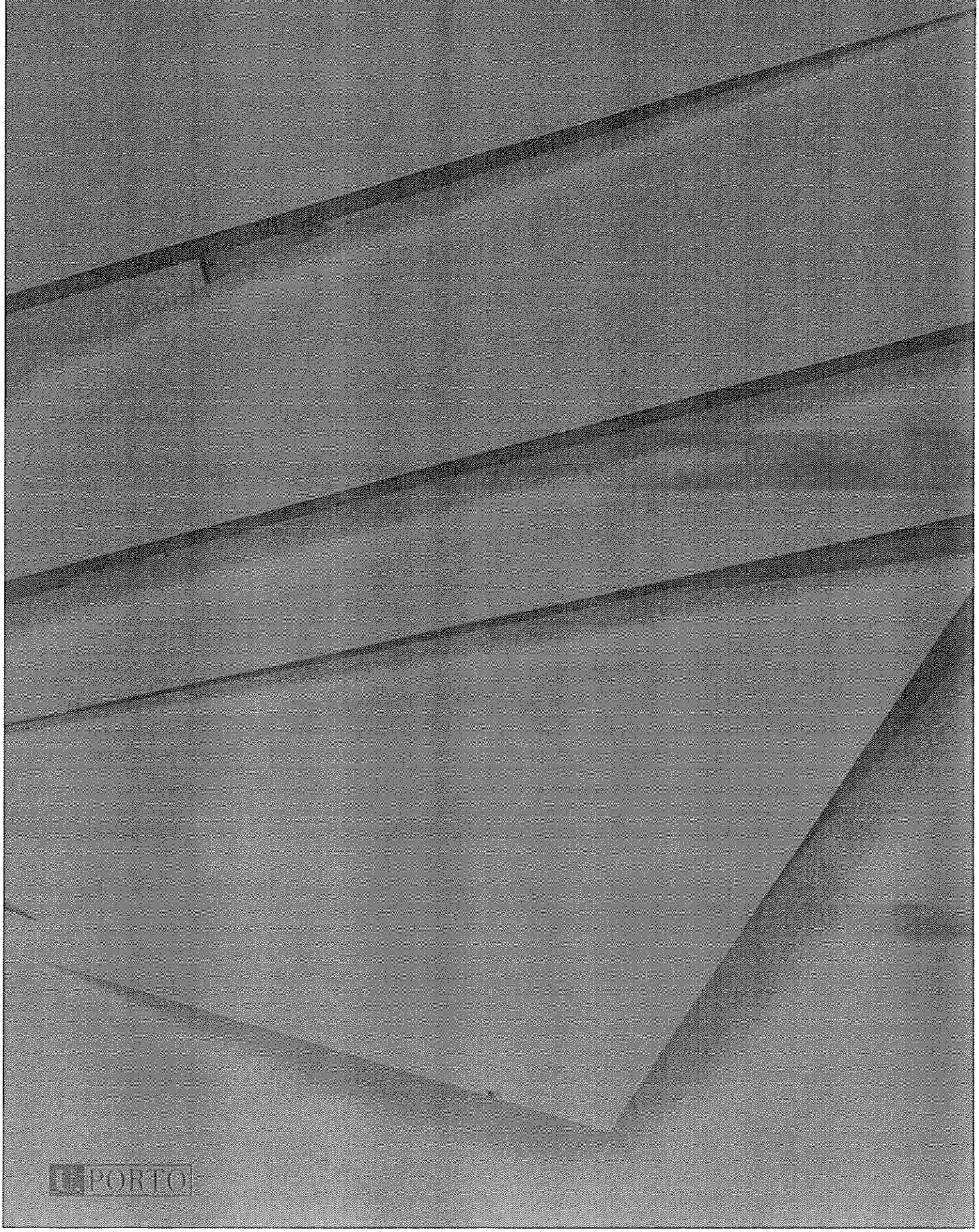
BOOK OF ABSTRACTS

5TH MEETING OF YOUNG RESEARCHERS OF UNIVERSITY OF PORTO

I.JUP'12



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Effect of fatty acids upon catecholamine handling by adrenal chromaffin cells

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Adrenaline (AD) and noradrenaline (NA), the main mediators of the sympathoadrenomedullary system, play crucial roles in the regulation of metabolic and cardiovascular (CV) homeostasis. Interestingly enough, relatively to metabolic syndrome (MS), AD and NA seem to behave very differently: whereas NA levels positively correlate with obesity and CV risk, AD shows an inverse association with CV mortality [1]. Fatty acids (FA) overload or dysfunction of their metabolism could contribute to the development of obesity and/or type 2 diabetes [2]. The typical western diet is overloaded with omega-6 FA and contains insufficient omega-3 FA, and this dietary imbalance in FA is a fundamental underlying cause of many chronic diseases including CV disease [2]. In line with this, omega-3 FA are usually associated with cardioprotective benefits [2]. On the other hand, consumption of trans FA, even at low levels of intake, significantly increases the risk of coronary events [2]. Although our group has already described that saturated fatty acids affect CA content and release [3], very limited information is available concerning the effect of these molecules on CA handling by adrenal chromaffin cells.

The aim of this work was to investigate the effect of several fatty acids on catecholamine (CA) synthesis and secretion from chromaffin cells. Tyrosine hydroxilase (TH) and phenylethanolamine N-methyltransferase (PNMT) expression was also evaluated under the same conditions. For that purpose, the effect of acute (60 minutes) and chronic (24 hours) exposure to monounsaturated, trans and polyunsaturated fatty acids upon the above parameters was investigated, using bovine adrenal chromaffin cells. CA in cells and liquids were quantified by HPLC and mRNA levels of both enzymes were analyzed by relative quantification using quantitative real-time PCR with SYBR Green I detection.

With the exception of eicosapentaenoic acid, which was able to significantly reduce TH mRNA levels ($p= 0,043$), none of the fatty acids studied significantly affected the expression of this enzyme. PNMT mRNA levels were significantly diminished after cells incubation with elaidic acid ($p= 0,019$), γ-linolenic acid ($p= 0,015$), linoleic acid ($p< 0,001$), α-linolenic ($p=0,015$) and eicosapentaenoic acid ($p=0,031$), comparatively to control conditions. In conclusion, fatty acids differently affect the expression of both CA synthesis enzymes, TH and PNMT, in chromaffin cells, suggesting distinct roles in AD and NA production. These findings, together with data from functional studies, currently under analysis, will help to clarify the role of monounsaturated, trans and polyunsaturated fatty acids upon CA handling by these cells.

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