which supports the hypothesis that CNVs are causally linked. Importantly, many of the CNVs contain known genes and thus may underlie both gene expression and phenotypic variation between the rat models. Further studies and finer tiling arrays are warranted.

026

DOES THE REACTIVITY OF THE SYMPATHETIC NERVOUS SYSTEM CONTRIBUTE TO THE MORNING SURGE IN BLOOD PRESSURE?

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The early morning is known to be associated with increased cardiovascular risk. Hypertensive individuals, who have a greater risk of cardiovascular events, also have an increased amplitude, faster rate and more powerful rise in morning blood pressure. Although the mechanisms underlying this relationship remain unclear, it is possible that an exaggerated response to arousal is an important factor. We therefore determined whether the reactivity of the sympathetic nervous system (SNS) is related to the morning surge in blood pressure. Ambulatory blood pressure recordings were obtained from subjects and the amplitude and rate of rise (RoR) of morning mean arterial pressure were determined mathematically. In addition, we determined a measure of the effective power of the morning surge in mean arterial pressure (BPPower), derived by the product of the amplitude and RoR. The reactivity of the SNS to an aversive stimulus was assessed on a separate day by microneurographic recording of multiunit, postganglionic muscle sympathetic nerve activity (MSNA), measured from the peroneal nerve at the fibular head. Blood pressure and electrocardiogram were measured concurrently at rest, during a cold pressor test which involved immersing the hand in ice water for 2 minutes, and at recovery. We examined 33 subjects (14 males / 19 females) with average age 40.6±4.0 years (range 18 – 83), BMI 25.9±0.7 and 24% of whom were taking antihypertensive therapy. The cold pressor test increased MSNA ($P<0.001$) and mean arterial pressure by 24.0±2.4 mmHg ($P<0.001$). MSNA was adjusted for age and BMI, and subjects were divided into tertiles by RoR and BPPower. Both BPPower and RoR were positively related to the increase in total MSNA ($r=0.4$, $P=0.02$) and MSNA amplitude ($r=0.5$, $P=0.01$) observed during the cold pressor test but were not related to the increase in MSNA frequency ($r=0.03$). In conclusion, these results suggest that the CNS mechanisms influencing the increase in sympathetic burst amplitude during arousal may also be fundamental in determining the rate of blood pressure rise during the morning period.

027

FEATURES OF FLOWING OF METABOLIC SYNDROME ASSOCIATED WITH HYPERTENSION

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As a result of present lifestyle (absence of physical activity, increased intake of calories, etc.) number of persons with impaired glucose tolerance, cardiometabolic diseases, diabetes mellitus and obesity is elevated. According the estimation, worldwide 20–25% population suffers from metabolic syndrome (MS). In this population, all cause mortality is two times higher and risk of cardiovascular event is three times higher than in persons without metabolic syndrome. Prevalence of MS is growing to an epidemic in the developed countries. The subject of this research were 73 persons with metabolic syndrome (MS) by age 33–57 years, 38 of them were patients with arterial hypertension (AH). Patients underwent the next procedures: determination of anthropometric indexes (body mass index (BMI), circumference of waist (CW), circumference of thighs (CT), sagital diameter of abdomen (SDA)), measuring the body fat percentage (BFP), ultrasonic research of liver, determination of concentration of glucose and insulin in the whey of blood with further determination of insulin resistance index (IRI) using HOMA-IR method, determination of C-reactive protein (CRP), echocardiography in B- and M-modes, determination of 10-years risk of severe ischaemic heart disease and ischaemic stroke development. It was discovered that the increase of blood pressure ≥130/85 torr is more frequent for men than for women (accordingly 41% and 20%, $p=0.005$). For persons with MS and AH increased BFP was discovered, by comparison to patients with MS and without AH (accordingly 30,7% and 17%, $p<0,05$). Direct cross-correlation connection was traced between BMI and systolic and dyastolic blood pressure ($\tau=0.21$, $p=0.005$ and $\tau=0.15$, $p=0.005$), and also between blood pressure and CW, CT, relation of CW/CT, insulin resistance index and BFP. For patients with MS and AH a reliable increase of 10-years risk of severe ischaemic heart disease and ischaemic stroke development was marked, by comparison to persons with MS and without AH. Thus, it is possible to assert on the basis of the got results, that presence of AH for patients with MS substantially burdens state of patients.

028

EXAGGERATED BLOOD PRESSURE AND HEART RATE CIRCADIAN RHYTHMS INDUCE ACTIVATION OF HYPOTHALAMIC NEURONS IN GENETICALLY HYPERTENSIVE MICE

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The high blood pressure (BP) strain of "Schlager" mice (BPH/2J) has been reported to have a systolic BP 35 mmHg greater than the normal BP (BPN/3J) strain. Furthermore, circadian influences that "drive" the sympathetic nervous system (SNS) during active periods and inhibit the SNS during sleep appear to be exaggerated in BPH mice. In the present study, we examined the circadian variation in BP and heart rate (HR) and hypothalamic neuronal activation to determine whether these regions likely contribute to the greater circadian changes in BP in BPH mice. BPN and BPH mice were implanted with telemetry devices to measure mean arterial pressure (MAP), HR and locomotor activity. Following recovery, basal values were recorded for a 48-hour period to determine circadian variation. Mice were perfused, 2 hours after dark during the active (hypertensive) period, and neuronal activation was detected using c-Fos immunohistochemistry. Greater MAP was recorded in BPH mice (122±1 mmHg; n=5) than in BPN mice (98±1 mmHg; n=7) during the 48-hour recording period. HR levels were also elevated in BPH mice (562±6 bpm) compared with BPN mice (418±8 bpm). Two hours after dark, MAP increased more in BPH mice (+17±3 mmHg; $P<0.01$) and only increased by +4±1 mmHg in BPN mice compared with 2 hours before dark. HR was also more elevated in the active period in BPH mice compared with BPN mice (+139±24 vs +73±16 bpm; $P<0.05$), as was locomotor activity (+2.8±0.9 vs +0.4±0.1 units, $P<0.01$). Neuronal activation (c-Fos expression) was 56% greater, in the dark than in the light, in the paraventricular nucleus of the hypothalamus and was 33% greater in the dorsomedial hypothalamus ($P<0.01$) in BPH mice (n=3) compared with BPN mice (n=3). Our findings show that exaggerated BP and HR circadian rhythms observed in BPH mice induces a markedly greater activation of hypothalamic regions that are known to be important for regulating cardiovascular autonomic function. It is proposed that these amplified circadian variations observed in BPH/2J mice may be neurogenic and this mechanism could be important in the manifestation of hypertension.

029

STRESS INDUCED ACTIVATION OF HYPOTHALMIC BRAIN REGIONS IN GENETICALLY HYPERTENSIVE MICE

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We have previously shown that the high blood pressure (BPH/2J) strain of "Schlager" mice also have greater arousal associated rises in blood pressure compared with normotensive mice (BPN/3J). However, it is unclear whether this is due to a neurogenic mechanism or to peripheral vascular and cardiac hypertrophy. Therefore, we examined whether acute aversive stress activates hypothalamic brain regions that may contribute to the hypertension observed in these BPH mice. BPN and BPH mice were implanted with telemetry devices to measure mean arterial pressure (MAP), heart rate (HR) and locomotor activity. Following recovery, CV variables were recorded at rest and throughout a 1 hr period when a high arousal state (stress) was induced by placing a mouse in a cage previously occupied by a different male mouse (cage swap). Animals were then perfused and neuronal activation was detected using c-Fos immunohistochemistry. Before stress exposure, greater resting MAP was recorded in BPH mice (102±2 mmHg; n=5) than in BPN mice (86±1 mmHg; n=7). HR levels were also elevated in BPH mice (438±11 bpm) compared with BPN mice (338±5 bpm). During cage swap stress MAP increased more in BPH mice compared to BPN mice (+41±2 vs +31±1 mmHg, $P<0.001$), as did locomotor activity (+6.3±0.5 vs +2.6±0.2 units, $P<0.001$). By contrast HR increased less in BPH mice (+275±13 vs +356±15 bpm, $P<0.001$). Following exposure to acute stress, neuronal activation (c-Fos expression) was 33% greater in the paraventricular nucleus of the hypothalamus ($P<0.05$) and 27% greater in the dorsomedial hypothalamus ($P<0.001$) in BPH mice (n=3) compared to BPN mice (n=3). Our findings show that a relatively "natural" arousal response induces a markedly greater activation of hypothalamic regions that are known to be important for regulating cardiovascular autonomic function. The associated greater pressor response to stress suggests that this may be a major underlying central mechanism contributing to the hypertension.

030

THE ROLE OF AT_{1A} RECEPTORS IN CARDIOVASCULAR REACTIVITY TO ACUTE AVERSIVE STRESS

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Recently, we have shown that pharmacological inhibition of angiotensin AT_1 receptors in the dorsomedial hypothalamus (DMH) attenuates cardiovascular (CV) stress response. In the present study we determined whether reduced CV reactivity in AT_{1A} receptor knockout ($AT_{1A}^{-/-}$) mice relates to attenuated neuronal responsiveness to stress. $AT_{1A}^{-/-}$ and $AT_{1A}^{+/+}$ mice were implanted with telemetry devices to measure mean arterial pressure (MAP), heart rate (HR) and locomotor activity. Following recovery, CV responses were recorded at rest and during a 1 hour period when a high arousal state was induced by placing a mouse in a cage previously occupied by a different male mouse (cage swap). Neuronal activation was detected using c-Fos immunohistochemistry. Before stress, lower MAP was recorded in $AT_{1A}^{-/-}$ mice (85±2 mmHg; n=7) than in $AT_{1A}^{+/+}$ mice (112±2 mmHg; n=10), whereas HR levels were not different between groups. Cage swap increased MAP by +24±2 mmHg in $AT_{1A}^{+/+}$ mice and by +17±2 mmHg ($P<0.01$) in $AT_{1A}^{-/-}$ mice, as did HR (+203±9 vs +121±9 bpm; $P<0.001$). This smaller HR response may be due to the failure of stress to inhibit baroreceptor reflexes in $AT_{1A}^{-/-}$ mice. Likewise, locomotor activity was also less in $AT_{1A}^{-/-}$ mice. Cage swap stress reduced neuronal activation in the bed nucleus of the stria terminalis ($P<0.001$), paraventricular nucleus, central nucleus of the amygdala, rostral ventrolateral medulla (VLM) ($P<0.01$), DMH and raphe pallidus nucleus ($P<0.05$). Thus, the attenuated CV and behavioral responses suggest that primary differences between groups may relate to lesser activation at the limbic level (amygdala) where the primary emotional reaction to stress is formed. This may lead to lesser activation at the hypothalamic autonomic areas and also motor regions. We also observed greater activation in the caudal VLM ($P<0.01$) and nucleus of the solitary tract ($P<0.05$) in $AT_{1A}^{-/-}$ mice compared with $AT_{1A}^{+/+}$ mice which may reflect lesser baroreflex inhibition induced by stress in $AT_{1A}^{-/-}$ mice. These studies suggest that central AT_{1A} receptors are likely involved in the emotional and autonomic reactions to acute aversive stress.

031

IS THERE A THRESHOLD EFFECT OF FLAVANOL RICH COCOA ON BLOOD PRESSURE?

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The effect of cocoa on BP is controversial. Although flavanol rich cocoa can improve flow mediated dilatation, evidence for a sustained effect on BP is lacking, yet small amounts of dark

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