P-124
Extracellular carbonic anhydrase contributes to the regulation of Ca2+ homeostasis and salivation in submandibular salivary gland
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The maintenance of pH in the oral cavity is important for the oral heath since even a minor drop in pH can result in dental caries and damage to the teeth. Submandibular salivary gland (SMG) is main source of fluid and electrolytes enriched saliva therefore its core for oral pH homeostasis. SMG secretion is activated by acetylcholine (Ach) in $[Ca^{2+}]_i$-dependend manner and accompanied with oral pH acidic shifts. pH shifts could be due to changes in buffering capacity that is regulated by carbonic anhydrase (CA). Despite the expression of different subtypes of CA in SMG the role of CA in the regulation of SMG function is unclear yet. We found that CA inhibition by benzolamide (BZ) decreased of fluid secretion *in vivo* extracellular Na^{2+} concentration *in situ*. The latter confirm the ability of CA to modify both primarily and final saliva secretion. We also found correlation between the secretion and Ca^{2+}-homeostasis since BZ-induced decrease of: i) total resting calcium content and stimulating effect of ACh; ii) activity of endoplasmic reticulum Ca^{2+}-ATPase; iii) mitochondrial Ca^{2+}-uptake. Thus CA contributes to saliva pH via cytosolic Ca^{2+} handling in SMG acinar cells and that this effect is mediated via cholinoreceptors.

O-125
A simple model to describe single and multichannel calcium regulation of ryanodine receptors
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In cardiac muscle, type 2 ryanodine receptor (RyR2) functioning relies on cellular Ca^{2+} levels from both background cytosolic Ca^{2+} and from neighboring open RyRs. Activation of RyR2 is brought on by calcium-induced-calcium release (CICR), but the CICR termination mechanism remains unknown. A simple physical model is developed that is able to describe the Ca^{2+} dependence of a single RyR2 and a multichannel array of RyR2. The open probability of RyR2 is defined through a two-site Hill function comprised of one activation site and one inactivation site per subunit. The diffusion equation for a steady state point source defines the Ca^{2+} concentration in the region of the RyR2 activation and inactivation sites, for which experimental Ca^{2+} dissociation constant values were used. Metropolis Monte Carlo simulations show open probabilities for one and two RyR2s consistent with electrophysiology measurements. The model shows that large RyR2 clusters exhibit a sharp transition in open probability as a function of RyR Ca^{2+} current at physiological cytosolic Ca^{2+} levels. Such a characteristic may suggest not only an activation mechanism for multiple RyR2, but also a method of CICR termination in clustered RyR2 channels.

O-126
High sensitivity of Ca2+ wave propagation to ryanodine receptor inhibition in cardiac myocytes
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In ventricular cardiac myocytes, global Ca^{2+} release from the sarcoplasmic reticulum (SR) is accomplished through the triggering of ryanodine receptors (RyR) via Ca^{2+} influx from voltage-gated Ca^{2+} channels of the cell surface. Spontaneous, propagating Ca^{2+} release events (Ca^{2+} waves) are associated with the generation of arrhythmogenic currents. These also constitute the dominant mode of global Ca^{2+} release in cells with sparse t-tubular networks, such as atrial myocytes, representing an alternate, non-triggered form of global SR Ca^{2+} release. The mechanism of propagation is however still under debate [1,2]. In this study it will be shown that partial, irreversible inhibition of RyR clusters using ruthenium red (an effectively irreversible blocker) had differential affects on Ca^{2+} sparks and waves. Modest inhibition of RyR clusters abolished Ca^{2+} wave propagation, whilst Ca^{2+} sparks were relatively unchanged.
Computer modeling of this system showed a dependence of cluster size on the affect of inhibition on Ca^{2+} wave propagation; with smaller clusters being more sensitive to irreversible inhibition; larger cluster fluxes were relatively unchanged by modest inhibition and so propagation was uninterrupted. This highlights the importance of smaller clusters in Ca^{2+} wave propagation.

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O-127
Alterations of ryanodine receptor (RyR) function and arrhythmogenic Ca^{2+} waves in cardiomyocytes
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In cardiomyocytes, spontaneous Ca^{2+} release from the SR can occur in diastole, as Ca^{2+} sparks. Sparks arise from accidental openings of a few ryanodine receptors (RyRs). However, under pathophysiological conditions, chain reactions of sparks can occur as Ca^{2+} waves. SR Ca^{2+} overload and (hyper)-phosphorylation are known to favor wave occurence. We reported that changes of the luminal SR Ca^{2+} concentrations mediated by SERCA contribute to wave propagation, by sensitizing the RyRs for cytosolic Ca^{2+}. β-Adrenergic stimulation also speeds up Ca^{2+} waves. This could be mediated via SERCA stimulation and thus SR Ca^{2+} loading. Alternatively, Ca^{2+} waves may travel faster because of RyR phosphorylation. Using a transgenic mouse lacking the RyR phosphorylation site at serine 2808 (S2808A), we obtained further insight into spreading of Ca^{2+} waves. We consistently observed acceleration of Ca^{2+} waves upon β-adrenergic stimulation in WT myocytes by 15%. However, Ca^{2+} waves in S2808A cells did not increase their velocity, even though successful SERCA stimulation was confirmed

as faster wave decay. Taken together these results indicate that SR luminal Ca^{2+} sensing and RyR phosphorylation may be important for Ca^{2+} wave propagation and the Ca^{2+} sensitivity of the RyRs. Support: SNF & Transcure.

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Complementary methods in determining the chemical composition of renoureteral calculi

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Renoureteral lithiasis is a disease with a relatively high incidence among the population. Getting the chemical structure of the stones is very important in medical practice, both in terms of surgical approaches for applying a minimal invasive treatment and also for the medical drug therapy administrated to the patients. Stones have been collected by endourological procedures and open surgery operations in urologic department. Preliminary estimation on the structure of the studied calculi was established by the X-ray exam (KUB and IVP) and urine lab tests. Structural investigation and calculi composition was performed through the FTIR spectrophotometer method and complementary SEM-EDAX electron microscopy. The combination of FTIR spectroscopy and SEM-EDAX allowed quantitative and qualitative evaluation of the components, the spatial distribution and the percent of major and trace elements present in a sample. The surface morphology of the samples and elemental analysis performed by SEM-EDAX confirms the presence of oxalate, carbonate and cystine. The final result has showed some non homogeneous structures and different concentrations of the chemical components of the stones.

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P-129

Effects of phosphatidyl-inositol-phosphates (PtdInsP) on calcium release events in mammalian skeletal muscle fibres

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In striated muscle Ca^{2+} release from the sarcoplasmic reticulum (SR) occurs when ryanodine receptors (Ryr-s) open either spontaneously or upon the stimulation from dihydropyridine receptors that are located in the adjacent transverse-tubular membrane and change their conformation when the cell is depolarized. Recent observations demonstrated that muscles from animal models of PtdInsP phosphatase deficiency suffer from altered Ca^{2+} homeostasis and excitation-contraction coupling, raising the possibility that PtdInsP-s could modulate voltage-activated SR Ca^{2+} release in mammalian muscle. The openings of a single or a cluster of Ryr-s can be detected as Ca^{2+} release events on images recorded from fibres loaded with fluorescent Ca^{2+} indicators. To elucidate the effects of PtdInsP-s on Ca^{2+} release events, images were recorded from skeletal muscle fibers enzymatically isolated from the *m. flexor digitorum breavis* of mice utilizing a super-fast scanning technique. A wavelet-based detection method was used to automatically identify the events on the images. Three different PtdInsP-s (PtdIns3P, PtdIns5P, and PtdIns(3,5)P) were tested. All these PtdInsP compounds decreased the frequency of spontaneous Ca^{2+} release events. Supported by the Hungarian National Science Fund (OTKA 75604), TéT.

O-130

Caffeine and depolarization alters the morphology of calcium spark in amphibian skeletal muscle

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Calcium sparks elicited by 1 mmol/L caffeine and by a depolarization to -60 mV were recorded at high time resolution on both x-y (30 frames/s) and line-scan images (65 lines/ms) on intact skeletal muscle fibers of the frog. While a typical spark appeared in one frame only, 17.3 and 26.0% of spark positions overlapped on consecutive frames following caffeine treatment or depolarization, respectively. While both caffeine and depolarization increased the frequency of sparks, as estimated from x-y images, the morphology of sparks was different under the two conditions. Both the amplitude (in $\Delta F/F_0$; 0.49 ± 0.025 vs. 0.29 ± 0.001; $n = 22426$ vs. 23714; mean $\pm$ SEM, $p < 0.05$) and the full width at half maximum (in μm; parallel with fiber axis: 2.33 ± 0.002 vs. 2.21 ± 0.005; perpendicular to fiber axis: 2.07 ± 0.003 vs. 1.88 ± 0.004) of sparks was significantly greater after caffeine treatment than on depolarized cells. These observations were confirmed on sparks identified in line-scan images. In addition, x-t images were used to analyze the time course of these events. Calcium sparks had significantly slower rising phase under both conditions as compared to the control. On the other hand, while the rate of rise of signal mass was decreased after depolarization, it increased in the presence of caffeine.