BIOCOMPATIBILITY - EXPERIMENTS ON MODEL SURFACES

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The compatibility of a material when it contacts blood and tissue is most often defined as the absence of (adverse) protein mediated activation of blood clotting, complement, and inflammation. The degree of activation on a specific surface is then largely dependent on the surface physical and chemical characteristics. The interaction sequences, often protein mediated, are extremely complex in nature and difficult to monitor. Studies of protein adsorption patterns on model surfaces may therefore, in combination with *in vivo* data (not shown here) be one means to study these phenomena. Relevant protein solutions suitable to investigate are serum and plasma, and Hank's and diethyl-barbital/barbituric acid suitable buffers for clotting and complement, respectively. Polyclonal antibodies against high molecular weight kininogen (HMWK), factor XII (F XII), and prekallikrein indicate blood contact activation, and Immunoglobulins (Ig:s), complement factors C1q and C4 (the classical pathway), and C3 (alternative and classical pathways) readily reveal surface bound complement factors upon activation. Surface located fibrinogen is an important marker for inflammatory activation.

3-mercaptopropionic acid (MPA) and 3-mercapto-1, 2-propanediol were immobilized from aqueous solutions onto gold (see Figure 1.), and protein adsorption from heparinized human plasma measured by using antibody and ellipsometry techniques (see Figures 2, 3 below).

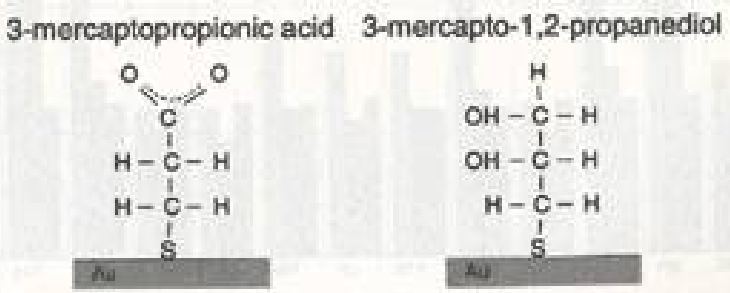

Fig. 1 - Schematics of MPA and glycerol immobilized on gold.

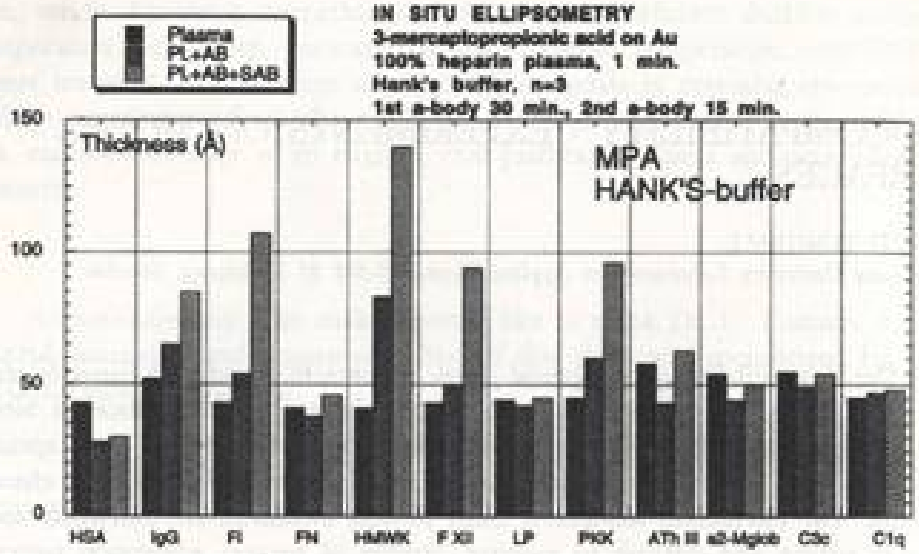

Fig. 2 - Antibody binding onto MPA incubated in plasma.

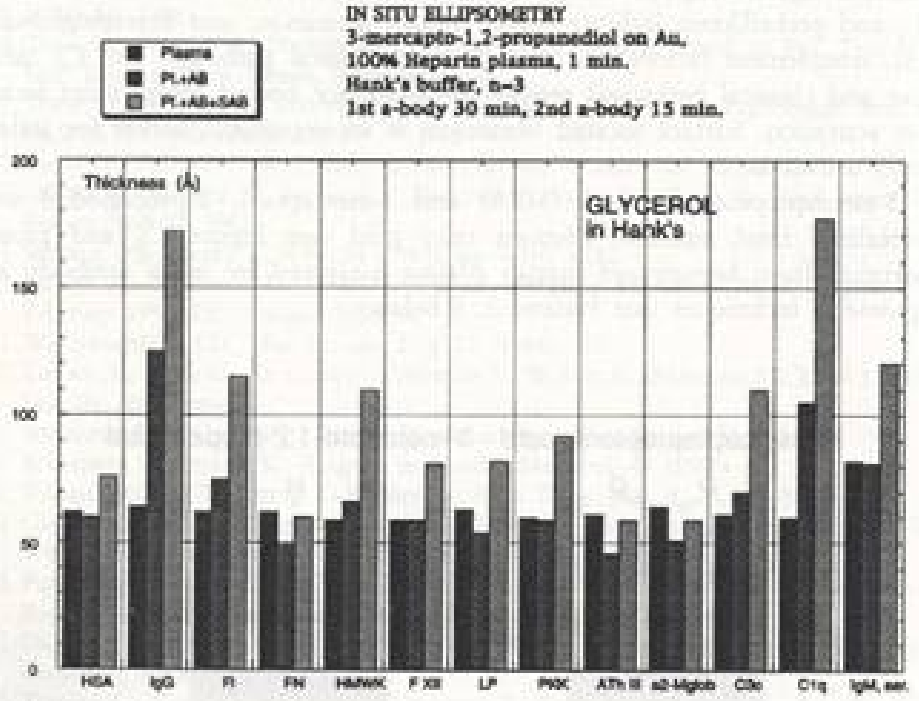

Fig. 3 - Antibody binding to glycerol incubated in plasma.

Figure 2. below indicates that MPA is a blood contact activator (binds a-HMWK, a-PK, and a-F XII. From Figure 3. we immedetealy recognize that glycerol, when immobilized, activates complement (binds a-C3, a-IgG, and a-C1q). Thus, thiols on gold offer a powerful tool for systematic studies on the impact of surface chemistry for humoral system activation.