

Environmental Pollutants Function as Immune Disruptors.

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The decline in amphibian populations has been under close examination for the past 15 years and more recently the role played by environment pollutants in this decline has received increased attention. It is well documented that environmental pollutants disrupt the function of the endocrine system in many animal species. Therefore, these substances are called endocrine disruptors and are defined by the EPA as: " external agents that interfere in some way with the role of natural hormones in the body". Hayes *et al.* demonstrated that exposure to very low doses of Atrazine, much lower than the levels found in environment, resulted in severe disruption of sexual development of *Rana pipiens* larvae (1). There is also a growing body of evidence that pesticides and herbicides reduce the ability of frogs to resist parasite infection (2,3). These compounds also suppress the humoral immune response of *Rana pipiens* and may have species-specific effects on the cellular immune response (4). We have examined the effects of atrazine and an ecologically relevant acidic pH (5.5) (5), on the innate immune response of *Rana pipiens*. It turns out that the effects of atrazine are similar to those of acid exposure.

Rana pipiens exposed to pH 5.5 for 10 days exhibit 70% mortality (6). Prior to death, at 4-6 days of acid-exposure, frogs experience a dramatic decrease in the ability to mount an experimentally induced inflammatory response and decreased phagocytic efficiency of white blood cells, both components of the innate immune response. Atrazine (21 ppb) affects the innate immune response of adult *Rana pipiens* in similar ways to acid (figure1), however it does not appear to cause mortality. Therefore, it appears that both acid and atrazine function as immune disruptors. This evidence coupled with the effects of herbicides on resistance to parasitic infection and the decrease

in the humoral response warrants the coining of the term immune disruptors. This term describes the effects of these compounds on immune system function. It is likely that other environmental pollutants such as herbicides, pesticides and other organic and inorganic compounds act in similar ways.

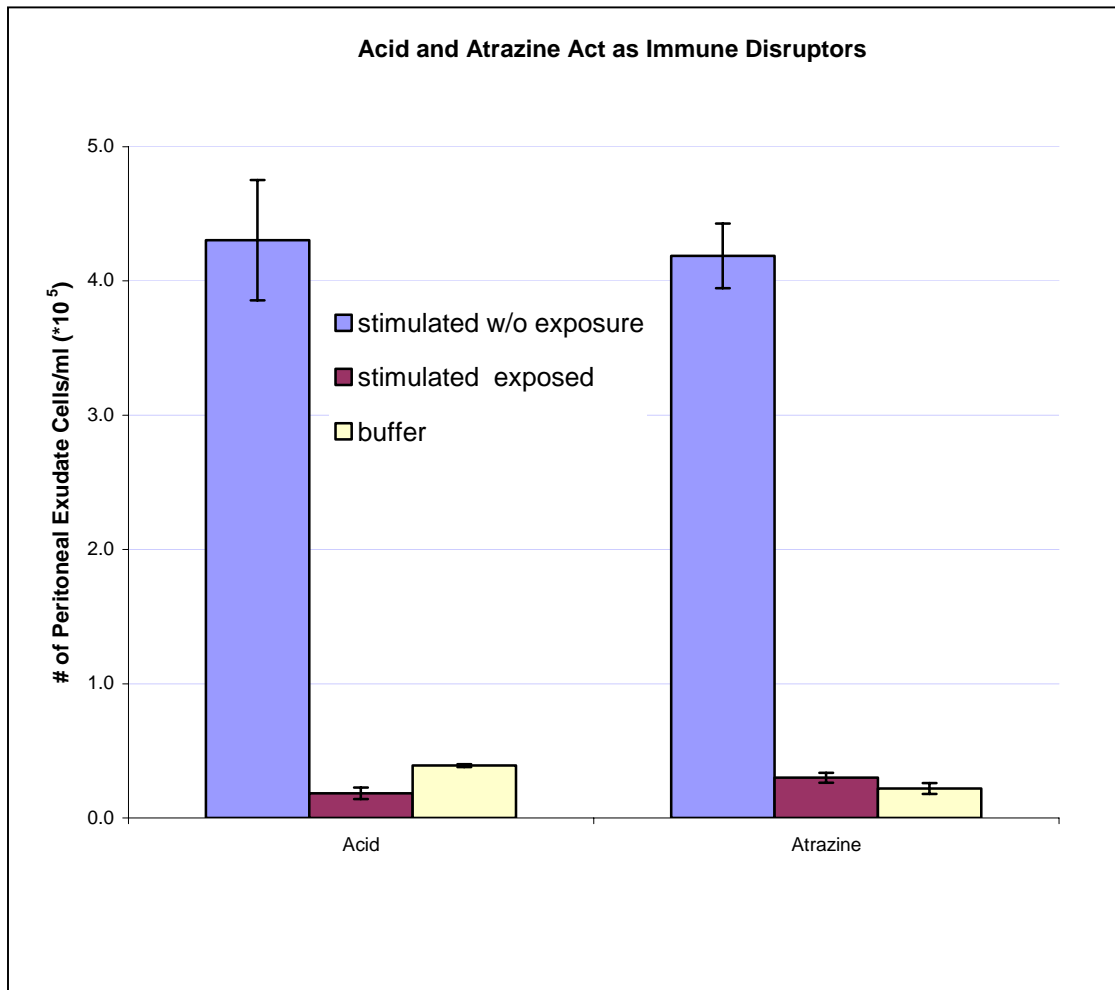


Figure 1. Acid and Atrazine (exposure) suppressed the thioglycollate-induced (stimulated) recruitment of white blood cells to the peritoneal cavity to background (buffer) levels.

References

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