ECRONICON OPEN ACCESS

EC PULMONOLOGY AND RESPIRATORY MEDICINE

Editorial

Gap-Junctional Intercellular Communication in the Lungs and Airways: An Underscored Direction of Research

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Received: January 27, 2026; **Published:** February 02, 2026

After almost 50 years of participation in research, the author of this Editorial has no doubt anymore about somewhat pulsatile nature of scientific exploration. In fact, although there occur sometimes breakthrough advances, thereafter these advances are not recognized or supported by higher attention of researchers for years or even decades. There are several reasons for these dynamics: low capacity of each scientist to dedicate investigative activities in more than one, rather limited area of research, as well as the barriers between disciplines and even languages. In several cases the stagnation is related also to low availability of adequate experimental models.

We would like to demonstrate this logic on example of gap-junctions and intercellular communication, as applied to pulmonology and respiratory medicine. As a matter of fact, our research in this area began already in the nineties of the last century, being inspired by the works of research group headed by Paulo Meda in Switzerland that was able to show important role of gap junctions in regulation of insulin secretion, using heptanol as inhibitor of intercellular communication (See discussion in [1]).

Applying a similar compound, octanol, we were able to demonstrate at first an important role of gap junctions in regulation of prolactin and growth hormone secretion in primary cultures of rat pituitary cells [2-5]. Thereafter, in the Department of Industrial Pharmacy, Federal University of Santa Maria in Brazil, we were lucky to use the same principles for studying the role of gap junctional intercellular communication in regulation of contractile activity of myometrium [1,6,7], employing the experimental model of isolated rat uterus *ex vivo* used previously mainly for evaluation of oxytocin biological activity.

It is interesting that before us only one research group in Canada studied the dynamics of gap junctions in rat myometrium after estrogen stimulation. Therefore, when these data were published by us in short mini-review article together with evidence on hormone secretion [1], they attracted proper attention of other researchers almost immediately.

It is symptomatic also that the results on isolated rat uterus were presented by us much earlier on Pan-American Congress of Biochemistry and Molecular Biology in Pucon, Chile [6], but here one more important factor should be considered: in a situation of information overload, many data in abstracts of scientific events are overlooked for years and even decades, simply because the publishers in general don't like the citations to such abstracts. There is only one exclusion to this unfortunate rule: exploration of topics like HIV - AIDS that is rapid enough to oblige the authors to cite the abstracts also.

Finally, what about pulmonology and respiratory medicine? Here the situation repeats, as compared with tissue streaming [8]: although some scarce data already exist [9,10], nevertheless, in general there are great perspectives of amplifying the research in near future. The main problem, however, is a scarcity of adequate experimental models for evaluation of gap-junctional intercellular communication in the lungs and airways.

Therefore, in conclusion we would like to repeat the same manner used by us earlier: following Gershom Zajicek that generalized tissue streaming from the liver to the whole organism, quite probably including the lungs and airways (see discussion in [8]), we shall consider the contribution of gap junctions in a broader sense of bioregulation as a whole [11].

Here again, we were lucky to be in touch with several researchers which were able already in the eighties of the last century to elaborate the concept of non-nervous information transfer for explanation of acupuncture mechanisms [12]. On its basis we launched an hypothesis of the involvement of diffuse neuroendocrine system in the inner paths of acupuncture channels (meridians) [13].

On the other hand, a simple approach of differentiating all the known bioregulators to the two groups, capable or not to penetrate through gap-junctional channels, according to their molecular weight [14], has clearly shown the importance of intercellular communication in general, probably beginning from the first multicellular species in evolution, still without circulatory systems of blood, lymph and interstitial fluid.

Therefore, pulmonology and respiratory medicine needs urgently experimental models that can properly evaluate the role of gap junctions in functional activity of the lungs and airways *in vitro* or *ex vivo*. Here the situation repeats again, as referred to studying the role of diffuse neuroendocrine system in regulation of tissues streaming [8] that strictly depends on new experimental approaches of histology and morphometrics.

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Volume 15 Issue 2 February 2026