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Short Report

Immunological Exploring of ACTH Levels in the Serum of Patients with Histologically Verified Microcellular Lung Cancer

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Abstract

It is already known in the science that the cells of microcellular lung cancer can produce ACTH. By following the levels of ACTH producing, in the serum of microcellular lung cancer patients, we could make some statistical conclusions how significant these levels would be in eventual future early diagnostic procedures, besides already existing tumormarkers etc. This work would connect the Pulmology, Oncology, Endocrinology, Chemistry and Immunology fields containing very interesting immunological procedures, hormonal theories and statistical estimates.

Keywords: ACTH, microcelullar lung cancer

Introduction

Generally, the Lung Cancers are malignant tumors of epithelial tissue, fast propagating and giving the bad prognosis. Microcellular lung cancer is characterized by nondiferented miniature, compactly packed, unequal cells, containing one atypical rotund nucleus each. Mitoses are very frequent and that is why the proliferation of those cells is very fast and this histological type rapidly gives the metastases. There are more histological types of microcellular cancer: intermediar, combined, oatcell etc. Microcellular type takes 20% of all Lung Cancers and its cells can secret the ACTH. Adrenocorticotropic Hormone is a complexed protein erected of 39 amino acids and its molecule weight is approximately 5000. The anterior part of pituitary gland-adenohipophise, secrets the ACTH and its role is to activate adrenocortical hormones, aldosterone and cortisol.

On the basis of above presented we can make the following connection: Microcellular lung cancer – ACTH

Materials and Methods

As much as possible number of blood samples from microcellular lung cancer patients should be collected by venipuncture and preserved in refrigerator in small test tubes under propperly conditions. In order to overcome challenges associated with ACTH immunoassays, it is recommended a high performance liquid chromatograph mass spectrometry (HPLC-MS/MS) assay, developed by Zahra Shajani-Yi, PhD, DABCC, FAACC, NRCC-CC, And Mari L. Demarco, PhD, DABCC, FAACC, FCACB, to quantify iACTH. Using HPLC-MS/MS enabling to selectively detect and quantify various forms of ACTH, most critically the biologically active iACTH. This HPLC-MS/MS assay also enabling to side-step interferences common to immunoassays including heterophile antibody interference and interference from closely related molecular isoforms—in this case ACTH precursors and fragments.When investigating potential causes for assay interferences, laboratorians typically start by repeating analysis using the same assay, followed by dilution studies and the use of heterophile block tubes. Testing on an alternate platform often involves sending out the samples and for this reason is usually one of the last steps. Based on the current available data, it is recommended that labs investigating an ACTH result prioritize troubleshooting via an alternate assay. This prioritization is driven in part by the limited volume often available for

alternate/repeat testing; unlike the majority of analytes, ACTH requires special preanalytical conditions (collection into a chilled tube and frozen immediately prior to analysis) due to rapid proteolytic degradation. The literature supports this approach, indicating that for ACTH, testing for antibody-mediated interference is often uninformative. It is also recommended making multiple aliquots (as is reasonable with the volume of plasma remaining), freezing them at -70 C and thawing an aliquot immediately before use when troubleshooting.

Statistical estimate**:** In this article will be presented already known, one of the simpliest of possible statistical estimates, the t-test for the big depended samples. This test considers the studies between the sampled group and the controle one. Its formula is:

$$t=\frac{\bar{x}_1-\bar{x}_2}{SE};\ SE=\sqrt{\frac{SD_1^2}{n_1}+\frac{SD_2^2}{n_2}-2r_{1,2}\times SE_1\times SE_2};\ SD^2=\frac{\sum\left(x-\bar{x}\right)^2}{N}$$

$\bar{x}_1$ – arythmetic middle of the sampled group

$\bar{x}_2$ – arythmetic middle of the controle group

SE- standard mistake

SD_1^2-varianse of the sampled group

SD_2^2-varianse of the controle group

SD- standard deviation

$r_{1,2}$- coeficient of corelacy

DF- degree of freedom; DF=n-1

The numeral size of t-test presents us could we or not take the alternative hypothesis (throw away or not the zero hypothesis) by which we affirm is there the statistically important difference between sampled and control groups. We can do it by comparating the numeral size of t-test with the probabilities of zero hypothesis given in for it especially created tables.

Discussion

It is known that the cells of microcelullar lung cancer can produce ACTH. On the base of following the levels of ACTH in patients with verified microcelullar lung cancer, as a target population; in so doing, following the levels of ACTH in population with risk factors (long term smokers, people with more than 50 yrs old, passive smokers, population exposed to radon and asbestos dust, long term COPD patients), as a study population; in so doing following the levels of ACTH in randomly chosen population not belonging with two previous categories, and without diseases and syndromes connected with ACTH abnormalities, as a control group. Comparation of these levels of ACTH could lead us to eventual values of ACTH in risk group, and could serve as a screening method and indication for MSCT of lungs, or bronchoscopy.

Course, for now, all presented represents just thinking, mostly theoretical and done by basic experimental, statistical work, that must be supported, theoretically and experimentally by larger and more detailed exploring, connected with a significantly larger number of examinees, through the cooperation among immunological and biochemical laboratories, ambulances, clinical and scientific-research centers that study and work with microcelullar lung cancer.

It is just a short opinion dedicated to attract and call scientists who are interested to implement serious work in this field.

Conclusion

By following of ACTH levels in the serum of microcellular lung cancer patients and making determinate statistical conclusions about its importance, that procedure could be eventually used as one of early or advanced diagnostic methods concerning mentioned disease. What would we get with that?

The histological verification is very slow and painfull, especially when the microcellular lung cancer is in the question. This histological type gives the metastases fastest then all others and it needs to be diagosticed in fastest possible way in order to be prevented by adecvate reaction and therapy. At the same time the biopsy as a very invasive method would be avoided.

When the tumormarkers (CA-50, NSE etc.) are in the question as a diagnostic methods, this procedure is still in progress and developing, offen unsound, but in a

combination with the ACTH levels exploring, could be more reliable.

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