Copeptin kinetics and brain edema/hemorrhagic transformation in acute ischemic stroke

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Background and Purpose: Prognostic value of copeptin in acute ischemic stroke patients has been widely disclosed ^{1,2}. This study aimed to evaluate copeptin temporal profile according to reperfusion treatments and its potential relationship with the development of vasogenic brain edema and/or hemorrhagic transformation.

Methods: In this prospective cohort study, we performed serial assessment of copeptin and brain CT/MRI upon admission (*T*₀), at 24 hours (*T*₁) and within the third and the fifth day of hospitalization (*T*₂) in 34 acute ischemic stroke patients. We evaluated copeptin kinetics along with the development of brain edema and/or hemorrhagic transformation, as well as functional outcomes and mortality at 3 months and 1 year (Table).

Results: Median copeptin concentration was 50,71 pmol/L at *T*₀, 18,31 pmol/L at *T*₁ and 10,92 pmol/L at *T*₂. Copeptin assessed at *T*₁ was higher in patients who had medium/severe brain edema at *T*₂ (32.25 pmol/L medium/severe vs 13.67 pmol/L mild/absent edema; *p*=0.038) and hemorrhagic transformation at *T*₁ (93.10 pmol/L vs 13.67 pmol/L: *p*<0.003) and *T*₂ (85.70 pmol/L vs 14.45 pmol/L: *p*=0.024). Moreover, copeptin level drop (*T*₀-*T*₁) was steeper in patients who received reperfusion treatments, particularly in those undergoing i.v. thrombolysis plus mechanical thrombectomy (-129.34 pmol/L vs -5.43 pmol/L combined therapy vs single reperfusion treatments: *p*=0.038) (figure). Drop in plasma copeptin levels also correlated with the TICI score of patients who underwent mechanical thrombectomy (*p*<0001).

		All patients (N=34)	Conservative Therapy (N=7)	Thrombolysis alone (N=13)	Thrombectomy alone (N=6)	Combined Therapy (N=8)
Age, years, mean		75,5	69,3	75,3	62	69,7
Women, n (%)		16 (47,1)	3 (42,8)	8 (61,5)	1 (16,7)	4 (50)
Copeptin <i>T</i> ₀ , pmol/L, median		50,71	31,18	26,71	60,71	174,15
Δ Copeptin (<i>T</i> ₀ - <i>T</i> ₁), pmol/L, median (IQR)		-11,28 (-130.83, 5.90)	-2,70 (-10.26, 25.90)	-4,50 (-124.13, 18.53)	-37,84 (-173.02, 5.68)	-129,34 (-289.59, -28.01)
Post-infarct Edema COED 2-3, n, (%) <i>T</i> ₁	<i>T</i> ₀	1/34 (2,9)	1/7 (14,3)	0	0	0
	<i>T</i> ₁	10/34 (29,4)	4/7 (57,1)	5/13 (38,5)	0	2/8 (25)
	<i>T</i> ₂	12/34 (35,3)	4/7 (57,1)	5/13 (38,5)	1/6 (16,7)	2/8 (25)
Hemorrhagic Transformation at <i>T</i> ₂ , n, (%)		7/34 (20,6)	3/7 (42,8)	3/13 (23,1)	0	1/8 (12,5)
mRS 0-2 (%) at 1 year, n, (%)		18/33 (54,6)	3/7 (42,8)	8/13 (61,5)	4/6 (66,7)	3/7 (42,8)
mRs 3-6 (%) at 1 year, n, (%)		8/33 (24,2)	2/7 (28,6)	2/13 (15,4)	2/6 (33,3)	2/7 (28,6)
Death at 1 year, n, (%)		7/33 (21,2)	2/7(28,6)	3/13 (23,1)	0	2/7 (28,6)

Table. Clinical and neuroimaging features of acute ischemic stroke patients

Figure. The drop in copeptin levels (*T*₀-*T*₁) in treated patients, stratified by reperfusion treatment

Conclusions: Copeptin is a stress protein whose release in acute ischemic stroke seems to be strictly related to the development of brain edema and/or hemorrhagic transformation. It sharply drops after recanalization, mirroring the level of the achieved reperfusion in the acute phase of ischemic stroke.

References
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