CHU de Poitiers

Université de Poitiers

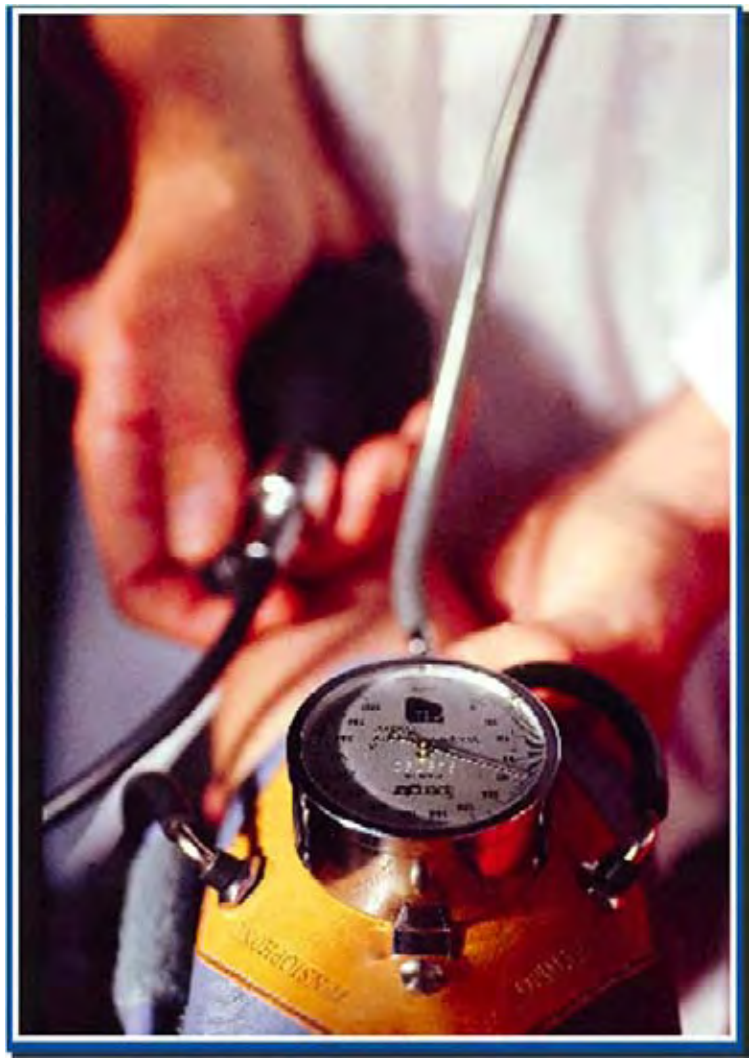
*European Society of Hypertension Excellence Centre*

# Mesures ambulatoires de la pression artérielle : - MAPA des 24h - Automesures

Philippe Sosner, Cardiologie, Centre de prévention (CPMCV)

DIU HTA, Poitiers, le 27 janvier 2012

# Office BP measurement



- Allow the patients to sit for several minutes in a quiet room before beginning BP measurements
- Take at least two measurements spaced by 1–2 minutes, and additional measurements if the first two are quite different
- Use a standard bladder (12–13 cm long and 35 cm wide) but have a larger and a smaller bladder available for fat and thin arms, respectively. Use the smaller bladder in children
- Have the cuff at the heart level, whatever the position of the patient
- Use phase I and V (disappearance) Korotkoff sounds to identify systolic and diastolic BP, respectively
- Measure BP in both arms at first visit to detect possible differences due to peripheral vascular disease. In this instance, take the higher value as the reference one
- Measure BP 1 and 5 min after assumption of the standing position in elderly subjects, diabetic patients, and in other conditions in which postural hypotension may be frequent or suspected
- Measure heart rate by pulse palpation (at least 30 sec) after the second measurement in the sitting position

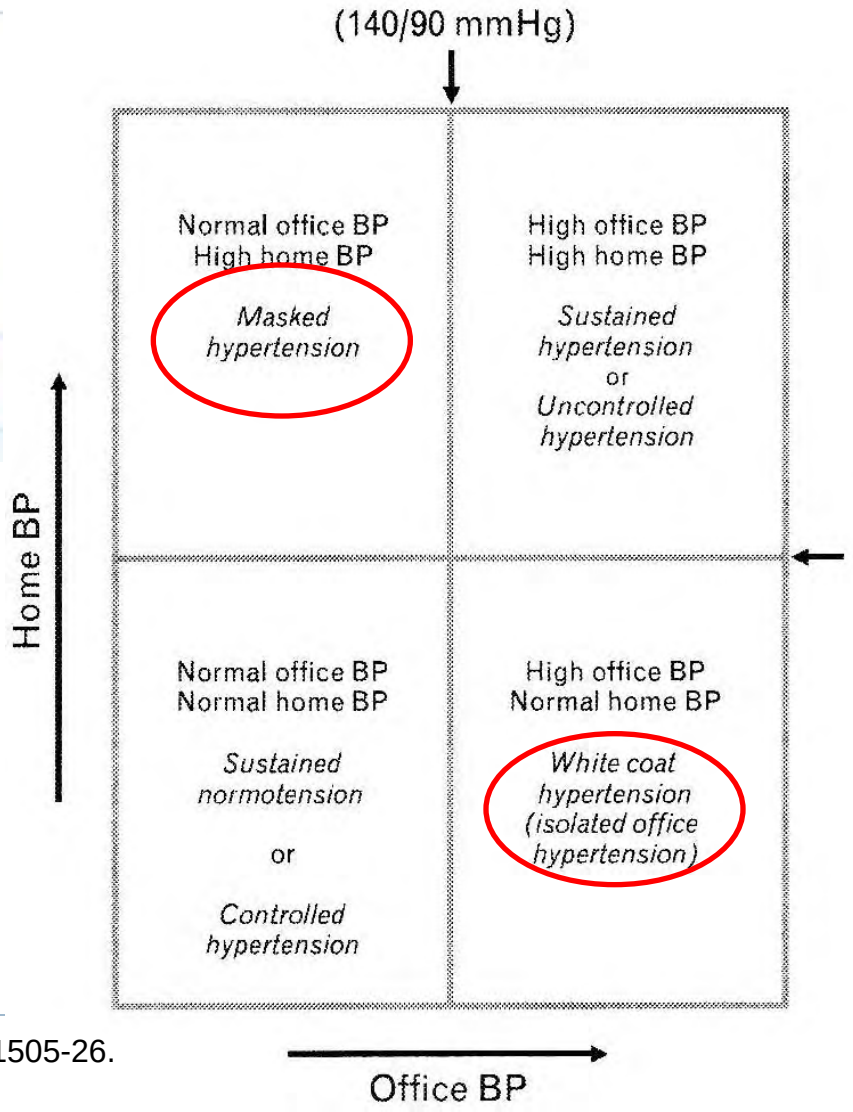
**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the ESH and of the ESC*. Journal of Hypertension 2007; 25: 1105-87.

# Office BP thresholds

| Blood pressure (mmHg) | | | | | |
|---|---|---|---|---|---|
| Other risk factors OD or disease | Normal SBP 120–129 or DBP 80–84 | High normal SBP 130–139 or DBP 85–89 | Grade 1 HT SBP 140–159 or DBP 90–99 | Grade 2 HT SBP 160–179 or DBP 100–109 | Grade 3 HT SBP ≥180 or DBP ≥110 |
| No other risk factors | No BP intervention | No BP intervention | Lifestyle changes for several months then drug treatment if BP uncontrolled | Lifestyle changes for several weeks then drug treatment if BP uncontrolled | Lifestyle changes + Immediate drug treatment |
| 1–2 risk factors | Lifestyle changes | Lifestyle changes | Lifestyle changes for several weeks then drug treatment if BP uncontrolled | Lifestyle changes for several weeks then drug treatment if BP uncontrolled | Lifestyle changes + Immediate drug treatment |
| ≥3 risk factors, MS or OD | Lifestyle changes | Lifestyle changes and consider drug treatment | Lifestyle changes + Drug treatment | Lifestyle changes + Drug treatment | Lifestyle changes + Immediate drug treatment |
| Diabetes | Lifestyle changes | Lifestyle changes + Drug treatment | | | |
| Established CV or renal disease | Lifestyle changes + Immediate drug treatment | Lifestyle changes + Immediate drug treatment | Lifestyle changes + Immediate drug treatment | Lifestyle changes + Immediate drug treatment | Lifestyle changes + Immediate drug treatment |

**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the ESH and of the ESC*. Journal of Hypertension 2007; 25: 1105-87.

# Limits of office BP




J Hypertens. 2008;26:1505-26.

# Masked HT: prevalence

**Table 1. Prevalence of Masked Hypertension in Various Studies**

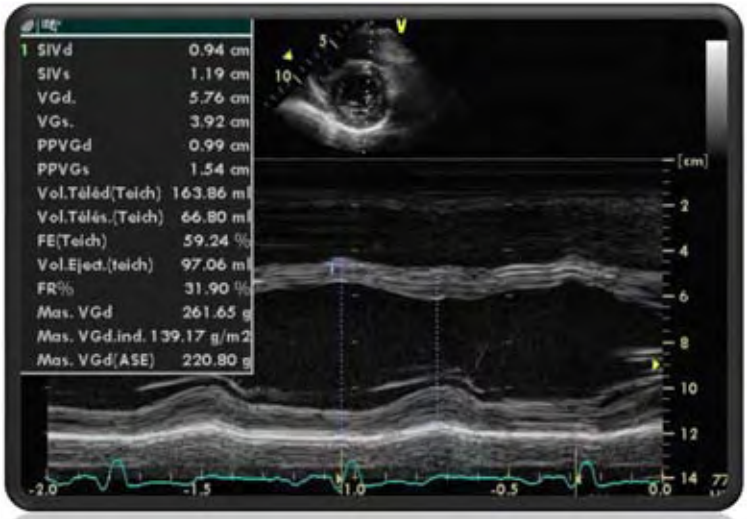
| Author | Population | *N* | ABP criterion | Prevalence (%) |
|---|---|---|---|---|
| Imai *et al.* (*47*) | Population Ohasama | 969 | 133/78 | 10 |
| Sega *et al.* (*39*) | Population PAMELA | 3,200 | 125/79 | 9 |
| Björklund *et al.* (*48*) | Population 70-year-old men | 578 | 135/85 | 14 |
| Liu *et al.* (*9*) | Healthy volunteers | 234 | 135/85 | 21 |
| Selenta *et al.* (*33*) | Healthy volunteers | 319 | 135/85 | 23 |

ABP, ambulatory blood pressure.

- **Pickering TG**, Eguchi K, Kario K. *Masked hypertension: a review.* Hypertens Res. 2007;30:479-88.

# Masked HT: consequences

- Prevalence: 16.8% (13.0-20.5%), 7% in children, 19% in adults, no significant differences between Home-BPM (21.1%) and 24h-ABPM (16.8%) (p=0.42).
- Consequences / LVH:
  - Normotensive: 98 g/m²
  - Masked HT: 110 g/m²
  - Hypertensive patients: 109 g/m²




**Verberk WJ**, Kessels AG, de Leeuw PW. *Prevalence, causes, and consequences of masked hypertension: a meta-analysis.* Am J Hypertens. 2008;21:969-75.

# Intérêt de la MAPA des 24h

- **Mesure automatique**
  - supprime la réaction d'alarme type « blouse blanche »
  - sans générer un autre artefact lié à l'appareil

  *(PARATI Hypertension 1985 et J. of Hypertension 1985)*
- **Mesures répétitives sur une période prolongée**
  - fournit un cycle nycthéméral entier
  - au lieu d'un échantillon isolé non représentatif de l'ensemble
- **Mesure ambulatoire**
  - le patient est dans son contexte socio-professionnel
  - non dans l'environnement artificiel d'un cabinet médical

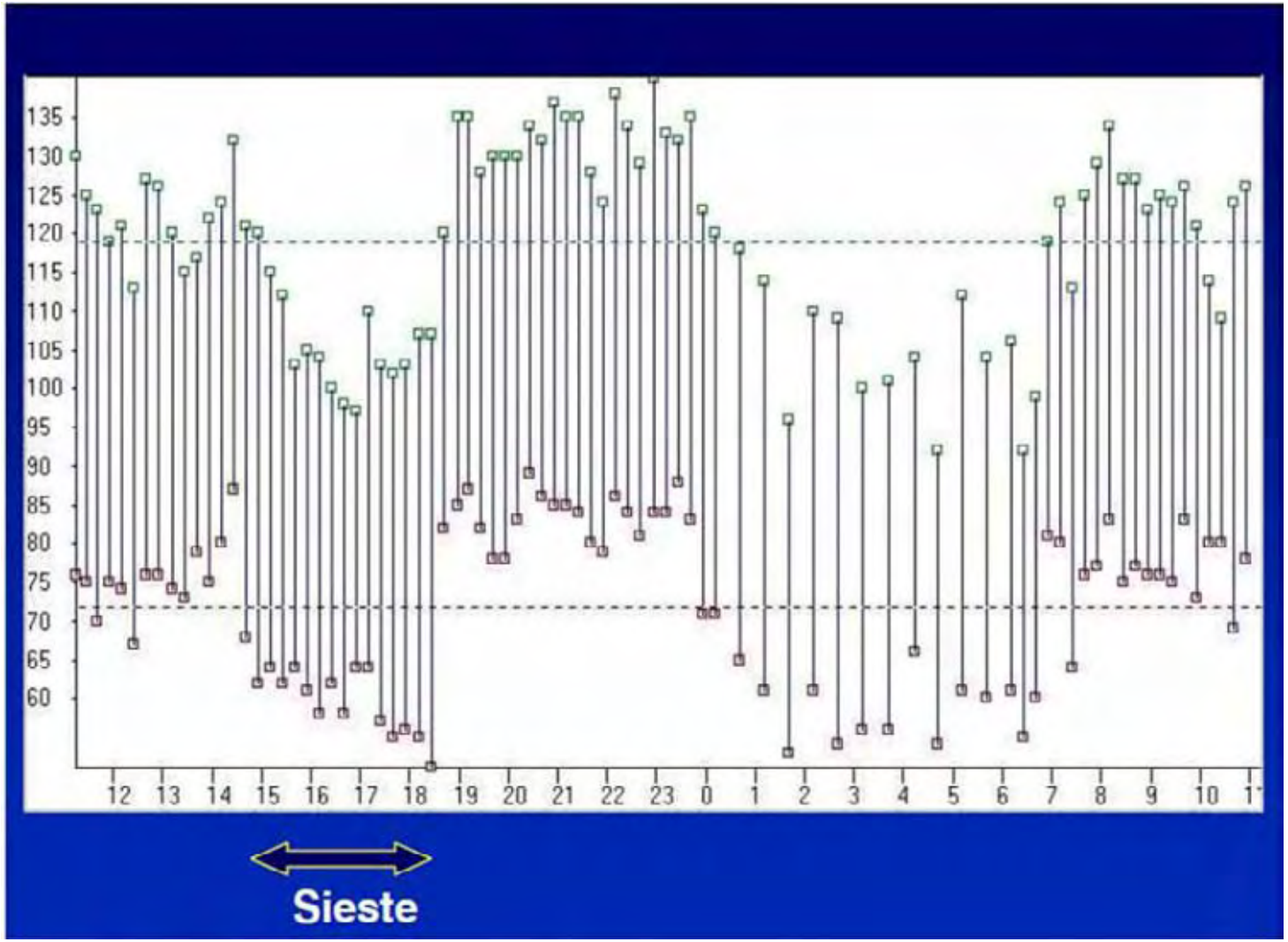
*With permission from Herpin D.*

# BP thresholds *(mm Hg)* for definition of hypertension

| | SBP | DBP |
|---|---|---|
| Office or clinic | **140** | **90** |
| 24-hour | 125 – **130** | **80** |
| Day | 130 – **135** | **85** |
| Night | **120** | **70** |
| Home | 130 – **135** | **85** |

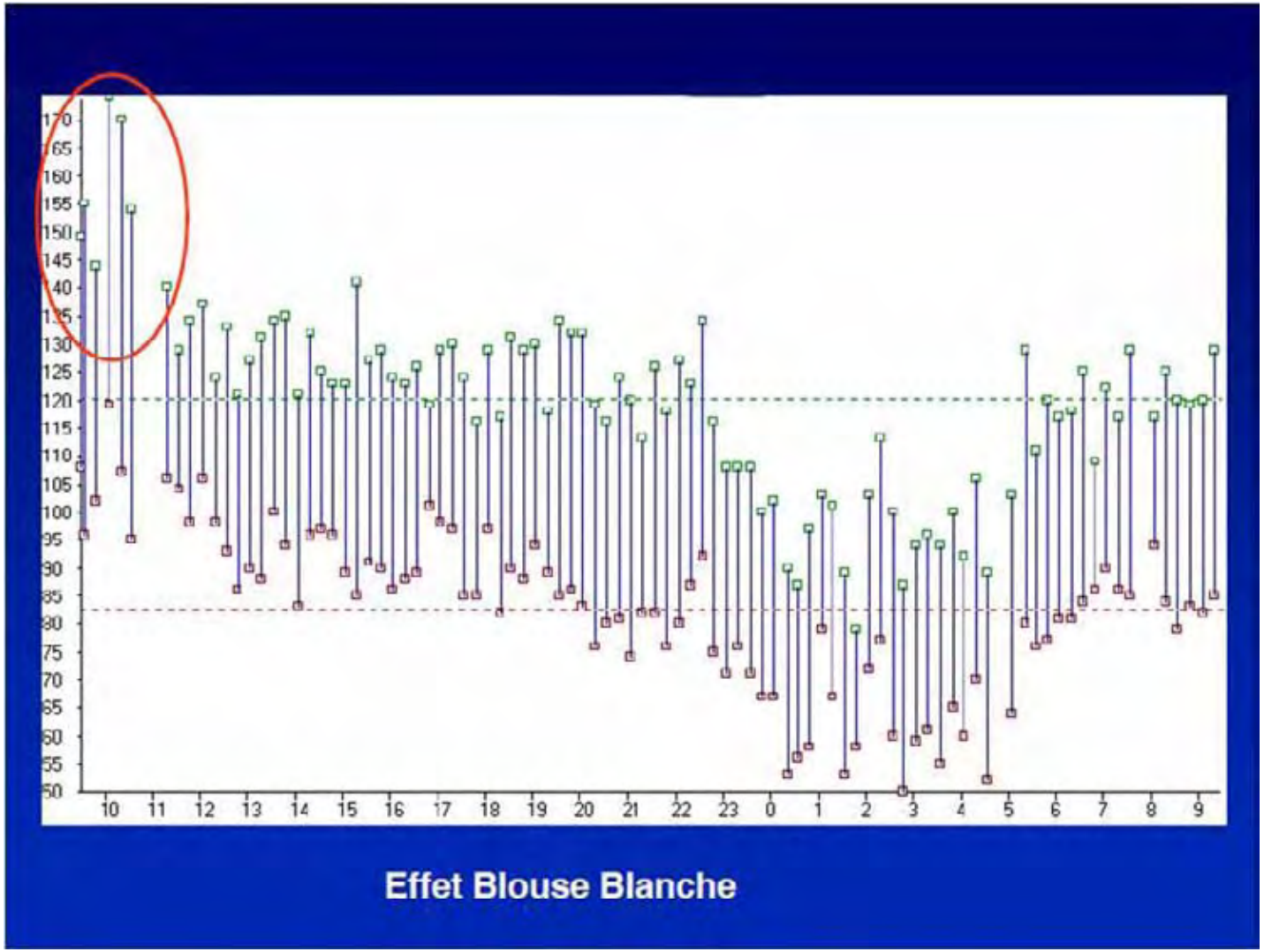
**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the ESH and of the ESC*. Journal of Hypertension 2007; 25: 1105-87.

# Intérêt de la MAPA des 24h



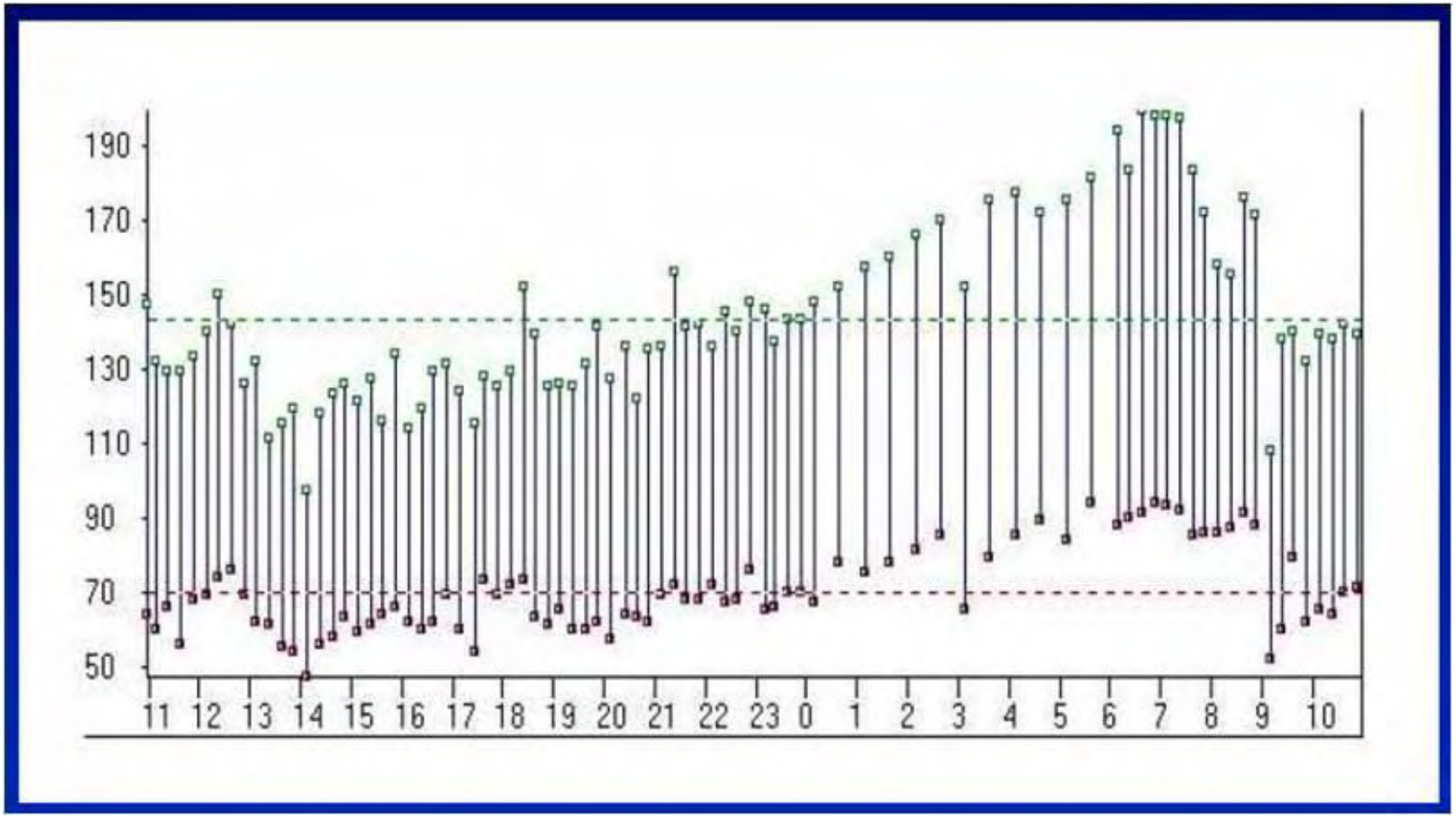

- *With permission from Herpin D.*

# Effet blouse-blanche




*With permission from Herpin D.*

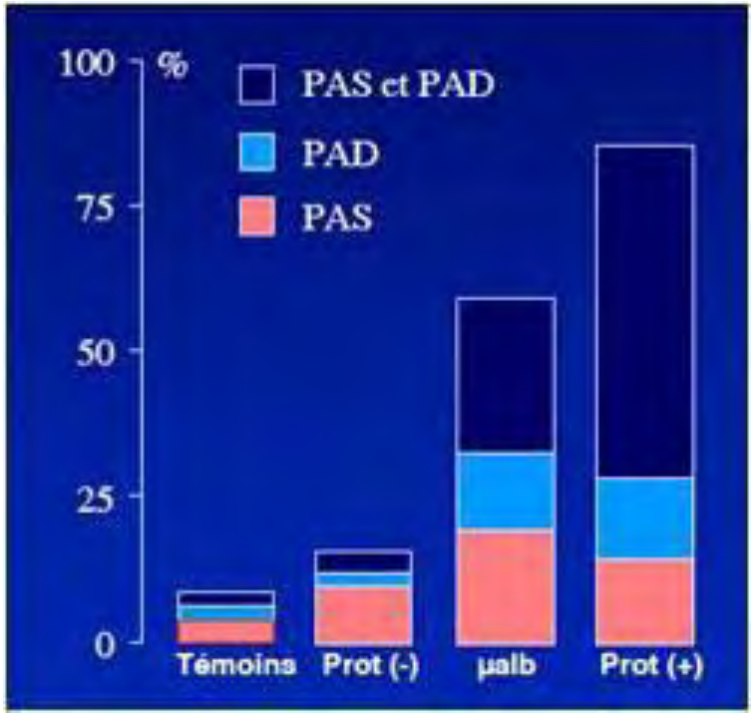
# Non-dipper
# Inversion du rythme nycthéméral



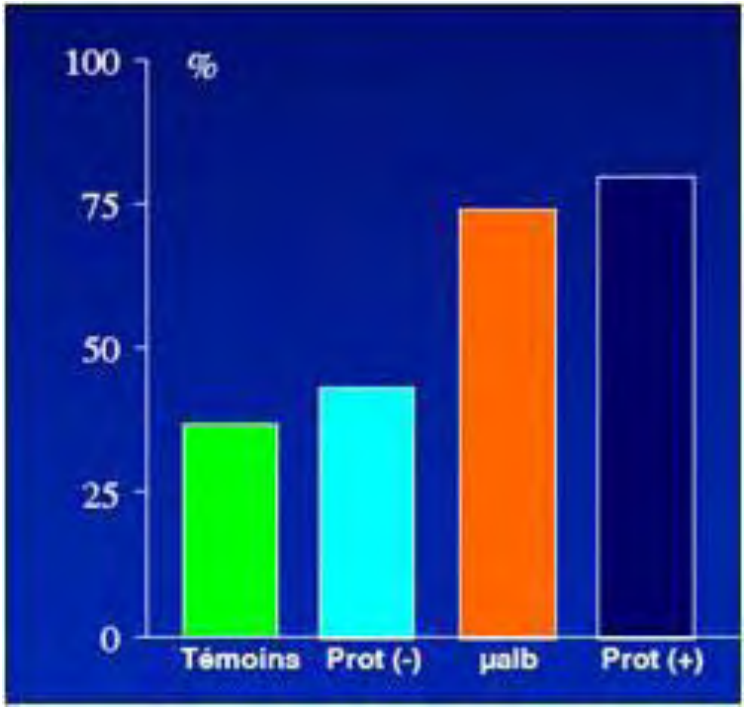

*With permission from Herpin D.*

# Pourcentage de diabétiques non-dipper

## Diabète type 1



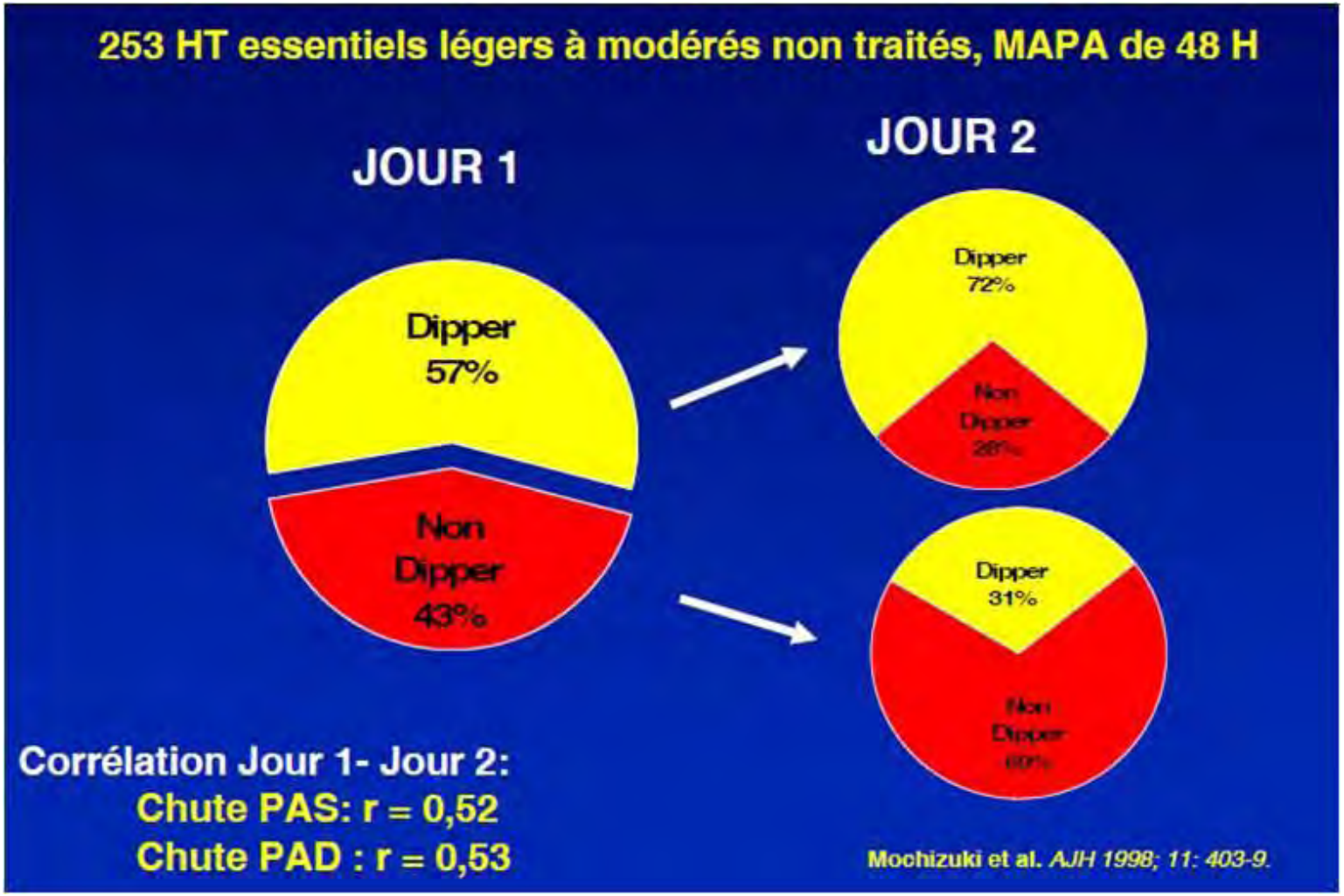

## Diabète type 2




LURBE E et al. J Hypertension 2001;19:1421-28.

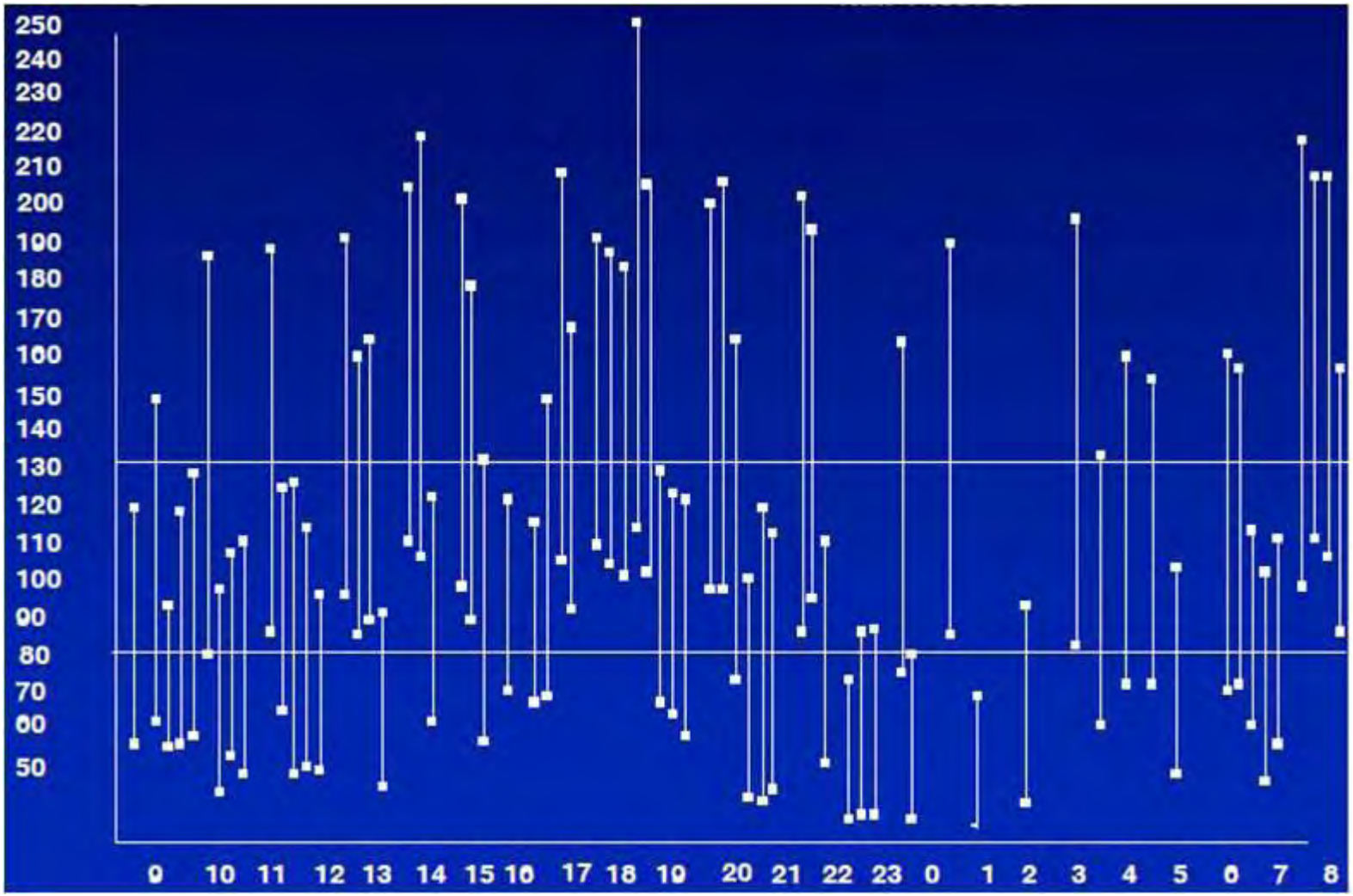
EQUILUZ-BRUCK S et al. Am J Hypertens 1996;9:1139-43.

# Non-dipper Reproductibilité



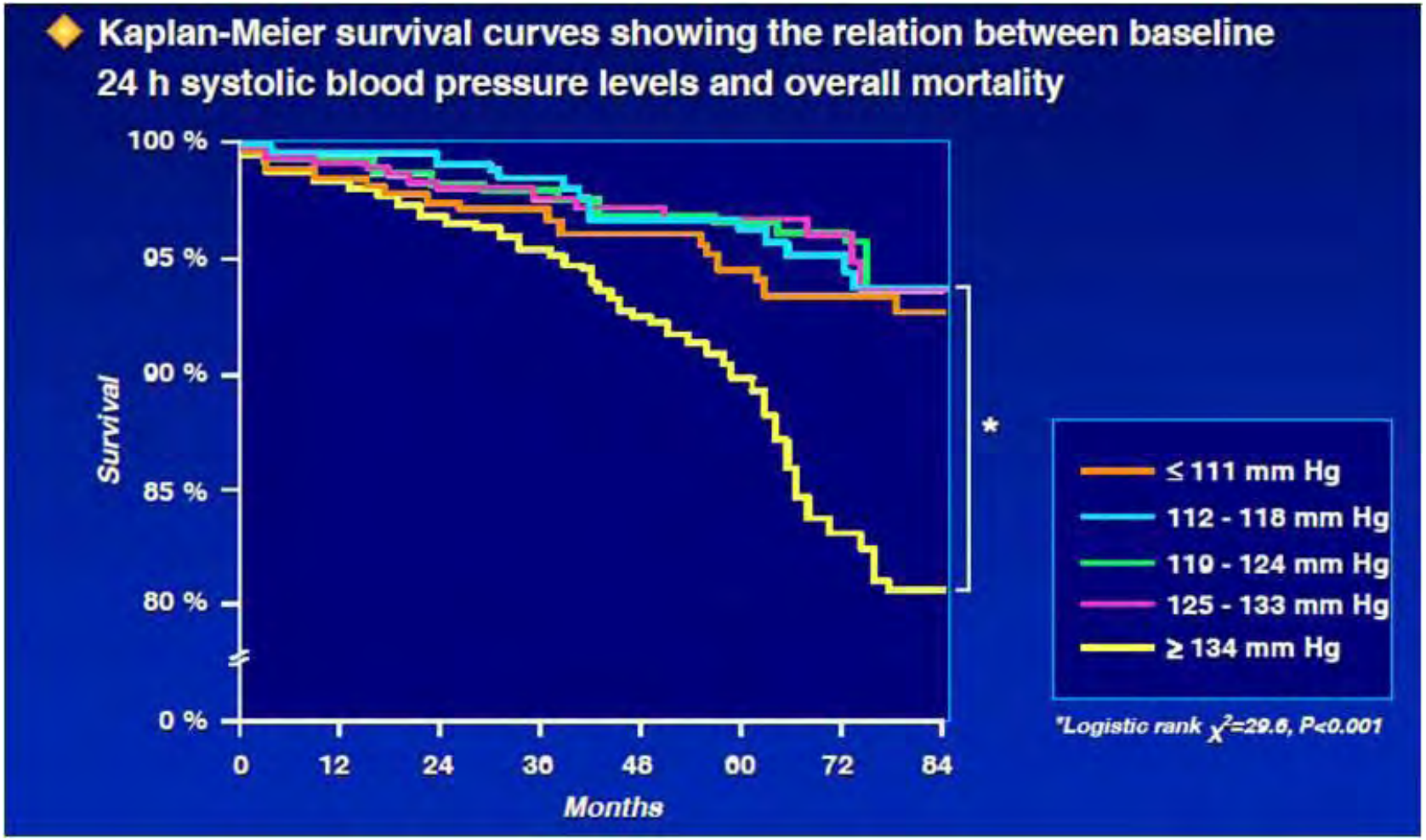

*With permission from Herpin D.*

# HTA paroxystique : Phéochromocytome



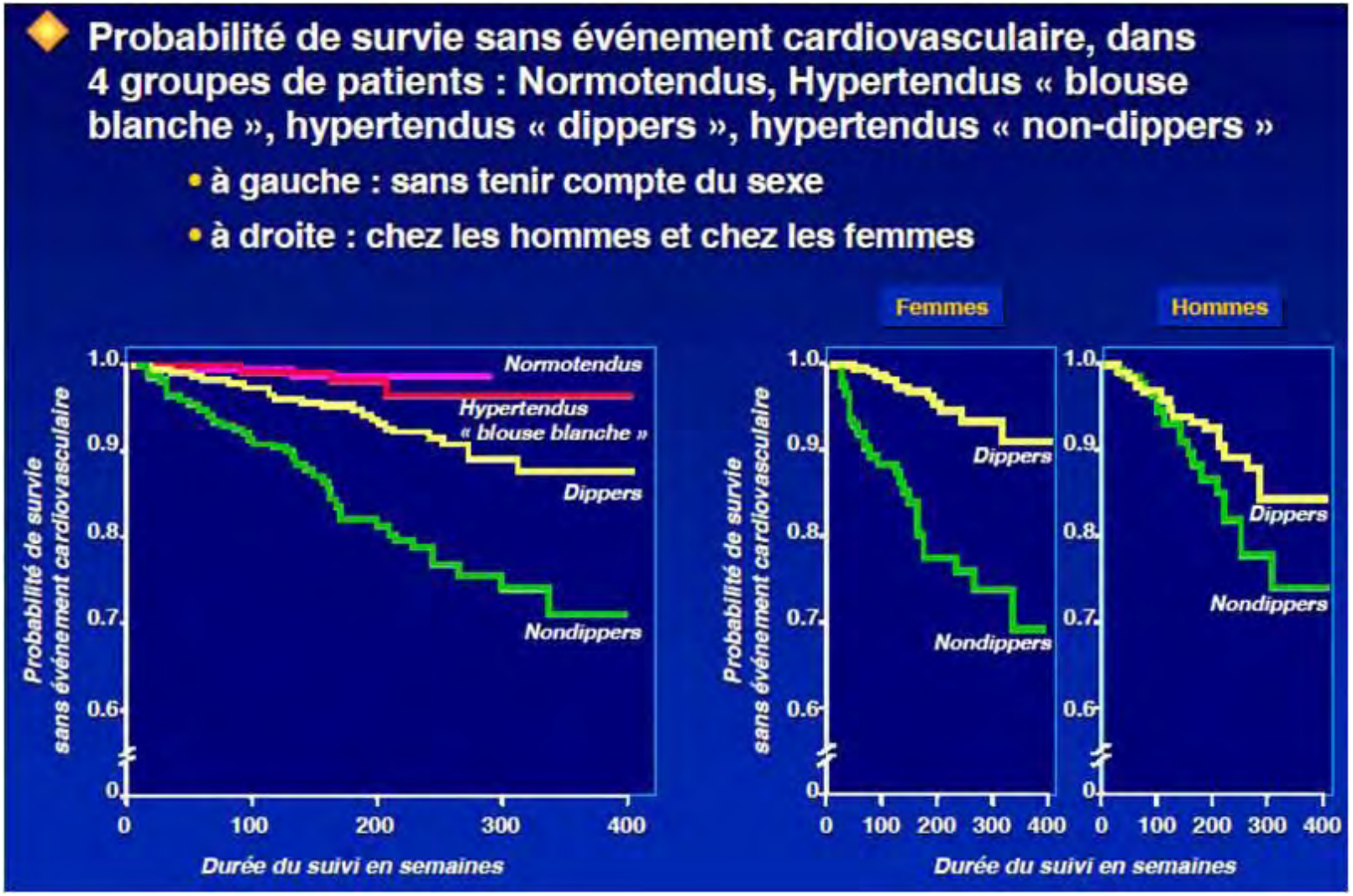

*With permission from Herpin D.*

# Valeur pronostique de la MAPA



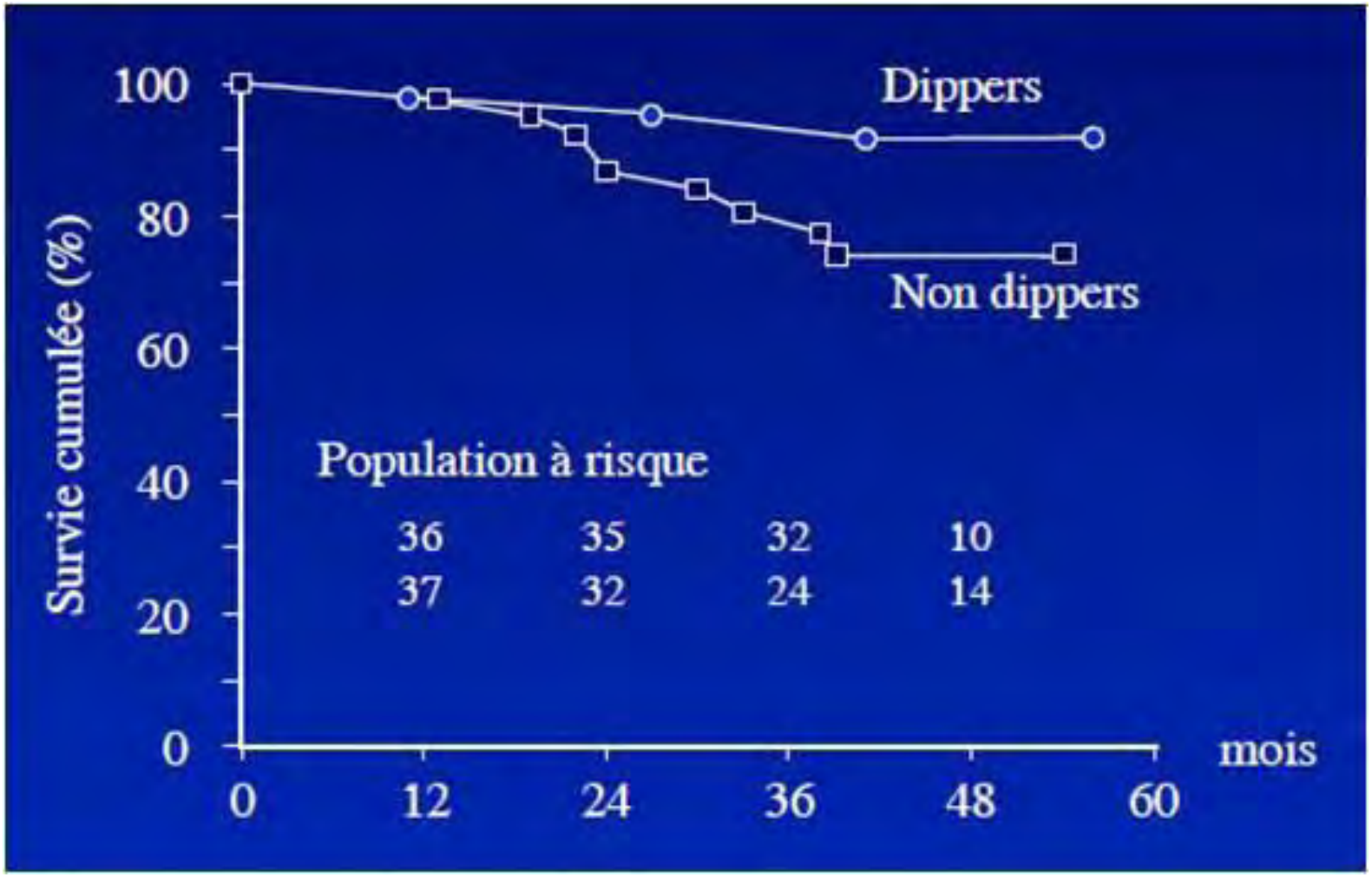

- Ohkubo T. et al, J. Hypertens., 1997

# Valeur pronostique de la MAPA




D'après Verdecchia, Hypertension 1994

# Survie des diabétiques et altérations du rythme tensionnel




STURROCK NDC et al. Diabet Med 2000;17:360-4.

# ESH/ESC 2007
# 24h-ABPM

- Although office BP should be used as reference, ambulatory BP may improve prediction of cardiovascular risk in untreated and treated patients
- Normal values are different for office and ambulatory BP
- 24-h ambulatory BP monitoring should be considered, in particular, when
  - considerable variability of office BP is found over the same or different visits
  - high office BP is measured in subjects otherwise at low total cardiovascular risk
  - there is a marked discrepancy between BP values measured in the office and at home
  - resistance to drug treatment is suspected
  - hypotensive episodes are suspected, particularly in elderly and diabetic patients
  - office BP is elevated in pregnant women and pre-eclampsia is suspected

**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the ESH and of the ESC*. Journal of Hypertension 2007; 25: 1105-87.

# ESH/ESC 2007
# HBPM

**Home BP**

- Self-measurement of BP at home is of clinical value and its prognostic significance is now demonstrated. These measurements should be encouraged in order to:
  - provide more information on the BP lowering effect of treatment at trough, and thus on therapeutic coverage throughout the dose-to-dose time interval
  - improve patient's adherence to treatment regimens
  - there are doubts on technical reliability/ environmental conditions of ambulatory BP data
- Self-measurement of BP at home should be discouraged whenever:
  - it causes anxiety to the patient
  - it induces self-modification of the treatment regimen
- Normal values are different for office and home BP (Table 5)

**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the ESH and of the ESC*. Journal of Hypertension 2007; 25: 1105-87.

# AHA/ASH/PCNA 2008

**Table 2. Summary of Recommendations for HBPM**

| Procedure | Recommendation |
|---|---|
| Technical aspects of BP measurement | Measure BP: |
| | No tobacco or caffeine for 30 minutes preceding measurement |
| | After 5 minutes of rest |
| | With arm at heart level; back supported and feet flat on the ground |
| | On nondominant arm (or arm with the highest BP) |
| BP monitor | Use a fully automated device with an upper arm cuff that has been validated by British Hypertension Society, Association for the Advancement of Medical Instrumentation, or International Protocol for the Validation of Automated BP Measuring Devices |
| | Monitors with memory that are able to store measurements are preferred |
| Training of patients | Patients should be trained by their healthcare provider, and the monitor readings should be checked against mercury |
| | Education content: hypertension and cardiovascular risk, BP measurement procedure, use of a validated monitor, cuff size, protocols for measuring BP, interpretation of BP readings, and monitor for their use only |
| | Reevaluate patient technique and accuracy of the device annually |
| Target BP goal | 135/85 mm Hg or 130/80 mm Hg if patient has diabetes, coronary heart disease, or chronic kidney disease (*Class IIa; Level of Evidence B*) |
| Frequency and schedule of measurement | Initial values (when patients begin HBPM at home): |
| | Base decisions on a 7-day measurement period with 2–3 measurements each morning and 2 to 3 measurements in the evening at prestipulated times (an average of 12 morning and evening measurements) |
| | Exclude first-day measurements from the analyses; take average of these values as the reference parameter in the subsequent dose-titration phase |
| | Dose-titration phase (titration of initial dose and adjustment of therapy): |
| | All measurements should be made under identical conditions and at the same times of day as the initial values |
| | HBPM data should be ascertained as trough values (ie, before medication taken) in the morning and again at night |
| | Use the average of BPs measured after 2 to 4 weeks to assess the effect of treatment |
| | Long-term observation: |
| | For stable normotensive (controlled) patients, patients should conduct HBPM a minimum of 1 week per quarter (an average of 12 morning and evening measurements under conditions described above) |
| | Measurement should be made more frequently in patients with poor compliance |

**Pickering TG**, Miller NH, Ogedegbe G, Krakoff LR, Artinian NT, Goff D; American Heart Association; American Society of Hypertension; Preventive Cardiovascular Nurses Association. *Call to action on use and reimbursement for home blood pressure monitoring: executive summary: a joint scientific statement from the American Heart Association, American Society Of Hypertension, and Preventive Cardiovascular Nurses Association.* Hypertension. 2008;52:1-9.

# ESH 2008

## European Society of Hypertension guidelines for blood pressure monitoring at home: a summary report of the Second International Consensus Conference on Home Blood Pressure Monitoring

Gianfranco Parati[a], George S. Stergiou[b], Roland Asmar[c], Grzegorz Bilo[a], Peter de Leeuw[d], Yutaka Imai[e], Kazuomi Kario[f], Empar Lurbe[g], Athanasios Manolis[h], Thomas Mengden[i], Eoin O'Brien[j], Takayoshi Ohkubo[k], Paul Padfield[l], Paolo Palatini[m], Thomas Pickering[n], Josep Redon[o], Miriam Revera[a], Luis M. Ruilope[p], Andrew Shennan[q], Jan A. Staessen[r], Andras Tisler[s], Bernard Waeber[t], Alberto Zanchetti[u] and Giuseppe Mancia[v], on behalf of the ESH Working Group on Blood Pressure Monitoring

**Parati G**, Stergiou GS, Asmar R, Bilo G, de Leeuw P, Imai Y, Kario K, Lurbe E, Manolis A, Mengden T, O'Brien E, Ohkubo T, Padfield P, Palatini P, Pickering T, Redon J, Revera M, Ruilope LM, Shennan A, Staessen JA, Tisler A, Waeber B, Zanchetti A, Mancia G; **ESH Working Group on Blood Pressure Monitoring**. *European Society of Hypertension guidelines for blood pressure monitoring at home: a summary report of the Second International Consensus Conference on Home Blood Pressure Monitoring.* J Hypertens. 2008;26:1505-26.

# Devices for HBPM: selection and validation

- Auscultatory (aneroid or mercury) devices not recommended for home monitoring except under specific circumstances (e.g. arrhythmia)
- Finger cuff devices not recommended
- Wrist cuff devices not recommended[a]
- Only validated semiautomated oscillometric arm cuff devices are recommended
- Device equivalence to be checked (same devices with different names in different countries)
- Optional small and large adult cuffs should be available[b]

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[a] Under evaluation for possible use in special conditions (elderly individual, obese people). Wrist monitors with position sensors are claimed to be more accurate.

[b] Cuff issue yet unresolved (different cuff sizes or adjustable cuff?).

J Hypertens. 2008;26:1505-26.

# User procedures

Condition of measurements

- 5 min rest, 30 min without smoking or caffeine
- Seated, back supported, arm resting on the table
- Correct cuff bladder placement
- Immobile, legs uncrossed, not talking, relaxing
- Repeated readings at 1–2 min intervals
- Results written down if devices without memory

How often and how many times to measure

- Initial assessment, assessment of treatment, and in the long-term follow-up before each clinic/office visit:
- 7 days of measurements
- Two measurements for each session
- Morning and evening readings per day (before drug intake and before eating)
- First day of each monitoring session to be discarded
- Long-term follow-up: one to two measurements per week (debated)

J Hypertens. 2008;26:1505-26.

# BP cuff bladder dimensions

Recommended dimension for BP cuff bladders in adults

British Hypertension Society

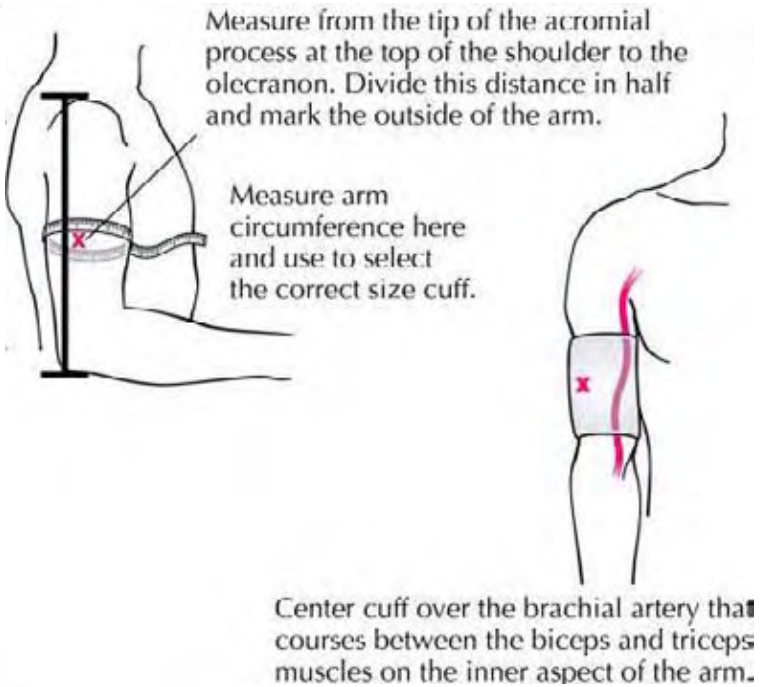
| Cuff type | For whom | Dimension (cm) |
|---|---|---|
| Small | Lean adult arms and children | 12 × 18 |
| Standard | Most adult arms | 12 × 26 |
| Large | Arms of obese patients | 12 × 40 |

American Heart Association[a]

| Cuff type | Arm circumference (cm) | Dimension (cm) |
|---|---|---|
| Small adults | 22–26 | 12 × 22 |
| Adults | 27–34 | 16 × 30 |
| Large adults | 35–44 | 16 × 36 |
| Adult thigh | 45–52 | 16 × 42 |

Recommended dimension for BP cuff bladders in children

| Age range | Width (cm) | Length (cm) | Maximum arm circumference (cm)[b] |
|---|---|---|---|
| Newborn | 4 | 8 | 10 |
| Infant | 6 | 12 | 15 |
| Child | 9 | 18 | 22 |






J Hypertens. 2008;26:1505-26.

# French recommandations

## Appliquer la règle des 3 c'est réaliser (1) :

www.automesure.com

**3**

mesures consécuti

entre le lever et le p

à quelques minut

mesures cons

entre le dî

à quelques


Et réaliser ces 2 séries de mesures,

**3**

jours de suite,

la semaine précédant la consultation.

**normale < 135/85**

# 24h-ABPM / Home-BPM

SYNTHESE

| | MIN | MOYEN | MAX |
|---|---|---|---|
| Systolique | 96 (1-02:43 | 126 | 150 (2-1( |
| Diastolique | 54 (1-03:43 | 76 | 95 (1-12 |
| PAM | 64 | 91 | 110 |
| Fréq. cardiaque | 40 | 66 | 107 |

Pourcentage des lectures systoliques supérieur aux lim
Pourcentage des lectures diastoliques supérieur aux li

Pourcentage temps pour lequel Systolique dépassait seu
Pourcentage temps pour lequel Diastolique dépassait se

PERIODE DE SYNTHESE: 7:00 à 23:0(

| | MIN | MOYEN | MAX |
|---|---|---|---|
| Systolique | 116 (1-07:13 | 133 | 150 (2-1( |
| Diastolique | 67 (1-20:13 | 82 | 95 (1-12 |
| PAM | 82 | 97 | 110 |
| Fréq. cardiaque | 55 | 73 | 107 |

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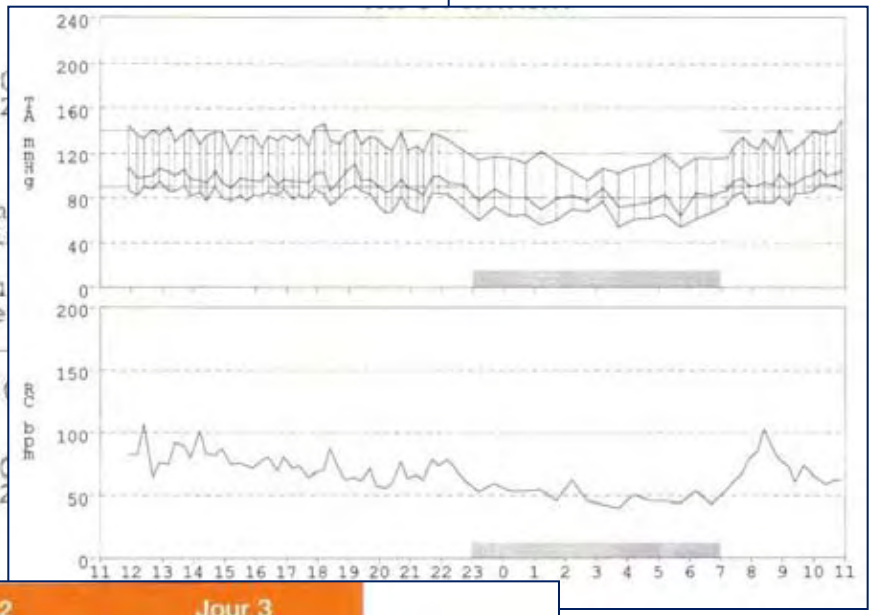


| | | Jour 1 | | Jour 2 | | Jour 3 | | |
|---|---|---|---|---|---|---|---|---|
| | | systolique | diastolique | systolique | diastolique | systolique | diastolique | |
| MATIN | mesure 1 | 129 | 80 | 135 | 82 | 124 | 70 | Moyenne systolique |
| | mesure 2 | 134 | 79 | 132 | 77 | 122 | 72 | 131 |
| | mesure 3 | 117 | 71 | 120 | 73 | 122 | 73 | |
| SOIR | mesure 1 | 136 | 73 | 139 | 74 | 138 | 80 | Moyenne diastolique |
| | mesure 2 | 136 | 67 | 135 | 75 | 141 | 76 | 74 |
| | mesure 3 | 132 | 73 | 129 | 69 | 131 | 74 | |

# Indications de l'automesure

**Box 9. Indications for HBPM in treated hypertensive patients**

All patients receiving antihypertensive medication
Evaluation of white coat hypertension
Evaluation of masked hypertension
Evaluation of resistant hypertension
To improve compliance and medical adherence
To improve hypertension control rates

J Hypertens. 2008;26:1505-26.

**Box 23 How to improve compliance to treatment**

- Inform the patient on the risk of hypertension and the benefit of effective treatment
- Provide clear written and oral instructions about treatment
- Tailor the treatment regimen to patient's lifestyle and needs
- Simplify treatment by reducing, if possible, the number of daily medicaments
- Involve patient's partner or family in information on disease and treatment plans
- Make use of self measurement of BP at home and of behavioural strategies such as reminder systems.
- Pay great attention to side effects (even if subtle) and be prepared to timely change drug doses or types if needed
- Dialogue with patient regarding adherence and be informed of his/her problems
- Provide reliable support system and affordable prices

**Guidelines Committee**. *2007 Guidelines for the Management of Arterial Hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC)*. Journal of Hypertension 2007; 25: 1105-87.

# Recommandations ESH 2008

**Box 10. Usefulness of long-term HBPM in treated hypertensive patients**

Advantages:

(1) Improved assessment of drug effects

(2) Detection of a causal relationship between adverse effects and blood pressure response to antihypertensive drugs

(3) Improvement of compliance

(4) Detection of white coat effect and masked hypertension

Shortcomings:

(1) Possible cause of anxiety

(2) Risk of self-medication

J Hypertens. 2008;26:1505-26.

# Recommandations ESH 2008

**Box 11. HBPM-related unresolved issues in special populations**

| Population | Unresolved issues |
|---|---|
| Children | • Uncertain reference values<br>• Few devices validated<br>• Home BP monitoring schedule<br>• Diagnostic role |
| Elderly | • BP variability<br>• Patient's performance/compliance |
| Obese people | • Need of validation of arm cuff and wrist devices |
| Arrhythmias | • Reliability of automated devices<br>• Usefulness of built-in software for arrhythmia indication |
| Pregnancy | • Need for specific validation of digital devices<br>• Importance of sitting position<br>• Lack of established thresholds or management algorithms |
| ESRD and diabetes | • Reduced accuracy of the oscillometric devices (due to arterial stiffness typical of these conditions?)<br>• Need to achieve a more aggressive BP target |

J Hypertens. 2008;26:1505-26.

# Chez l'enfant

**Table 4 Proposed home blood pressure thresholds for clinical use in children**

| | | Percentiles for boys ($n = 347$) | | | Percentiles for girls ($n = 420$) | |
|---|---|---|---|---|---|---|
| Height (cm) | *N* | 50th | 95th | *N* | 50th | 95th |
| 120–129 | 23 | 105/64 | 119/76 | 36 | 101/64 | 119/74 |
| 130–139 | 51 | 108/64 | 121/77 | 51 | 103/64 | 120/76 |
| 140–149 | 39 | 110/65 | 125/77 | 61 | 105/65 | 122/77 |
| 150–159 | 41 | 112/65 | 126/78 | 71 | 108/66 | 123/77 |
| 160–169 | 45 | 115/65 | 128/78 | 148 | 110/66 | 124/78 |
| 170–179 | 91 | 117/66 | 132/78 | 46 | 112/66 | 125/79 |
| 180–189 | 57 | 121/67 | 134/79 | 7 | 114/67 | 128/80 |

J Hypertens. 2008;26:1505-26.

# Chez la femme enceinte

**Table 5 Meta-analysis of 10 studies in which validation of home blood pressure monitoring devices was carried out in pregnant women with and without pre-eclampsia (PE)**

| | Auscultatory (mercury) | | Intra-arterial | |
|---|---|---|---|---|
| | Pregnancy | PE | Pregnancy | PE |
| Individuals (*n*) | 597 | 176 | 8 | 30 |
| Systolic[a] | −1.13 (5.80) | −4.60 (8.04) | 4.11 (10.95) | −17.76 (10.12) |
| Diastolic[a] | −1.20 (6.03) | −5.16 (7.19) | 3.00 (8.00) | −8.17 (6.59) |

[a] Mean pressure difference between oscillometric measurement and, respectively, auscultatory or intra-arterial measurement.

J Hypertens. 2008;26:1505-26.

# HBPM-related unresolved issues in special populations

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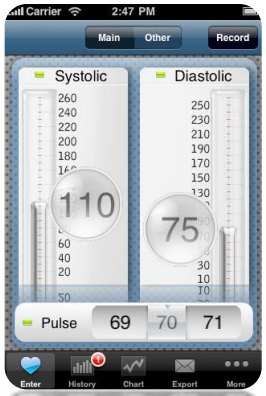
| Pregnancy | • Need for specific validation of digital devices<br>• Importance of sitting position<br>• Lack of established thresholds or management algorithms |
| ESRD and diabetes | • Reduced accuracy of the oscillometric devices (due to arterial stiffness typical of these conditions?)<br>• Need to achieve a more aggressive BP target |


J Hypertens. 2008;26:1505-26.

# Dans les essais cliniques

## Box 12. Usefulness of HBPM in clinical trials

Advantages:

(1) Availability of multiple BP readings, affording a better reproducibility
(2) Reduction of the sample size of patients to be included
(3) Guidance of treatment (initiation and titration)
(4) Identification of patients with WCH or masked hypertension
(5) Minimization of placebo effect
(6) Assessment of the duration of action of antihypertensive drugs (M/E ratio)
(7) Possibility to measure BP during prolonged periods
(8) Improvement of compliance
(9) Management of unexplained vertigo or fatigue (SBP $<100$ mmHg)
(10) Time until antihypertensive drugs have maximum effect (in days or weeks) can be analysed

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# Advantages and disadvantages of automated oscillometric BP devices

| Advantages | Disadvantages |
|---|---|
| Provide printouts with<br>Systolic and diastolic blood pressure<br>Mean blood pressure<br>Heart rate<br>Time of measurement<br>Date of measurement | Poor record for accuracy but improving<br>All use oscillometric measurement – systolic and diastolic blood pressure derived from algorithm known only to manufacturer<br>Oscillometric technique fails in some individuals |
| Eliminate observer error | Oscillometric technique not accurate in arrhythmias |
| Eliminate observer bias | More expensive than aneroid or mercury devices |
| Eliminate terminal digit preference | BP underestimation in pre-eclampsia. |
| Minimal training | |
| Store data for future analysis and comparison | |
| Provide trend plots | |

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# Avantages de l'automesure

- A number of measurements during the day and also over several days, weeks or months a are possible
- Assessment of treatment effects at different times of the day and over extended periods
- No alarm reaction to BP measurement
- Good reproducibility
- Good prognostic value
- Relatively low cost
- Patient-friendliness (in semiautomatic devices)
- Involvement of patient in hypertension management
- Possibility of digital storage, printout, PC download or teletransmission of BP values (in some devices/systems)
- Improvement of patients' compliance to treatment
- Improvement of hypertension control rates

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# Utilisation des appareils d'automesure en France en 2004

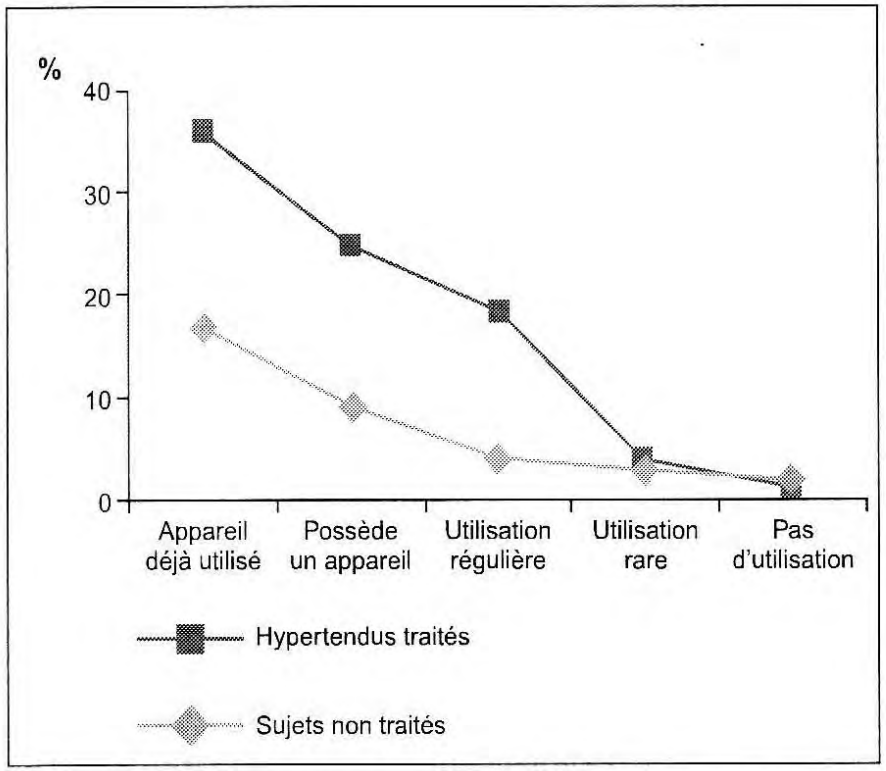



**FIG. 2 – Possession et utilisation d'un appareil d'automesure chez les hypertendus traités et chez les sujets non traités pour hypertension dans l'enquête FLAHS 2004.**
FIG. 2 – Possession and use of a self-monitoring device in treated hypertensives and subjects not treated for hypertension in the 2004 FLAHS survey.

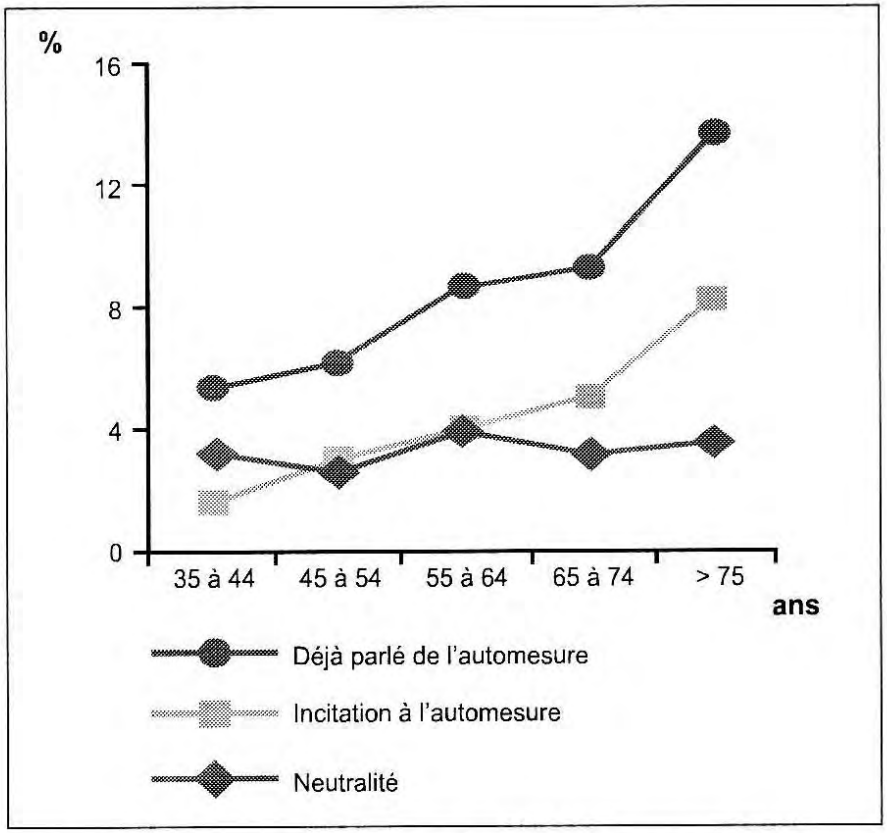



**FIG. 3 – Rôle du médecin dans l'utilisation des appareils d'automesure tensionnelle dans l'ensemble de la population.**
FIG. 3 – The doctor's role in the use of self-monitoring blood pressure devices in the entire population.

- Mourad JJ, Herpin D, Postel-Vinay N, Vaïsse B, Poncelet P, Mallion JM, Murino M, Girerd X. *Utilisation des appareils d'automesure tensionnelle en France en 2004.* Arch Mal Coeur Vaiss. 2005;98:779-82.

# Home-BPM prognostic value

| Study | Population Studied | No. of Subjects | Home BP Schedule | | | | Outcome |
|---|---|---|---|---|---|---|---|
| | | | Days | AM | PM | Total | |
| Ohasama[2] | Population | 1789 | 28 | 1 | 0 | 28 | Strokes and mortality predicted better by HBPM |
| SHEAF[3] | Treated hypertensive patients | 4939 | 4 | 3 | 3 | 24 | CV morbidity and mortality predicted better by HBPM |
| PAMELA[4] | Population | 2051 | 1 | 1 | 1 | 2 | CV and total mortality predicted better by HBPM |
| Belgian[5] | Referred | 391 | 1 | 3 | 0 | 3 | Combined CV events predicted better by HBPM |
| Didima[6] | Population | 662 | 3 | 2 | 2 | 12 | CV events predicted by both HBPM and office BP |

CV indicates cardiovascular.

**Pickering TG**, Miller NH, Ogedegbe G, Krakoff LR, Artinian NT, Goff D; American Heart Association; American Society of Hypertension; Preventive Cardiovascular Nurses Association. *Call to action on use and reimbursement for home blood pressure monitoring: executive summary: a joint scientific statement from the American Heart Association, American Society Of Hypertension, and Preventive Cardiovascular Nurses Association.* Hypertension. 2008;52:1-9.

# Limites de l'automesure

- Need of patient training (short for automated devices)
- Possible use of inaccurate devices
- Measurement errors
- Limited reliability of BP values reported by patients
- Induction of anxiety, resulting in excessive monitoring
- Treatment changes made by patients on the basis of casual home measurements without doctor's guidance.
- Normality thresholds and therapeutic targets still debated
- Lack of night recordings

J Hypertens. 2008;26:1505-26.

# Comparison of 24h-ABPM and HBPM

PROCEEDINGS FROM A CONFERENCE ON SELF BP MEASUREMENT

**Clinical applications and diagnosis**

Daniel Herpin[a], Thomas Pickering[b], George Stergiou[c], Peter de Leeuw[d], and Giuseppe Germano[e]

*Blood Pressure Monitoring 2000; 5 : 131-5*



**Table 1 Comparison of self blood pressure monitoring (SBPM) and ambulatory blood pressure monitoring (ABPM)**

| | SBPM | ABPM |
|---|---|---|
| Condition of measurement | Sitting rest | Ambulatory |
| Duration of monitoring | 3–5 days | 24 h |
| Avoids white-coat effect | Yes | Yes |
| Diagnosis of white-coat hypertension | Yes (?)[a] | Yes |
| Increases number of readings | Yes | Yes |
| Eliminates observer errors | Yes (digital)? | Yes |
| Situations | | |
| At home | Yes | Yes |
| At work | Possibly | Yes |
| Asleep | No | Yes |
| Use in diagnosis | Limited | Yes |
| Prognostic value | Possibly | Yes |
| Use in evaluating treatment | Yes | Limited |
| Improves compliance | Possibly | No |
| Cost | Low | High |

[a]Current evidence supports the use of SBPM in the diagnosis of white-coat hypertension only as a screening test that, if it gives a positive result, requires confirmation with ABPM.

**Table 6 Comparison of main features of ambulatory blood pressure monitoring and home blood pressure monitoring**

| Feature | ABPM | HBPM |
|---|---|---|
| Daytime BP | + + | + + |
| Night-time BP and dipping | + + | − |
| Morning BP | + + | + |
| 24-h BP variability | + + | ± |
| Long-term BP variability | ± | + + |
| WCH and MH diagnosis | + + | + + |
| Placebo effect | − | − |
| Reproducibility | + + | + + |
| Prognostic value | + + | + + |
| Patient involvement | − | + + |
| Patient training | ± | + + |
| Physician involvement | ++ | + |
| Patients' acceptance | ± | + + |
| Monitoring treatment effects | Extensive information on diurnal BP profile, can not be repeated frequently | Appropriate for long-term monitoring, limited information on BP profile |
| Hypertension control improvement | + | ++ |
| Cost | High | Low |
| Availability | Low | High |

ABPM, ambulatory blood pressure monitoring; BP, blood pressure; HBPM, home blood pressure monitoring; MH, masked hypertension; WCH, white-coat hypertension.

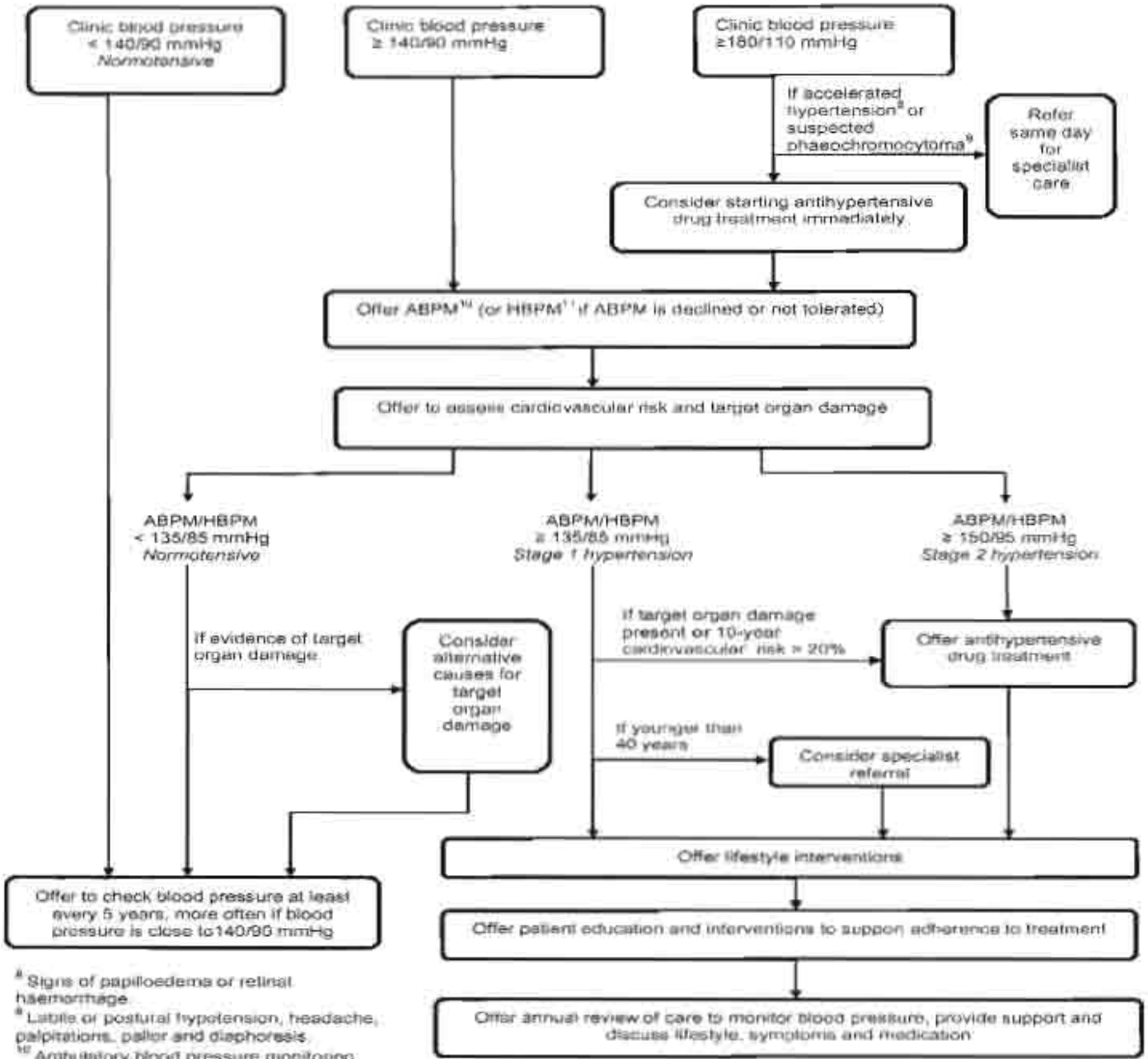
J Hypertens. 2008;26:1505-26.

# Choix de la méthode -visée diagnostique-

| Situations cliniques | Informations | Choix |
|---|---|---|
| HTA limite – légère | HTA ? | Automesure<br>MAPA |
| HTA sévère | Sévérité ?<br>Retentissement ? | Clinique<br>MAPA |
| HTA paroxystique | Poussée ?<br>Sévérité ? | MAPA |
| HTA gravidique | HTA ? Cycle circadien | Automesure<br>MAPA |
| PA variable - dysautonomie | Amplitude ?<br>Sévérité ? | MAPA |
| Surveillance HTA blouse blanche | Évolution vers une HTA vraie ? | Automesure |

# Choix de la méthode -évaluation thérapeutique-

| Situations cliniques | Informations | Choix |
|---|---|---|
| HTA traitée symptomatique | Symptôme ⇔ variation de PA ? | MAPA |
| Pathologies associées | Équilibre optimal ? | Automesure<br>MAPA |
| HTA résistante | Résistance vraie ? | Automesure<br>MAPA |
| Équilibre tensionnel | Variations et durée d'action ? | Automesure<br>MAPA |
| Aptitude à l'effort | Profil tensionnel équilibré ? | MAPA<br>Profil tensionnel d'effort |
| Dissection aortique | Élévation tensionnelle contrôlée ? | MAPA<br>Profil tensionnel d'effort |


Clinic blood pressure < 140/90 mmHg Normotensive
Clinic blood pressure ≥ 140/90 mmHg
Clinic blood pressure ≥180/110 mmHg
If accelerated hypertension[8] or suspected phaeochromocytoma[9]
Refer same day for specialist care
Consider starting antihypertensive drug treatment immediately
Offer ABPM[10] (or HBPM[11] if ABPM is declined or not tolerated)
Offer to assess cardiovascular risk and target organ damage
ABPM/HBPM < 135/85 mmHg Normotensive
ABPM/HBPM ≥ 135/85 mmHg Stage 1 hypertension
ABPM/HBPM ≥ 150/95 mmHg Stage 2 hypertension
If evidence of target organ damage
Consider alternative causes for target organ damage
If target organ damage present or 10-year cardiovascular risk ≥ 20%
Offer antihypertensive drug treatment
If younger than 40 years
Consider specialist referral
Offer lifestyle interventions
Offer to check blood pressure at least every 5 years, more often if blood pressure is close to140/90 mmHg
Offer patient education and interventions to support adherence to treatment
Offer annual review of care to monitor blood pressure, provide support and discuss lifestyle, symptoms and medication
[8] Signs of papilloedema or retinal haemorrhage
[9] Labile or postural hypotension, headache, palpitations, pallor and diaphoresis
[10] Ambulatory blood pressure monitoring
[11] Home blood pressure monitoring

# Conclusion


- Méthode validée de mesure de PA :
  - Automatique > auscultatoire
  - Ambulatoire : MAPA des 24h ou AMT (bras > poignet), pour diagnostiquer/confirmer puis suivre une HTA
- Résultats : *www.comitehta.org/*
  - Valeurs normales :
    - < 140/90 mm Hg = mesure clinique
    - < 135/85 mm Hg = AMT, MAPA diurne
    - < 130/80 mm Hg = MAPA des 24h
    - < 120/70 mm Hg = MAPA nocturne