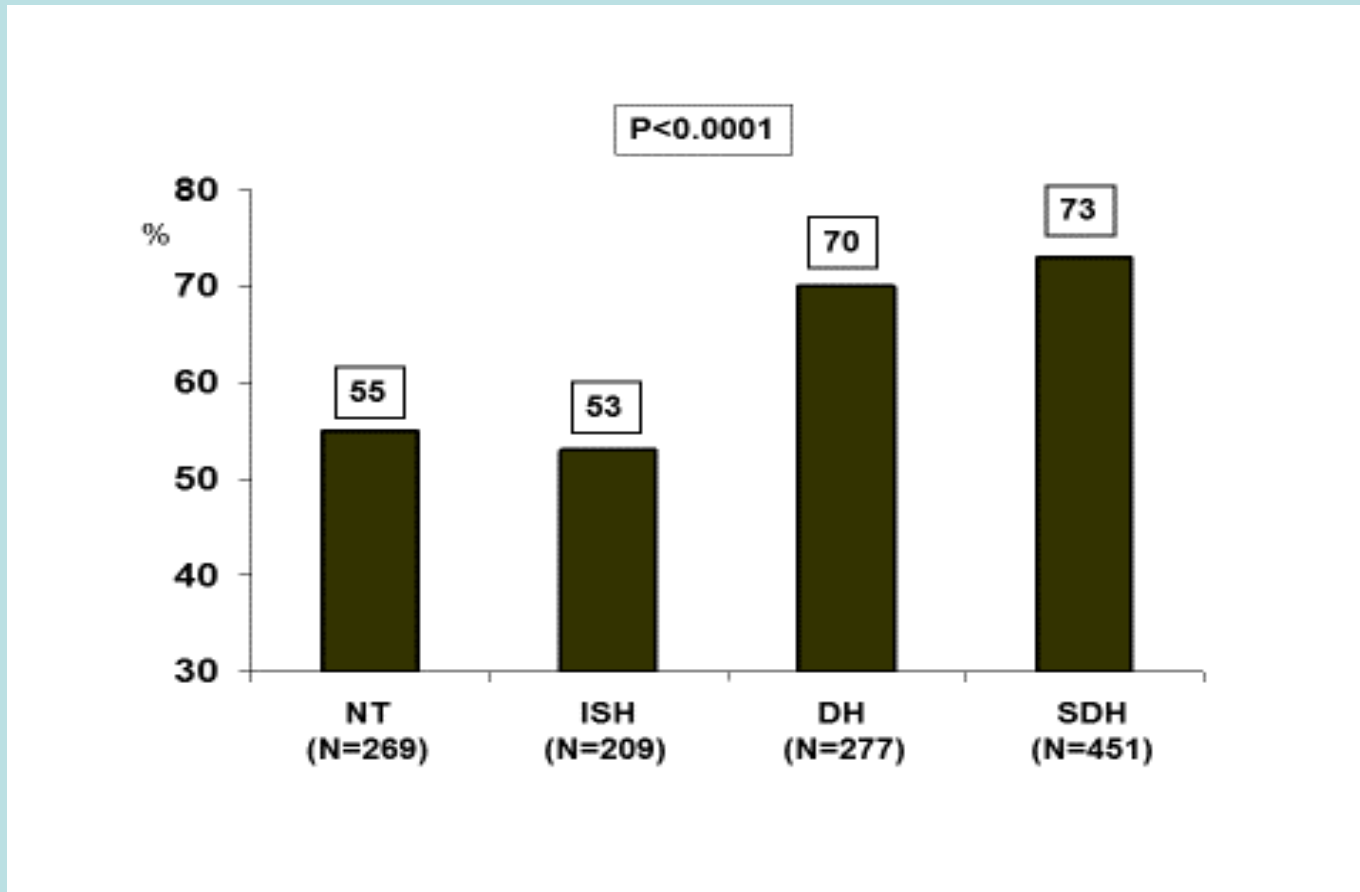
P<0.001



Data are mean±SEM and are adjusted for age and sex. ISH indicates isolated systolic hypertension; DH, isolated diastolic hypertension; SDH, systolic-diastolic hypertension; BP, blood pressure.

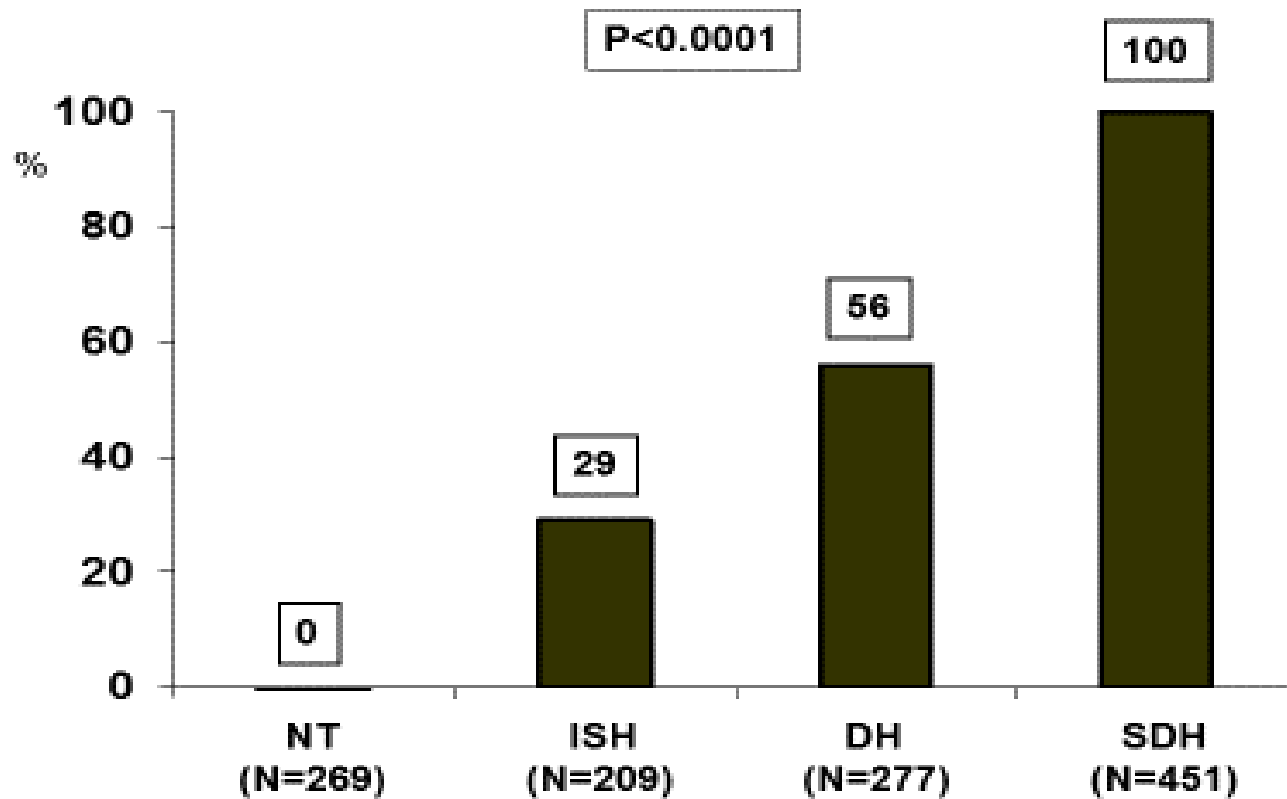


Frequency of incident hypertension needing pharmacological treatment during a 11.5 year follow-up in 1206 study participants according to hypertension subtype.



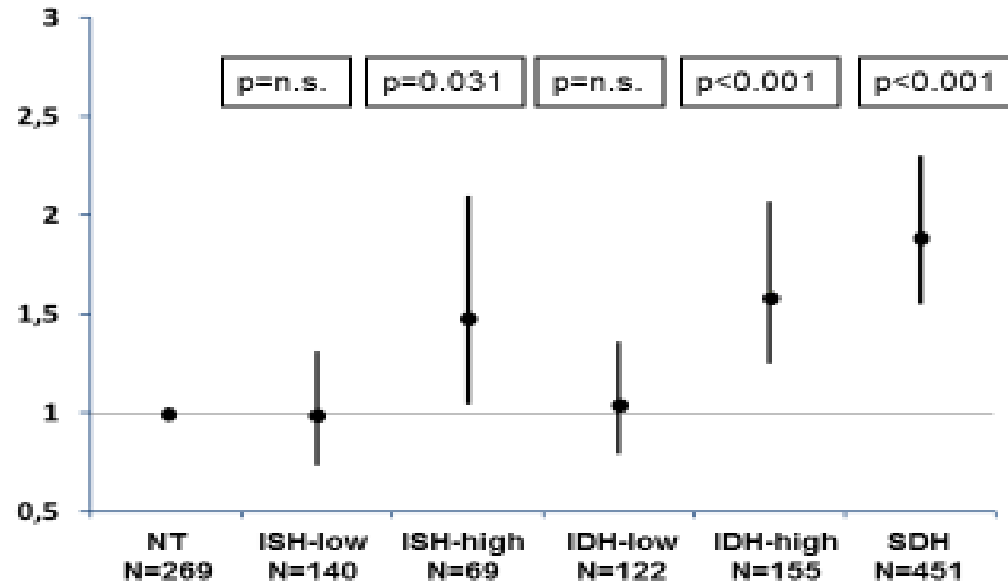
NT indicates subjects with normal 24h mean blood pressure; ISH, isolated systolic hypertension; DH, isolated diastolic hypertension; SDH, systolic-diastolic hypertension

## Frequency of high 24h mean blood pressure ( $\geq 97$ mmHg) in 1206 study participants according to hypertension subtype



NT indicates subjects with normal 24h mean blood pressure; ISH, isolated systolic hypertension; DH, isolated diastolic hypertension; SDH, systolic-diastolic hypertension.

Adjusted hazard ratios for hypertension needing pharmacological treatment in 1206 study participants grouped according to hypertension subtype. Subjects with isolated systolic hypertension and isolated diastolic hypertension were further divided into two groups with low ( $\leq 97$  mmHg) or high ( $\geq 97$  mmHg) 24h mean blood pressure.



The risk was calculated from a multivariable Cox regression also including age, gender, body mass index, 24h heart rate, parental history for hypertension, lifestyle factors, serum glucose, total cholesterol, systolic and diastolic blood pressure white-coat effects, and systolic blood pressure, diastolic blood pressure, and heart rate nocturnal dips. NT indicates subjects with normal 24h mean blood pressure; ISH, isolated systolic hypertension; DH, isolated diastolic hypertension; SDH, systolic-diastolic hypertension

# CONCLUSIONS

- The present data show that in young individuals ISH identified with ambulatory BP monitoring does not imply a higher risk of developing hypertension needing treatment in later life.
- 24-hour mean BP is the main predictor of future hypertension in this age range.