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## Relation of blood pressure circadian rhythm and proximal reabsorption of sodium to salt-sensitive hypertension

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**Statement of the Problem:** The majority of patients with hypertension have salt-sensitive form of disease, however little has known about mechanisms of salt sensitivity. Salt sensitivity and circadian rhythm of blood pressure might be the keys for understanding the connections between cardiovascular and renal complications. Proximal sodium reabsorption is considered to be the key determinant of response of blood pressure to sodium intake. The purpose of study was to elucidate the role of proximal sodium reabsorption in the development of salt-sensitivity and salt-sensitive hypertension, to find connections between the cardiovascular and renal systems, with regard to the salt sensitivity and circadian rhythm of blood pressure (BP).

**Material & Methods:** Typing of normotensive subjects and hypertensive patients by salt-sensitivity test; assessment of proximal sodium reabsorption in salt-resistant and salt-sensitive normotensive and hypertensive subjects; determination of circadian rhythm of blood pressure in normotensive and hypertensive patients. A total of 140 middle aged (30-50 yrs.) subjects – 70 normotensives and 70 hypertensives of stage I essential hypertension (JNC VIII) were examined. All subjects were tested for salt-sensitivity. Proximal sodium reabsorption was assessed by lithium clearance and its fractional excretion. Determination of circadian rhythm of blood pressure was performed by 24-hr ambulatory blood pressure monitoring.

**Findings:** 25 healthy subjects had salt-sensitivity and 56 had salt-sensitive essential hypertension. Sodium proximal reabsorption in salt-sensitive hypertension was significantly decreased compared to salt-sensitive normotensives ( $23.08 \pm 0.55\%$  and  $19.2 \pm 0.40\%$ ,  $p < 0.05$ ). Study of circadian rhythms revealed significant ( $p < 0.05$ ) perversion of circadian rhythm in salt-sensitive subjects (both in normotensives and in having essential hypertension) compared to salt-resistant subjects.

**Conclusions:** The results of this study clarify interrelationship between main causative factors leading to salt-sensitivity: inadequate proximal sodium reabsorption and specificities of blood pressure circadian rhythm.

### Recent Publications

1. Guo Tong-Shuai, Dai Yi, Ren Ke-Yu Mu, Jian-Jun Ren, Jie Wang, Dan Wang, Yang Chu, ChaoLi, Yan Yuan and Zu-Yi (2017) Effects of salt loading and potassium supplement on the circadian blood pressure profile in salt-sensitive Chinese patients. *Blood Pressure Monitoring* 22:307–313.
2. Isobe-Sasaki Y, Fukuda M and Ogiyama Y (2017) Sodium balance, circadian BP rhythm, heart rate variability, and intrarenal renin–angiotensin–aldosterone and dopaminergic systems in acute phase of ARB therapy. *Physiology Reports* 5(11):e13309.
3. Kimura G, Dohi Y and Fukuda M (2010) Salt sensitivity and circadian rhythm of blood pressure: the keys to connect CKD with cardiovascular events. *Hypertension Research* 33:515–520.
4. Nishimoto M and Fujita T (2015) Renal mechanisms of salt-sensitive hypertension: contribution of two steroid receptor-associated pathways. *American Journal of Physiology-Renal Physiology* 308(5):377–87.
5. Takeda N and Maemura K (2011) Circadian clock and cardiovascular disease. *Journal of Cardiology* 57:249–256.

### Biography

Irine Andronikashvili is an Associate Professor at the Department of Internal Medicine, Tbilisi State Medical University. Her field of scientific interest includes etiology and pathophysiology of hypertension, particularly mechanism of development salt sensitivity and salt sensitive essential hypertension, elaboration of adequate methods of treatment and prevention. She is a member of Georgian and European Societies of Cardiology.