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*Dimensions of segmental bronchi of pulmonary lower lobes
in humans and Cercopithecus aethiops*

The variability of the lobular pulmonary structure in Primates is commonly known (1). It concerns both the route of interlobar fissures and their depth. Sometimes the presence of additional fissures is noticeable. According to Boyden (2) and Hayek (4) the lower lobe of the right lung has the greatest differentiation. In the case of this particular lobe, due to the stronger or weaker outline of the additional fissure the accessory lower lobe has been demonstrated. Accessory lobe, which is also called impar, azygos, tertius, quartus, accesorius, cardiacus and infracardiacus are present in many Mammals and almost all Primates (9,10,11). Many authors argue that the last name on this list is the only one (3,5). Łasiński considers the presence of this lobe to be one of the mammalian characteristics (5). Several authors argue that there is some relationship between the chest structure and number of lung lobes in Primates. Hayek claims that the infracardiacus lobe or the additional fissures in this region appear in humans in 30 % of cases (4).

The aim of the study was to determine the bronchial segmental tree dimensions of lower lobes in humans and *Cercopithecus aethiops* and to estimate the possible relations between them.

MATERIAL AND METHODS

The study was carried out on a group of 62 human cadavers (aged 20 to 60; 28 men, and 34 women) and 30 sexually mature corpses of *Cercopithecus aethiops* (14 male and 16 female individuals). Body weight was measured and compared with other authors' data (13).

The trachea and bronchi were swilled out, injected with duracryl and digested in hydrochloric acid, according to standard anatomical techniques (12). After washing out an exact model of the topographically unchanged bronchial tree was obtained. These preparations were dried and the diameters of the segmental bronchi in the lower lobes of both lungs were measured. The statistical analysis was done using the SAS system v. 6.11 (SAS Institute Inc., SAS Campus Drive, Carry, NC 27513, USA). The results are expressed as means \pm SD. Differences between groups were analyzed by ANOVA. The correlation coefficients (r) between the analyzed characters (X, Y) were counted. If $P < 0.05$, differences between the mean values were considered statistically significant.

RESULTS

Human body weight in male ranged from 60.0 to 100.3 kg (average 75.0 ± 10.4) and in female from 41.8 to 83.7 kg (average 64.6 ± 9.4). Monkey body weight in male varied from 1.22 to 2.34 kg (average 1.78 ± 0.18) and in female from 1.23 to 2.41 kg (average 1.82 ± 0.24). Results of the measurements of the bronchial tree are presented in the Tables 1 and 2.

DISCUSSION

The comparison of the data listed in tables 1 and 2 indicates that the diameter of medial basal bronchus both in male and female individuals was the biggest or equal to the diameter of anterior basal bronchus. The results of the measurements of the basal bronchi in human lungs provided by other authors indicate that the diameter of the posterior basal bronchi has the biggest value (2,6). This discrepancy can be attributed to the fact that the bronchial and vascular tree diameters of individual basal segments depend on the posture (7,8). Given the erect position of humans the posterior segments developed more than the medial and anterior ones.

Table 1. Diameters of segmental bronchi in the lower lobe of the right lung (mm). The difference of means marked with the same index is statistically significant ($p < 0.05$)

Segmental bronchi	Female		Male	
	<i>Cercopithecus aethiops</i>	human	<i>Cercopithecus aethiops</i>	human
Superior	1.83 ± 0.29	4.34 ± 0.81	1.72 ± 0.31	4.89 ± 0.78
Medial basal	2.02 ± 0.36^1	4.37 ± 1.25	1.94 ± 0.25^1	5.02 ± 1.23
Anterior basal	2.08 ± 0.33^2	4.04 ± 1.08^1	1.72 ± 0.25	4.71 ± 0.92^1
Lateral basal	1.65 ± 0.27	4.34 ± 0.98	1.73 ± 0.21	4.76 ± 0.99
Posterior basal	$1.47 \pm 0.18^{1,2}$	5.23 ± 1.26^1	1.46 ± 0.57^1	5.69 ± 1.40^1

Table 2. Diameters of segmental bronchi in the lower lobe of the left lung (mm). The difference of means marked with the same index is statistically significant ($p < 0.05$)

Segmental bronchi	Female		Male	
	<i>Cercopithecus aethiops</i>	human	<i>Cercopithecus aethiops</i>	human
Superior	1.92 ± 0.34^1	4.54 ± 0.95	1.63 ± 0.47	5.26 ± 1.29
Medial basal	2.05 ± 0.51^2	4.37 ± 1.18^1	2.04 ± 0.67^1	4.86 ± 1.16^1
Anterior basal	1.98 ± 0.66	3.86 ± 0.52^2	2.02 ± 0.35	4.72 ± 0.57^2
Lateral basal	$1.53 \pm 0.38^{1,2}$	4.53 ± 1.09	1.64 ± 0.22	4.95 ± 1.14
Posterior basal	1.64 ± 0.27	$5.38 \pm 0.69^{1,2}$	1.53 ± 0.19^1	$5.77 \pm 0.83^{1,2}$

CONCLUSIONS

1. In the studied material almost all measured values in *Cercopithecus aethiops* were higher in female individuals in contrast to the results obtained for humans.

2. In both sexes of *Cercopithecus aethiops* medial and anterior basal bronchi have the biggest diameter in both sides.

3. In male and female posterior basal bronchus has humans the biggest diameter.

4. Unlike humans, where the medial segments are small, the medial segments in *Cercopithecus aethiops* constitute a significant functional part of the lungs.

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SUMMARY

The aim of the study was to determine the bronchial segmental tree dimensions of lower lobes in humans and *Cercopithecus aethiops* and to estimate the possible relations between them. The study was carried out on a group of 62 human cadavers (aged 20 to 60; 28 men, and 34 women) and 30 sexually mature corpses of *Cercopithecus aethiops* (14 male and 16 female individuals). The trachea and bronchi were swilled out, injected with duracryl and digested in hydrochloric acid. After washing out an exact model of the topographically unchanged

bronchial tree was obtained. Those preparations were dried and the diameters of the segmental bronchi in the lower lobes of both lungs were measured. The statistical analysis was performed using the SAS system v. 6.11. Differences between groups were analyzed by ANOVA. If $P < 0.05$, differences between the mean values were considered statistically significant. In the studied material almost all measured values in *Cercopithecus aethiops* were higher in female individuals in contrast to the results obtained for humans. In both sexes of *Cercopithecus aethiops* medial and anterior basal bronchi have the biggest diameter in both sides, but in male and female humans posterior basal bronchus has the biggest diameter. Unlike humans, where the medial segments are small, the medial segments in *Cercopithecus aethiops* constitute a significant functional part of the lungs.

Średnica oskrzeli segmentowych płatów dolnych płuc u człowieka i *Cercopithecus aethiops*

Celem pracy była ocena średnicy oskrzeli segmentowych płatów dolnych płuc człowieka i *Cercopithecus aethiops* oraz ocena potencjalnie występujących pomiędzy nimi podobieństw. Badanie przeprowadzono na 62 zwłokach ludzkich (w wieku 20-60 lat, 28 mężczyzn i 34 kobiet) oraz 30 zwłokach dorosłych osobników *Cercopithecus aethiops* (14 samców i 16 samic). W pracy do oceny średnicy oskrzeli segmentowych płatów dolnych płuc wykorzystano preparaty korozyjne wypreparowanych tchawic z drzewem oskrzelowym. Analizę statystyczną przeprowadzono z wykorzystaniem systemu SAS v. 6.11. Do oceny różnic pomiędzy grupami wykorzystano test ANOVA, uznając za istotne statystycznie wyniki o $p < 0,05$. W przebadanym materiale niemal wszystkie średnie wartości średnicy oskrzeli były większe u samic *Cercopithecus aethiops* w przeciwieństwie do wyników uzyskanych na preparatach oskrzeli ludzkich. U obu płci *Cercopithecus aethiops* największą średnicę mają oskrzela podstawne przednie i przyśrodkowe, natomiast u człowieka oskrzele podstawne tylne. W odróżnieniu od segmentu przyśrodkowego u człowieka, segment ten stanowi istotną część funkcjonalną płuc *Cercopithecus aethiops*.