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NF- κ B and SP1 expression in AGEs exposed retina and influence of different neurotrophic factors on it

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Purpose: To determine the effect of advanced glycation end-products (AGEs) on neurite regeneration in isolated rat retinas and the regenerative effects of different neurotrophic factors. Furthermore, to examine whether nuclear factor- κ B (NF- κ B) and specificity protein 1 (SP1) expression are correlated with the regenerative effect of each neurotrophic factor.

Methods: Retinal explants of 4 adult SD rats were three-dimensionally cultured in collagen gel and incubated in: 1. Serum free control culture media; 2. 100 μ g/ml glucose-AGE-BSA, glycolaldehyde-AGE-BSA, glyceraldehyde-AGE-BSA media; 3. Glucose, glycol, glycer+100 ng/ml neurotrophin 4 (NT-4) media; 4. Glucose, glycol, glycer+100 ng/ml hepatocyte growth factor (HGF) media. 5. Glucose, glycol, glycer+100 ng/ml glial cell line derived neurotrophic factor (GDNF) media and 6. Glucose, glycol and glycer+100 ng/ml tauroursodeoxycholic acid (TUDCA) media; after 7 days, the number of regenerating neurites was counted under a phase-contrast microscope. The explants were immunostained for NF- κ B and SP1 transcription factors. Statistical analyses were performed by one-way ANOVA.

Results: In retinas incubated with AGEs, the numbers of regenerating neurites were fewer than in control. Neurotrophic factors increased the number of neurites but more significantly in the NT-4 group. The numbers of NF- κ B and SP1 immunopositive cells were higher in retinas exposed to AGEs than in control. Neurotrophic factors decreased the number of NF- κ B immunopositive cells but did not significantly affect SP-1 expression. NT-4 shows the best neuroprotective and regenerative effect.

Conclusions: High dose AGEs impede neurite regeneration. The inhibition of regeneration is correlated with increased expression of NF- κ B and SP1. NT-4 enhances neurite regeneration in AGEs exposed retinas more than other neurotrophic factors such as HGF, GDNF and TUDCA. The regenerative effect of NT-4 is correlated with NF- κ B suppression.

Biography

Guzel Bikbova has completed her PhD from Scientific Research Institute of Eye Diseases Russian Academy of Medical Science, Moscow, Russia. She worked in Ufa Eye Research Institute and now is obtaining another PhD in Chiba University, Japan as scholarship holder from Ministry of Education, Culture, Sport and Technology in Japan. She has published 12 papers in peer reviewed journals and has 4 patents of Russian Federation.

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