Megakaryocytes in Rabbit Pulmonary Blood Vessels

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Abstract. Semiserial sections of lung capillaries of seven rabbits were examined for megakaryocytes. Triads of serial sections of each lobe were examined, and megakaryocyte counts per cm^2 were determined. Median megakaryocyte count was determined for each lobe. The lobal values were used to calculate the median cell-counts for each experimental animal. Values of 0.16—0.64 megakaryocytes per cm^2 were established as "normal".

Key words: Megakaryocytes — Irradiation — Lungs — Rabbit

Introduction

As early as in 1893, Aschoff was the first to describe the phenomenon of massive megakaryocytic lung embolisation associated with acute infection in man.

In 1912 Ogata (Moschinski 1966) found numerous megakaryocytes in rabbit pulmonary capillaries after Staphylococcus infection, and Medlar and Sasano in 1931 (Moschinski 1966) observed this phenomenon in BCG-vaccinated rabbits.

Later on, several authors provided evidence for this state to occur in acute infections (puerperal sepsis, dysentery, malaria, etc.), post-operative states, hepatic and renal insufficiency, thrombotic lung embolisation or tumours (Moschinski 1966; Breslow et al. 1968; Tverdy 1967; Aabo and Hansen 1978; Bettendorf and Meyer-Breiting 1974; Kadas and Szell 1981).

The presence of numerous megakaryocytes in the lungs of non-uniformly irradiated rabbits prompted us to try to quantify this unusual pattern in control non-irradiated rabbits.

Materials and Methods

Seven female rabbits (chinchilla) with a median body mass of 3.5 kg (Velaz, Prague) were used. The animals were allowed free access to standard diet KO-16 (Velaz, Prague) and drinking water. The

diet was supplemented with dry bread and carrots twice a week, and 250 g Roboran-H (vitamines and stimulators) per 5 kg wheat starch were given twice a month. The animals were killed by cervical cord contusion with subsequent exsanquination. The respiratory tract was entirely removed and fixed intrabronchially by alkalized formol. Six tissue blocks (one from each lobe and its middle part) were routinelly processed for paraffine embedding. At least twenty triads (i.e. three serial 5 μm sections) cut at 300 μm were investigated in each tissue block. The surface are of the individual sections was one cm^2. Only megakaryocytes in the middle sections were counted. Two outer sections (the left and the right) from the triad served as controls. Mean megakaryocyte counts per cm^2 were determined for each slide (a total of 20—25 slides) and each lobal tissue block. The values thus obtained were used to determine mean megakaryocyte count per cm^2 for each animal. Minimum and maximum counts per cm^2 observed in the animals investigated were considered as "normal-range-values".

Ocular: × 12.5, objective: × 10 (× 25), Carl-Zeiss objective micrometre, staining: hematoxylin-eosin.

Results

Megakaryocytes were mostly present as so-called "naked nuclei" i.e., pycnotic multilobulated cells with irregular chromatin density and indistinct cytoplasm (Fig. 1). The nucleoli of these elements were often seen. The maximum diameter of these cells was only exceptionally larger than 40 μm. Megakaryocytes in the septal arterioles were seen extremely rarely (two slides only).

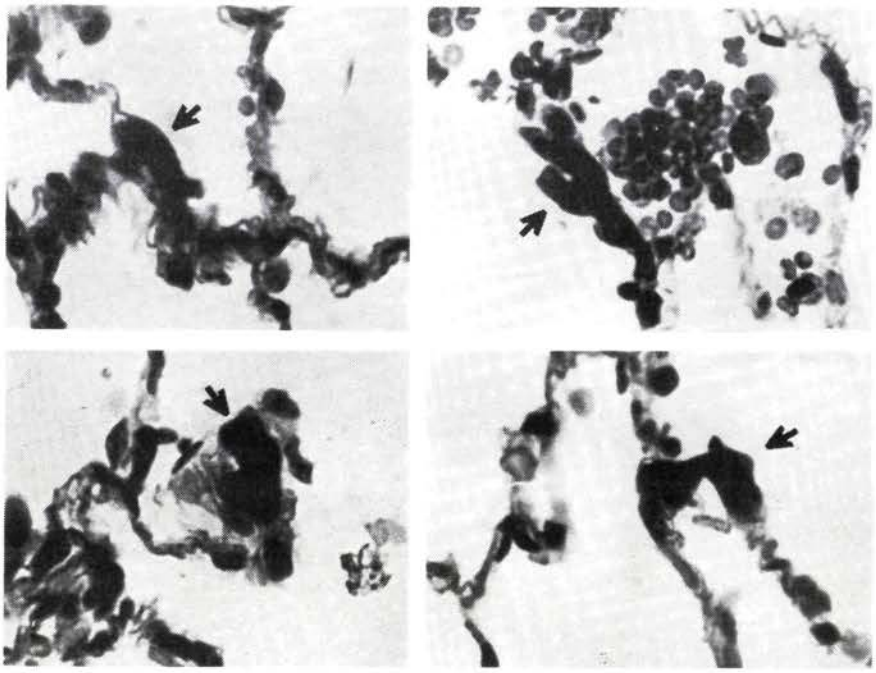

Fig. 1. Four megakaryocytes (arrows) in septal capillaries. Magnif.: × 400, hematoxylin-eosin.

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Table I presents mean values of megakaryocyte counts per cm^2 found in the respective lobe.

Table I. Mean megakaryocyte counts per cm^2

Animal	P1	P2	P3	L1	L2	D
I	0.60	0.21	0.23	0.64	0.52	0.18
II	0.57	0.58	0.75	0.58	0.75	aplastic
III	0.23	0.20	0.19	0.15	0.20	0.04
IV	0.45	0.70	0.60	0.37	0.63	0.78
V	0.23	0.56	0.24	0.15	0.50	0.35
VI	0.25	0.50	0.61	0.45	0.35	0.42
VII	0.35	0.26	0.80	0.50	0.55	0.66

Symbols: P1 — right superior lobe
P2 — right middle lobe
P3 — right inferior lobe
L1 — left superior lobe
L2 — left inferior lobe
D — accessory lobe

Table II. Mean megakaryocyte counts per cm^2 for the individual animals investigated

	Experimental animals						
	I	II	III	IV	V	VI	VII
cells per 1 cm^2	0.36	0.64	0.16	0.58	0.33	0.43	0.52

Mean values of megakaryocyte counts per cm^2 for animals investigated are show in Table II.

In our experiment, a "normal" range of 0.33—0.61 megakaryocytes per cm^2 was found.

Discussion

Our results suggest that megakaryocytes may be present in lung capillaries in absence of any signs of a disease, and this phenomenon can thus be considered as physiological. The median counts of the elements studied by our method did not exceed one megakaryocyte per cm^2 in animal. Altogether more than 900 slides were seen, and four megakaryocytes per one slide were the maximum.

Serial sections were used to exclude the artifacts due to thick section or unproper fixation (a slight alveolar distension). The observed values of 0.16—0.64 megakaryocyte per cm^2 in the lung capillaries can be considered as "normal".

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