Simple correlation matrix for variables descriptive of eating pattern, food intake, and heart disease risk factors in Maryland men

Variable identification	Sys	Dias	Chol	Tri	Cal	Fat	Suc	Alc	Smo	PI	Cof	Col	E.F.
Age	0.26^{b}	0.17^{b}	0.36^{b}	0.15^{b}	-0.27^{b}	-0.05	-0.20^{b}	0.00	0.07	-0.22^{b}	0.14^{b}	-0.29^{b}	-0.06
Systolic blood pressure (Sys)		0.57^{b}	0.19^{b}	0.14^{b}	-0.18^{b}	0.00	-0.10^{a}	0.14^{b}	0.02	-0.28^{b}	0.05	-0.12^{a}	-0.22^{b}
Diastolic blood pressure (Dias)			0.12^{a}	0.07	-0.15^{b}	0.02	-0.07	0.14^{b}	0.02	-0.24^{b}	0.04	-0.11^{a}	-0.16^{b}
Cholesterol level (Chol)				0.45^{b}	-0.08	0.00	-0.06	0.08	0.16^{b}	-0.23^{b}	0.18^{b}	-0.03	-0.14^{b}
Triglyceride level (Tri)					-0.06	-0.08	-0.01	0.10^{a}	0.19^{b}	-0.22^{b}	0.15^{b}	-0.02	-0.12^{a}
Caloric intake (Cal)						-0.06	0.26^{b}	-0.18^{b}	0.03	0.22^{b}	0.03	0.53^{b}	0.15^{b}
% Fat calories (Fat)							-0.60^{b}	-0.06	0.06	0.05	0.07	-0.38^{b}	0.03
% Sucrose calories (Suc)								-0.25^{b}	0.00	0.06	-0.05	0.78^{b}	0.01
% Alcohol calories (Alc)									0.14^{b}	-0.07	0.11^{a}	-0.12^{a}	-0.17^{b}
Smoking (Smo)										-0.06	0.32^{b}	0.10^{a}	-0.19^{b}
Ponderal index (PI)											-0.07	0.11^{a}	0.12^{a}
Coffee drinking (Cof)												-0.03	-0.11^{a}
Cola drinking (Col)													0.05
Eating frequency (E.F.)													

Critical correlation coefficients. ^{a} $r = \pm 0.10$ ($p < 0.05$); ^{b} $r = \pm 0.14$ ($p < 0.01$).

involves a 3rd factor. Coffee drinking seems to act as an index of life style. Central to this life style seems to be infrequent eating. Infrequent eating correlated significantly with all of the heart disease risk factors studied. Moore et al.[10] have taken this relationship 1 step further and found raised coronary lesions in deceased persons who practiced an earlier life style that included infrequent eating.

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Evidence for cross bridge slippage in a stretched muscle fibre[1]

K. Güth, H.J. Kuhn, J.W. Herzig and J.C. Rüegg

Department of Physiology II, University of Heidelberg, Im Neuenheimer Feld 326, D-6900 Heidelberg (Federal Republic of Germany), 16 December 1977

Summary. Bundles of glycerol-extracted psoas fibres which were contracted by immersion in a saline containing 15 mM MgATP and 12 μM free Ca^{++} were subjected to up to 3 stretches (rise time 0.8 msec) each of amplitude 1% L_i at intervals of 10 msec. The elastic tension responses to these stretches were all of comparable size and the peak tensions reached during the stretches were in each case followed by a rapid tension decline almost to the tension values before the stretches. This indicates that stretch-induced detachment and reattachment of cross bridges to the actin filament occurred within 10 msec (slippage).

The Huxley and Simmons model (1971)[2] for muscle contraction attributes the quick phase of the tension transient, following a quick length change, to rotation of acute angled cross bridges into a perpendicular position[3,4]. The elastic elements of these rotated cross bridges are thereby discharged, bringing about a decline in tension. The Huxley and Simmons model[2] further postulates that, once a cross bridge is attached, it remains attached for at least several tens of msec, i.e. no appreciable attachment or detachment of cross bridges can take place within the quick phase.

According to Huxley[5] and Podolsky[6] on the other hand, rapid attachment and detachment processes may take place during the quick tension transients.

Major criteria for deciding between such models are provided by the analysis of force transients. In order to investigate whether fast attachment and detachment processes take place during the quick phase or not, we performed double stretch and triple stretch experiments.

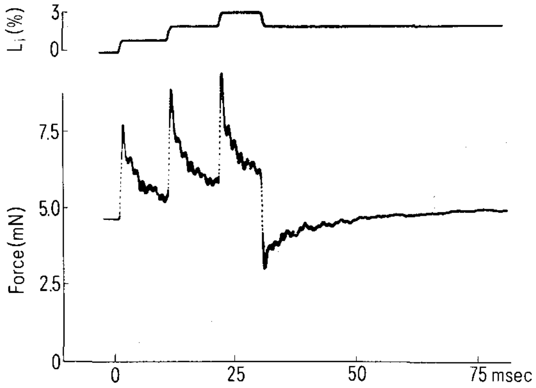
Methods. A bundle of 5 glycerol-extracted[7] rabbit psoas fibres was bent as a loop around the pin of a RCA-5734 force transducer (resonance frequency 2 kHz), and the 2 free ends were glued to a glass rod attached to a servo controlled Ling Dynamics type 101 Vibrator[8]. Length steps performed within 0.8 msec were recorded by field plates. The preparation was first immersed in relaxing solution containing: 15 mM ATP, 15 mM $MgCl_2$, 20 mM imidazole 4 mM EGTA, pH 6.7, estimated free Ca^{++}-concentration of $< 10^{-8}$ M. The bundle was subsequently immersed in contraction solution. This was identical with the relaxing solution except that EGTA was replaced by 4 mM CaEGTA (Ca^{++}-concentration 1.2×10^{-5} M).

Results. In the contracting state (isometric tension 4.5 mN), 3 stretches and a subsequent release were performed. Each length change had an amplitude of 1% L_i of the initial length of the fibre. The corresponding force transient is shown in the figure.

Note that the first stretch induces an immediate increase in tension which is followed by a rapid decline of tension which, within ca. 10 msec, leads almost to the value obtained before stretch. The transients observed after 2 further steps were very similar to the first one. The subsequent release produced a transient tension drop comparable to the immediate tension increases after the stretches. This immediate phase is followed by a recovery of tension up to the level observed before the first stretch, i.e. the tension remains the same while the muscle length is increased by 2% L_i.

To prove that the results obtained are due to cross bridge activity, and not only to passive elastic properties of the fibres, we performed the same experiment in relaxing solution. The tension responses observed were only about 10% of those obtained in the contracting state.

Discussion. It might be argued that detachment alone is responsible for the quick phase. One would then expect the number of attached cross bridges to become smaller with each stretch. But the elastic increase of tension induced during each stretch, and the elastic decrease in tension induced during the release, are more or less of the same amplitude. This indicates that the stiffness and consequently (cf. Huxley and Simmons[2]) the net number of attached cross bridges is almost the same at the end of each quick phase.



Triple stretch experiment of glycerinated psoas fibres immersed in a saline containing 15 mM MgATP pCa 4.9 (pH 6.7, I = 0.1 M, 23 °C). Upper trace = length change; lower trace = force developed by 2 × 5 fibres (see 'methods').

Huxley and Simmons[2] proposed that a single cross bridge is displaced by $\sim$ 10 nm on rotation due to the force generating process. Assuming that cross bridges do not detach during and after the 1% L_i length step, the bridges ought to rotate from an acute angle into a perpendicular position as proposed by Huxley and Simmons[2] (cf. also Julian et al.[9]). However, if they remained attached, a 2nd (and 3rd) stretch should be unable to induce a quick tension decay due to cross bridge rotation. This prediction was not fulfilled in our experiments. On the contrary, a pronounced quick phase was observed after the second and even after the 3rd 1% L_i stretch, although the time between the length changes was only 10 msec.

We therefore propose that additional to crossbridge rotation the decline of tension following large stretches is attributable to detachment of cross bridges (with discharge of their elastic elements), and reattachment of cross bridges in a new (slipped) position. This process requires that attachment and detachment occur within 5 msec, i.e. at a rate greater than the known rates of ATP splitting. The postulated attachment and detachment of cross bridges is unlikely to be associated with ATP splitting, as in the case of complete cross bridge cycles. Instead they may reflect the existence of a rapid equilibrium of detached and attached bridges of the type recently proposed by White and Taylor[10] (cf. also Güth and Kuhn[11]).

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Circadian rhythmicity in phosphorylase activity and glycogen content in the heart muscle of the scorpion, *Heterometrus fulvipes*, C.L. Koch

V. Jayaram[1], D. Chandra Sekara Reddy and B. Padmanabha Naidu

Department of Zoology, S.V. University, Tirupati-517502 (India), 15 August 1977

Summary. Maximal activity levels of phosphorylase A and AB at 20.00 h alternate with minimal levels at 08.00 h of the day, while the glycogen content exhibited a reverse trend in the heart of the scorpion, *Heterometrus fulvipes.*

Earlier investigations on the physiology of the scorpion, *H. fulvipes* showed the presence of rhythmic variations in locomotion[2], rate of heart beat[3], electrical activity of the ventral nerve cord[4], enzymatic activities[3,5,6] and in the levels of blood glucose and hepatopancreatic glycogen[7]. Therefore an attempt has been made to see whether such changes would also occur in phosphorylase activity and glycogen content of the heart. The activity pattern of phosphorylase, which is involved in glycogen breakdown, may reflect the pattern of utilization of carbohydrate energy sources in the various metabolic pathways during the course of 24-h period.

Material and methods. Scorpions, collected from the local hilly terrain, were maintained in glass vivaria containing