Pressurized intra-peritoneal aerosol chemotherapy (PIPAC): does increase of level of pneumoperitoneum change distribution pattern and penetration depth of doxorubicin in a sheep model?

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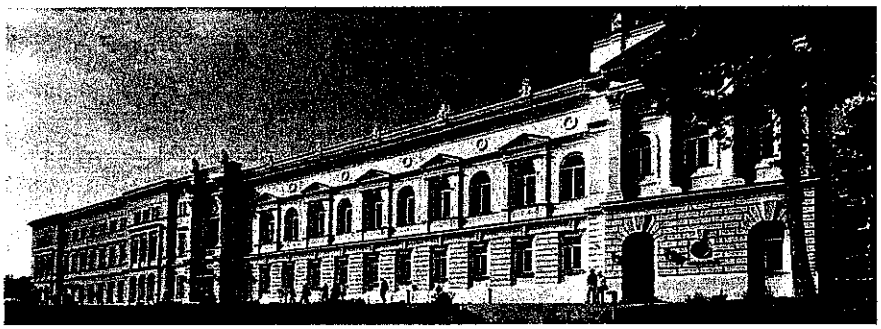

PROGRAMME AND ABSTRACTS

Pressurized Intra-Peritoneal Aerosol Chemotherapy (PIPAC): Does increase of level of pneumoperitoneum change distribution pattern and penetration depth of doxorubicin in a sheep model?

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Background:
Pressurized Intra-Peritoneal Aerosol Chemotherapy (PIPAC) is a novel treatment against peritoneal carcinomatosis, in digestive and ovarian cancer. Doxorubicin is a chemotherapy employed for many years for treating different cancers. The fluorescence characteristics of doxorubin are often used to monitor its localization in tissues.
This study was conducted to evaluate the impact of the increase of intraperitoneal pressure on distribution pattern and penetration depth of doxorubicin aerosolized with PIPAC in a sheep model.

Methods:
Doxorubicin was aerosolized into the peritoneal cavity of 6 sheep: 3 sheep with a pressure at 12mmHg (A group) and 3 sheep (B group) with a pressure at 20mmHg. One more sheep was used as a witness, receiving physiological serum with PIPAC (without doxorubicin). One hour after the end of PIPAC procedure, 9 samples were made: 6 peritoneal, 1 ovarian, 1 omental and 1 caecal samples. For one sample, 10 localizations were studied. Fluorescence microscopy was used to analyse the tissues, blindly. Doxorubicin distribution was evaluated by the proportion between the number of cell nucleus with doxorubicin (DOXO+) and total cell nucleus (DAPI+). The penetration depth was evaluated by the measurement of distance between luminal surface and innermost nucleus DOXO+ (µm). Statistical analysis was made to compare the A and B group (Mann Withney and Generalized Estimating Equations / GEE).

Results:
The witness sheep had no nucleus DOXO+. 87% of biopsies sampled in the 6 sheep receiving doxorubicin with PIPAC showed nucleus DOXO+. Distribution pattern did not show any difference between A group and B group for all samples. Concerning the peritoneal tissue, no difference of penetration depth was observed between the two groups. On the other side, the penetration depth was significantly more important in B group concerning the ovary and the caecum. The omentum, localized just in front of the nebulizer, had 100% of nucleus with doxorubicin.

Conclusion:
The increase of pressure seems to increase penetration depth of doxorubicin in ovarian and digestive tissues. No difference was shown in peritoneal tissues. The variation of pressure does not change the distribution pattern of doxorubicin in peritoneal cavity. The distribution of doxorubicin seems to be better for tissues exposed to the nebulizer.