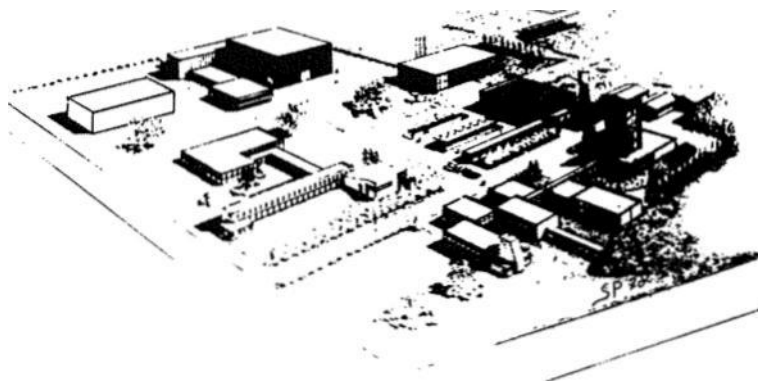


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P 2 - BIOPHYSICS OF THE VESTIBULAR APPARATUS

(F. Biezza)

During this period we researched on this field about three different arguments: excitation of human semicircular canals from Coriolis acceleration, excitation of human semi-circular canals from angular accelerations, merely modellistic analysis of excitations from a general point of view.

The researches about the first two arguments were appointed by the Working Party of the Committee on Science of the Council of Europe.

We made several experimental series on young volunteers in order to study the effects of particular Coriolis accelerations arising in some situations that appear frequently in the civil and military aeronautic field and that are interesting from the astronautic point of view.

There are many real problems that must be solved even by the knowledge of the symptomatology of these accelerations: for example, the prevention of many aeronautic disasters.

With these experiments we obtained meaningful answers about many aspects of this excitation, as well as about the movements that may be innocuous and dangerous for an air-pilot during some manoeuvres, and for an astronaut in a space station with partly simulated gravitational field.

The same experimental situations were analysed with the aid of usual models: the Schubert-Meda one for the exciting force momenta calculus, and the Steinhausen one (without the Groen double approximation) for the calculus of the law of movement of each dynamic unity endolymph-cupula.

This analysis provided a full interpretation of all the experimental symptoms, including the rotating sensations qualitatively regarded.

A detailed description of this work is contained in Ref. 1, regarding the astronautics, and in Ref. 2, regarding the aeronautics.

We made two other series of experiments of negative angular acceleration on young volunteers. These accelerations, all of $-90^\circ/\text{sec}^2$, were received with the head in two positions:

a 90° forward inflection and a 30° forward inflection.

We aimed to search on the variation of the symptomatology with the head position, and on the possibility of explaining this variation by models.

The whole neurovegetative symptomatology, the rotating sensations and the horizontal nystagmus resulted in both series, but were less intense in the first one; on the contrary, the vertical nystagmus resulted clearly present in the first series and negligible in the second one.

The modellistic analysis gave a complete interpretation even of all these experimental symptoms, with the added hypo-thesis about the minor sensitivity of the posterior and superior canals than the lateràl canal.

All this enabled us to give a physical meaning to the rotating sensations from a quantitative point of view.

A detailed description of this work is contained in Ref.3.

The researches about the modellistic argument regarded the analysis of several accelerative situations with the above mentioned models, also with the Groen double approximation.

References

- 1) - M. Arslan, A. Martini, R. Razzolini, 75/76 F. Blezza (1976) Correlations between biological effects and physical features provoked by different endolymphatic Coriolis accelerations-Nuovo Arch. Ital. Otol., 4,1,7-18.
- 2) - F. Blezza (1976) - La fisica dei canali semicircolari in particolari situazioni aeronautiche - Min. Med., 67,30-35.
- 3) - A. Martini, F. Blezza (1976) - L'influenza della posizione cefalica sull'eccitazione labirintica da accelerazione angolare negativa - Il Valsava, LII, 3, 141-156.