fibers was greater in alkali than in acid, and this could explain the changes in action potential duration observed in this study; furthermore, the reduction of the maximum rate of depolarization as well as the increased conduction time produced at pH 3.0 may be the result of competition between H^+ and Na^+ for membrane carriers[13].

Zusammenfassung. Der Einfluss von pH-Änderungen auf die Kontraktions- und elektrischen Eigenschaften von Rattenvorhöfen wurde in pufferfreien Medien untersucht; eine Suspension von Vorhöfen in pufferfreier Krebs-Ringerlösung hatte eine zweiphasige inotrope Wirkung, (anfängliche Erregung, hierauf progressive Entspannung). Reduktion des pH von 7,4 auf 6 hatte keine bedeutende Wirkung auf die kontraktile Spannung, während eine Erhöhung des pH von 7,4 auf 8,8 das Spannungsdekrement verringerte. Saures Medium erhöhte die Dauer der Aktionspotentiale, verringerte die maximale Geschwindigkeit der Depolarisierung und verlängerte die Leitungszeit, während ein alkalisches Medium die Dauer der Aktionspotentiale verkürzte.

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Viscosity Changes of Synovia after Application of Water Treated with Ultrasound

In our recent experiments[1,2] we demonstrated an increased permeability of water treated by ultrasound through connective tissue membranes. The effect of chemically active substances formed in sounded water on the colloids of connective tissue may be responsible for this effect. It is known that 2 principal compounds in connective tissue are present: collagen and mucopolysaccharides. Depolymerization of mucopolysaccharides determines an increase of connective tissue permeability in some experiments[3,4].

In order to prove the possibility of a similar mechanism under the conditions of our experiments, the effect of sounded water on synovia fluid has been investigated using changes in its viscosity as the measure of the degradation of hyaluronic acid.

The synovia was taken from the bovine joints and cleaned by filtration and centrifugation[4]. The relative viscosity was determined by an Ostwald capillary viscosimeter. All the measurements were made with fresh samples of synovia. After the first measurement of viscosity the synovia was diluted (5:1) with the deionized water (control), deionized water treated with ultrasound (frequency 800 kc, irradiation time 1 min, intensity 1 W/cm^2) and for comparison with hydrogen peroxide solution at a concentration of 1%. Viscosity measurements were repeated several times. The results, summarized in the Table indicate a rapid lowering of viscosity 2 min after the addition of the experimental solution. Using sounded water, the decrease of viscosity ceases within 10 min; using the hydrogen peroxide solution, the viscosity of synovia drops to the value of the viscosity of water. The decrease in viscosity under a lower concentration of hydrogen peroxide was not so evident.

Mean % of change of relative viscosity against the value of the first measurement (100%)

Min[a]	Control	Sounded water	Hydrogen peroxide
2	88.5	76.5	78.0
4	↓	74.5	76.5
6	↓	70.0	72.5
10	↓	68.0	72.0
30	↓	↓	65.5
60	↓	↓	63.0
120	↓	↓	62.5

[a] Time in min measured after adding experimental solutions.

A 0.06 mg % concentration of hydrogen peroxide as determined by polarographic method[5], was found in the water treated by ultrasound under our conditions. The decrease in viscosity when using sounded water is approximately the same as using 1.00 mg% solution of hydrogen peroxide. The presence of stabilizers in commercial hydrogen peroxide, or the additive role of free radicals in the sounded water, may be responsible for this difference.

Our results indicate that the indirect effect of ultrasound on the connective tissue may be caused by the chemical action of hydrogen peroxide[6,7] or of free radicals[8] on the mucopolysaccharides of connective tissue. These chemically active compounds can depolymerize the long chains of mucopolysaccharides, or they can only loosen the tertiary structure of polysaccharides and their hydration. Both these changes result in the decrease of anomalous viscosity of mucopolysaccharides.

Zusammenfassung. Nach Applikation von beschalltem Wasser wurde infolge physikochemischer Degradation der Polysaccharide ein Viskositätsabfall der Synovia nachgewiesen.

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