thrombin activity. Our interpretation is that antithrombin III is involved. It can combine with thrombin and is then no longer available for neutralizing autoprothrombin *C*. The two enzymes from prothrombin both have an affinity for the same inhibitor.

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## An Antigenic Difference between 'A' Antigens in Human Epithelial and Endothelial Tissue

The distribution of the blood group A antigen in human tissues as shown by fluorescent rabbit antibody against human ovarian cyst A substance has been previously described[1,2]. It was found that the A antigen in epithelial tissues was not soluble in ethanol and thus differed from the A antigen found in the vascular endothelium, which was removed by ethanol treatment.

Antigenic subdivisions of the human A antigen are already known. Thus Winstanley *et al.*[3] and Konugres and Coombs[4] found that a component ($A^p$) of the human A antigen is present on pig A red cells, and there is reason to believe that other subdivisions of the human A antigen exist in dog A and sheep A (ref. 5). We therefore examined the effect on epithelial and endothelial blood group staining in human tissues of absorbing the rabbit anti-human A fluorescent conjugate with pig A cells.

The A grouping of the pigs was determined by a capillary precipitation test using pig saliva and rabbit anti-human A serum prepared as described by Glynn, Holborow and Johnson[6] and the group was confirmed by agglutination of the pig red blood cells by human immune and rabbit anti-A sera, previously absorbed with pig non-A red cells. The human immune anti-A (batch 3413/79) was kindly given by Dr. R. R. A. Coombs.

The fluorescein conjugate was absorbed with twice its volume of packed pig A red cells for 2 hr. at room temperature. As control, a further conjugate was similarly treated with non-A pig red cells and some also was absorbed with human group A red cells.

Sections of group A human submaxillary gland, thymus gland, stomach and appendix from a secretor were stained with fluorescent anti-A conjugate, and the conjugate absorbed as above. The results are shown in Table 1.

Table 1. Staining of Human Tissue with Fluorescent Anti-A Conjugate and Conjugate absorbed with Pig A, Pig non-A and Human Red Blood Cells

| Human tissue group A | Anti-A conjugate | Anti-A conjugate absorbed pig non-A red blood cells | Anti-A conjugate absorbed pig A red blood cells | Anti-A conjugate absorbed human A red blood cells |
|---|---|---|---|---|
| Thymus capillaries | + | + | + | 0 |
| Submaxillary gland (mucous cells) | + | + | 0 | 0 |
| Stomach mucosa | + | ND | 0 | ND |
| Appendix mucosa | + | ND | 0 | ND |
| Appendix capillaries | + | ND | + | ND |

+, Specific staining; 0, no staining; ND, not done.

It is seen that absorption by pig A cells removes the staining of the water-soluble A substance in the epithelial tissues whereas the alcohol-soluble A substance in the endothelium of the capillaries remains unaffected. Absorption with human A red cells removes all staining.

These results indicate that the A antigen of human vascular endothelium possesses determinants different from (but presumably in addition to) those present in mucosal water-soluble antigen. They also show that the antigen originally used to stimulate the production of anti-A in the rabbit—human group A substance from human ovarian cyst fluid—itself contains both antigenic variants.

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# PATHOLOGY

## Zinc Content of Hair from the Head of Carcinoma Patients

During an investigation, preceding our work on the decreased zinc-level of whole blood of carcinoma patients in connexion with the progress of the disease[1-3], we found that other tissues also (heart, spleen, liver, kidney, etc.) show a decrease of zinc content in carcinoma cases. This is comprehensible because blood flows through all these tissues. It therefore seemed to us to be of interest to analyse blood-free tissues, and hair from the head was chosen for this purpose.

Hair is formed in the hair follicle out of relatively small protein molecules present in the serum of the blood. During growth, keratinization takes place: the molecules become larger and —Zn—S— bridges are formed, which give the hair its stiffness.

In an autoradiographic investigation, Mawson *et al.*[4] showed that, after treatment of rats with zinc-65, this isotope was found only near the hair follicle. This indicates that at those spots exchange of non-active zinc with zinc-65 is possible, whereas farther away from the follicle, after complete keratinization, zinc is firmly bound to sulphydril groups in such a way that a turn-over cannot occur. For the determination