Artificial neural network for monitoring the antioxidant status of human plasma.

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Introduction

Background: We evaluated theperformance of a mathematical method to predict antioxidant power of plasma and importance of oxidative parameters in humanplasma.

Material and Methods

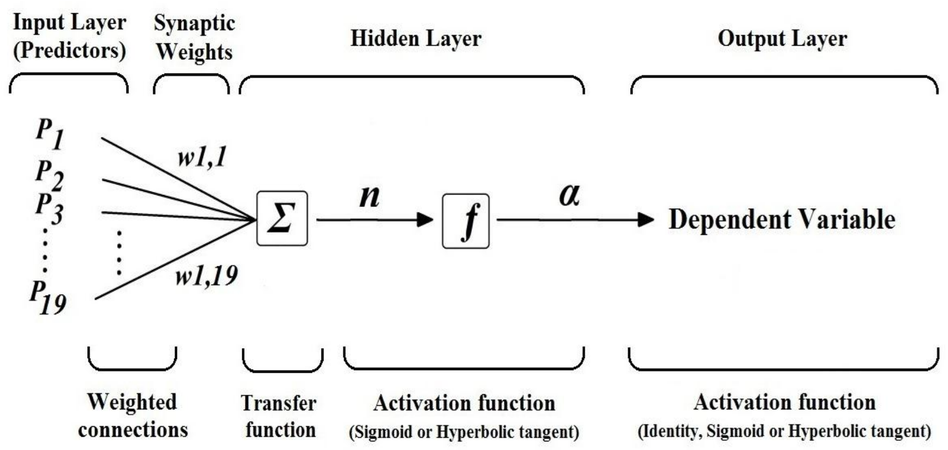
Methods: One hundred sixty five blood samples from donors were analyzed in this experimental study. Age, weight and sex were determined as demographic parameters. Albumin, creatinine, FBS, triglyceride, uric acid and Hbabsorbances at 280 to700 nm were analyzed as biochemical parameters. Ferric reducing ability of plasma (FRAP) and carbonyl content of proteins (PCO) were calculated as oxidative markers. An artificial neural network (ANN) was developed as multilayer feed forward architecture using IBM SPSS statistics.

Results and Discussion

Results: The best ANN model was performed by four-layer perceptron method (19-10-10-1) with hyperbolic tangent and identity activation functions for hidden and output layers, respectively. A significant positive correlation (R^2 =0.912) was observed between predicted and observed values of FRAP. According to the normalized importance, the main parameters were uric acid (100%), oxyHb (66.8%), A560(65%), BUN (55%), A420(52.9%) and creatinine (51.2%).

Conclusion

Conclusion: This study demonstrated the ability of ANN to predict the most important oxidative markers in human plasma. Identification of important parameters can eliminate less important parameters from laboratory procedures and performs a cheaper and faster experiments.



*ANN FRAP 94-8-22.sav [DataSet1] - IBM SPSS Statistics Data Editor

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	Gender	Group	Age	Weight	PCO	FRAP	FBS	BUN	Creatinine	TG	Cholesterol	UA
1	2.00	3.00	60.00	66.00	6.82	1765.86	120.00	47.00	7.50	113.00	205.00	6
2	1.00	3.00	58.00	53.00	3.51	1208.33	301.00	44.00	7.80	147.00	153.00	3
3	1.00	3.00	49.00	60.00	3.05	1303.33	100.00	72.00	8.50	87.00	131.00	8
4	1.00	3.00	59.00	59.00	3.63	1355.00	226.00	68.00	9.00	166.00	111.00	7
5	1.00	3.00	63.00	88.00	4.01	1353.33	150.00	51.00	8.90	87.00	120.00	6
6	1.00	3.00	64.00	56.00	3.90	1301.67	87.00	42.00	6.70	185.00	130.00	6
7	1.00	3.00	57.00	67.00	2.53	1190.00	100.00	44.00	3.80	209.00	106.00	6
8	2.00	3.00	60.00	76.00	3.22	1408.33	114.00	45.00	7.20	159.00	151.00	5
9	1.00	3.00	54.00	52.00	2.47	1735.00	301.00	55.00	8.40	124.00	185.00	8
10	1.00	3.00	53.00	68.00	3.11	1480.00	156.00	38.00	5.60	100.00	185.00	8
11	1.00	3.00	60.00	65.00	3.26	1533.33	155.00	70.00	5.40	76.00	145.00	8
12	2.00	3.00	63.00	60.00	2.69	1345.00	97.00	44.00	5.60	243.00	179.00	7
13	2.00	3.00	60.00	66.00	2.99	1543.33	87.00	54.00	7.50	77.00	157.00	8
14	1.00	3.00	50.00	53.00	2.86	1076.67	80.00	40.00	5.50	112.00	156.00	4
15	1.00	3.00	66.00	52.00	3.15	1483.33	101.00	53.00	5.80	263.00	223.00	5
16	2.00	3.00	54.00	66.00	4.70	1275.00	111.00	76.00	9.20	223.00	99.00	6
17	2.00	3.00	60.00	63.00	4.78	1155.00	223.00	92.00	6.20	50.00	120.00	6
18	2.00	3.00	63.00	72.00	5.51	1471.67	145.00	38.00	5.90	92.00	118.00	5
19	2.00	3.00	63.00	70.00	5.24	1408.33	193.00	52.00	9.40	347.00	167.00	4
20	2.00	3.00	54.00	66.00	5.02	1351.67	141.00	40.00	6.50	50.00	122.00	6
21	2.00	2.00	59.00	65.00	5.04	788.30	155.00	13.60	.89	176.00	150.00	3