

## PL1-1

**Istraživanja iz laboratorijske medicine na velikim nadmorskim visinama**Huber A<sup>1</sup>, Pichler J<sup>1</sup>, Hefti U<sup>2</sup>, Weinberger K<sup>3</sup><sup>1</sup>Kantonalna bolnica Aarau, Aarau, Švicarska<sup>2</sup>Kantonalna bolnica Liestal, Liestal, Švicarska<sup>3</sup>Biokrates Innsbruck, Innsbruck, Austrija

Tijekom dva ekspedicijska istraživanja na velikim nadmorskim visinama 2005. (Muztagh Ata, 7.627 m, zapadna Kina s 34 dobrovoljaca) i 2009. (Pik Lenin, 7.230 m, Kirgistan s 30 dobrovoljaca) provedeno je sakupljanje krvi i pokušno testiranje na raznim visinama iznad 6.800 m, kako bi se dobio uvid u patomehanizam akutne visinske bolesti (engl. *acute mountain sickness*, AMS), visinskog plućnog edema (engl. *high altitude pulmonary edema*, HAPE), i moždanog edema (engl. *high altitude cerebral edema*, HACE). Procjena funkcije bubrega, srca i koagulacije metodom procjene brzine glomerularne filtracije pomoću kreatinina (eGFR kreat) i cistatina C (eGFR cist), ANP, BNP i CNP, otkrila je 30%-tno smanjenje GFR, izostanak značajnih promjena srčanih biljega, no otkrivene su značajne promjene u sklonosti zgrušnjavanja i krvarenja. Nije nađena povezanost s akutnom visinskom bolesti, no otkrivene su neke povezanosti s HACE i HAPE kod bubrežnih promjena, ovisno o nadmorskoj visini. Nadalje, metodom masene spektrometrije (metabolomika) ustanovljene su značajne metaboličke promjene, što ukazuje na stvaranje reaktivnih spojeva kisika (engl. *reactive oxydative species*, ROS) uvjetovano nadmorskom visinom. Tijekom druge ekspedicije korišten je protokol dvostruko slijepog istraživanja te postavljena teorija o smanjenom stvaranju ROS i poboljšavanju tolerancije vježbanja kao i pogoršanje stanja AMS, HACE i HAPE. Na kraju treba spomenuti da su ove dvije ekspedicije omogućile jedinstvenu istraživačku aktivnost u uzbudljivoj okolini i s izvanrednim timom.

e-pošta: [andreas.huber@ksa.ch](mailto:andreas.huber@ksa.ch)

## PL1-1

**Laboratory medicine research on highest niveau**Huber A<sup>1</sup>, Pichler J<sup>1</sup>, Hefti U<sup>2</sup>, Weinberger K<sup>3</sup><sup>1</sup>Kantonsspital Aarau, Aarau, Switzerland<sup>2</sup>Kantonsspital Liestal, Liestal, Switzerland<sup>3</sup>Biokrates Innsbruck, Innsbruck, Austria

During 2 high altitude research expeditions in 2005 (Muztagh Ata, 7'627 m, Western China with 34 volunteers) and in 2009 (Pik Lenin, 7'230 m, Kirgistan with 30 volunteers) blood sampling and exercise testing was performed at different altitudes up to 6,800 m in order to gain insight into pathomechanisms of acute mountain sickness (AMS), high altitude pulmonary edema (HAPE), and high altitude cerebral edema (HACE). Evaluation of renal function, cardiac function and coagulation by eGFR kreat and eGFR cist, ANP, BNP and CNP as well as various coagulation tests revealed a 30% reduction of GFR, no significant changes of cardiac markers, yet significant prothrombotic as well as hemorrhagic changes of coagulation. No correlation with AMS was found, but some correlations with HACE and HAPE were seen in renal changes dependent on altitudes. Further, significant metabolic changes were detectable using mass spectrometric methods (metabolomics) indicating altitude dependent generation of reactive oxydative species (ROS). During the second expedition using a double blind study protocol, we postulated attenuation of ROS generation and improvement of exercise tolerance as well as amelioration of AMS, HACE and HAPE. Finally, the 2 expeditions allowed for a unique research activity in an exciting environment and team constellation.

e-mail: [andreas.huber@ksa.ch](mailto:andreas.huber@ksa.ch)