

# **AMBULATORY BP MONITORING**

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# VARIABILITY OF BP

- *Heart beats*
- *The breathing cycle*
- *The cycle during the day (day/night variation)*
- *Nervous regulation of the blood pressure*
- *Hormonal regulation of the blood pressure*
- *External stress*
- *Physical activities*
- *Environment : temperature of the air, season*
- *Alcohol, diet, coffee, tobacco*
- *Drugs*

# What is ABPM?

- A way to automatically sample several BP measurements through the day
- Usually every 30 min waking time, and every hour sleeping time
- The resultant curve give you information about waking and sleeping BP averages, dipping and non dipping, white coat effect
- Efficacy of drugs

# WHITE COAT EFFECT

- greater in older than younger patients,
  - greater in women than in men,
  - present to in almost all hypertensive patients
  - diminished drug treatment.
  - not closely related to overall BP variability,
  - does not predict cardiovascular risk.
- (PickeringTG, Gerin W, Schwartz AR)

# Dipping

- Normal people exhibit a 10-15% drop in BP during sleep
- Failure to do so = Non dipping
- Associated with higher Cardiovascular risk (Verdecchia et al, 1992)

# HOME VERSUS AMULATORY BP MEASUREMENT

- **ABPM**
- more frequent measurements, sleep measurements
- some discomfort
- more expensive
- **HBPM (SBPM)**
- Possible over longer period of time
- Allows patient involvement in management of BP

# BP monitoring

“Home BP monitoring was considerably less reproducible than ambulatory blood pressure and no different from office blood pressure in this respect. The relationship with left ventricular mass index appeared to be stronger for ambulatory than it was for home and office blood pressures, although not statistically significant”

Kok et al, 1999

# MEASUREMENT DEVICES

- Named according to the sensing method
  - Microphonic
  - Oscillometric
  - Plethysmographic

# Microphonic Method

- *Inflation of the cuff*
- *Deflation at 2 to 3 mmHg/sec*
- *the artery starts to emit a noise defining the systolic blood pressure.*
- *The point at which the noise disappears defines the diastolic blood pressure.*
- *This method of measurement corresponds to the auscultatory method*

# Oscillometric method

- *Measures arterial vibrations during deflation*
- *Simple, effective and validated by many medical societies.*
- *Easily automated, easy handling, reliable*
- *So, the majority of the self- and ambulatory measurement devices for blood pressure use this technique*

# Plethysmography Method

- *Obtains BP at the level of the arteries of the fingers.*
- *A small cuff is inflated around the finger, and a constant pressure is maintained. Any variation in the pressure at the level of the finger will involve a modification of the pressure in the cuff, which thus converts it into blood pressure.*
- *Doubtful reliability*

# ABPM device



# The Inflation of the Cuff

- *Insufficient inflation: undervaluation of the systolic blood pressure.*
- *Automatic inflation up to 180 mmHg. Immediate sensing prompts repetition*
- *Presetting the maximal BP e.g. 140, 170, 200 and 240 mmHg*
- *Gradual inflation till sensing occurs*

# The deflating of the cuff

- *Must be very meticulous*
- *Too fast : Underestimation of SBP and over-estimation of DBP*
- *Best: 2 mmHg/ sec.*
- *Devices programmed on the heart pulsations are valid only when the patient's heart rate is regular and between 60 and 80 per minute.*

# Validation of the Device

- *The British Medical Society for high BP*
- *The American association for the development of the medical device*
- *Comparison between the level of BP obtained with the reference method (mercury sphygmomanometer, and the device being validated) by the help of a Y connector*
- *Cuff*

# Validated AMBULATORY BP devices

- Spacelabs
- Oxford Medical

# Reliability of the Device with Time

- *No precise data relating to the lifespan and the reliability of the self-measurement devices with time.*
- *Regular validation by simultaneous BP measurement with a standard sphygmomanometer*

# REFERENCE VALUES

- For self-measured BP,

**135 mmHg systolic and 85 mmHg diastolic**  
(average of 2 measurements in the morning and 2 in the evening for at least 3 working days, Ohasama study)

- For non-invasive 24 h ambulatory BP

average daytime blood pressure of < **135 mmHg systolic and < than 85 mmHg diastolic**

**< 130/80 mmHg optimal.**

Verdecchia P., 2001

# WHEN TO ASK FOR ABPM

## ABPM

- In cases of resistant hypertension
- Evaluation of antihypertensive therapy
- Discrepancy between home and office BP
- Severe hypertension & no target organ damage
- Research