**Background** Anti-EC antibodies (AECAs) may be pathogenic in vasculitides. Among a wide range of autoAg, they may recognise ATP synthase, a proton transport molecule regulating intracellular pH (pHi) expressed on the surface of ECs. The aim of the current study was to evaluate ATP synthase antigenicity in vasculitides, and anti-ATP synthase effect on cell surface ATP synthase function.

**Methods** Sera from primary (group I) and secondary (group II) vasculitides were tested for ATP synthase reactivities using bovine ATP synthase as substrate in ELISA and western blot assays. EAhy926 cells were incubated in acidic medium and analysed by flow cytometry to assess ATP synthase activity in pHi regulation in the presence of serum.

**Results** Anti-ATP synthase autoAbs were found in group I patients with higher frequency than in group II. AutoAbs from group I were directed to the β subunit, whereas those from group II were reactive to α, β and γ subunits of ATP synthase. In acidic medium, pHi of ECs decreased in the presence of some autoAbs. However, dysregulation of ATP synthase activity could not be associated with specific antigenic recognition. Finally, HSP60 found as a ligand of ATP synthase, impeded deleterious effect of anti-ATP auto-Abs.

**Conclusion** Cell surface ATP synthase appears as a novel target for AECAs. Its function can be altered by autoAbs resulting in disruption of pH regulation. This suggests that in acidic environment, survival of ECs can be compromised by anti-ATP synthase autoAbs in vasculitides, although modulated by the presence of HSP60.