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The role of benzoxazinoids, new players for human health

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In 2008 we discovered that mature grains of rye and wheat contain benzoxazinoids (BXs). Bread baked in our lab from rye or hydrothermally processed wheat showed to contain substantial amounts of BXs. The composition and quantity of BXs in food products depended much more on the food preparation process than on the cultivar. BXs were taken up by pigs, rats and humans after consuming rye-based food. BXs have a range of potential pharmacological properties, as reviewed by Adhikari et al. When bacteria induce the production of inflammatory cytokines in innate immune cells, a previous diet high in BXs enhances this production, indicating an immune-modulating effect of the BXs. With a highly sensitive analytical method uptake of 6 BX compounds in human prostate tissue was documented after one week’s high-BX diet.

Recent analytical papers revealed that profiles of methoxylated hydroxamic acids in young maize plants varied depending on sample treatment, and that chromatographic separation of glucosylated DIMBOA and DIMBOA required the use of uncommon chromatographic columns. 25 commercial cereal food products contained from nd to >500 µg/g dry weight total BXs. Most products high in rye content had high concentrations of BXs.

Our above-mentioned results do not stand alone. Knowledge about BX structures took a leap forward when multiple glycosylated BXs were identified. BXs with both glycosylation and acetylation and a 6-hydroxylated MBOA (6-methoxy-benzoxazolin-2-one) were identified. Recent identification of a ScBX6-like enzyme in rye, will aid in future understanding of BX biosynthesis in rye.

Based on the above, benzoxazinoids are good candidates as future players in human and animal health. Future research should cover: full characterization of BX structures; methods for easy isolation of pure compounds; fate of benzoxazinoids in the body - occurrence in plasma and urine, and distribution to tissues; effect studies - not only registration of effects but understanding of mechanisms behind effects.

References
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