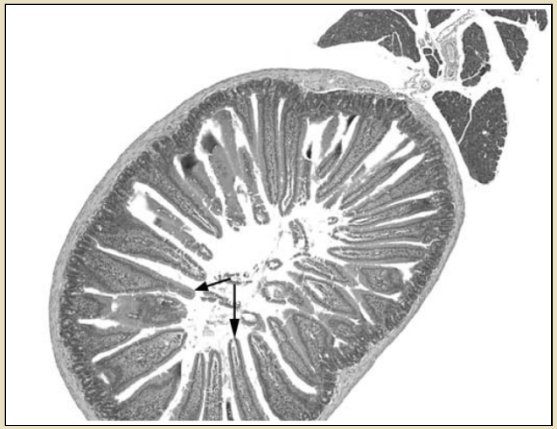
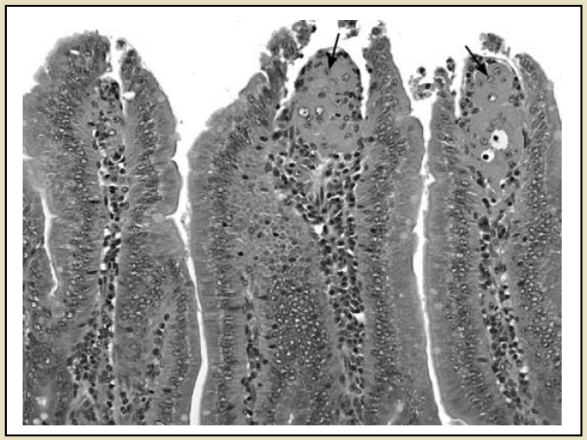
Morphologic Evidence that Hexavalent Chromium Targets the Epithelium of Duodenal Villi But Not Crypts

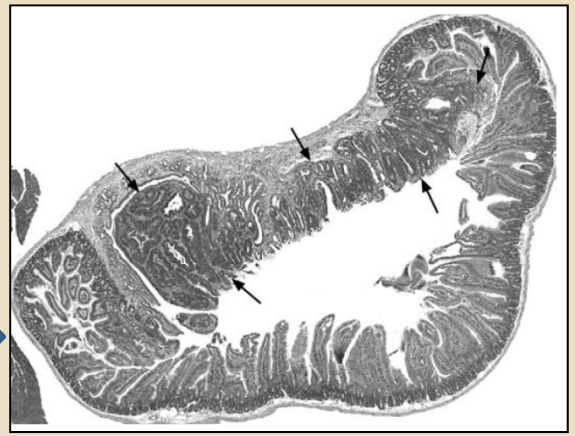
Normal Duodenum



Villus Damage Resulting in Crypt Epithelial Hyperplasia



Intestinal Epithelial Neoplasia



Jeffrey C. Wolf, DVM, DACVP

Experimental Pathology Laboratories, Inc., Sterling, VA

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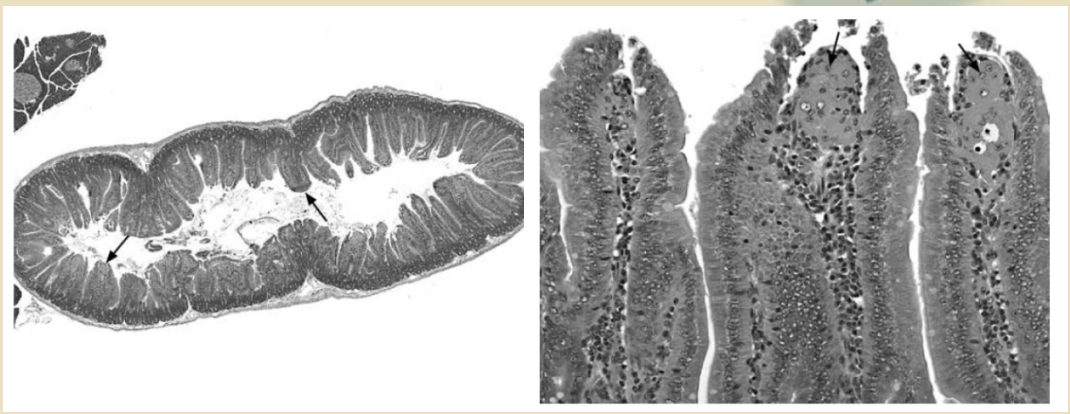
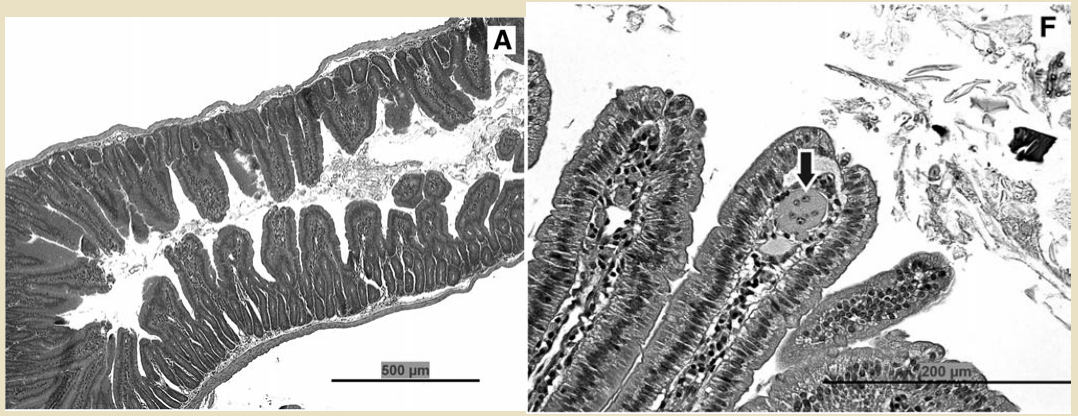
NTP 2-Year Drinking Water Study in Mice (516 mg/L)



Southern Research 90-day Drinking Water Study in Mice (520 mg/L)



Same Findings

- **Blunting and thickening of villi**
- **Histiocytic cells in lamina propria of villus tips**
- **Elongation of crypts**
- **Regenerative epithelial hyperplasia**

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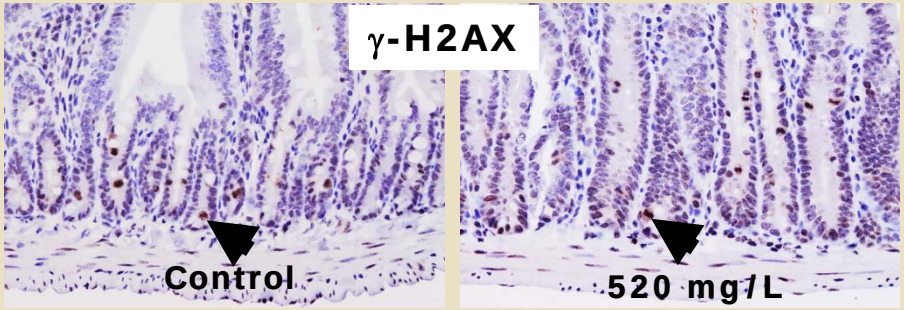
Morphologic indications of villus damage

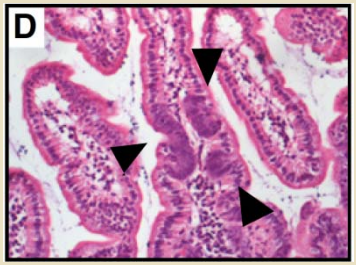
- Lack of treatment-related effects in crypts
- Lack of DNA damage in crypts
- Chromium localized to villi
- Lack of aberrant foci

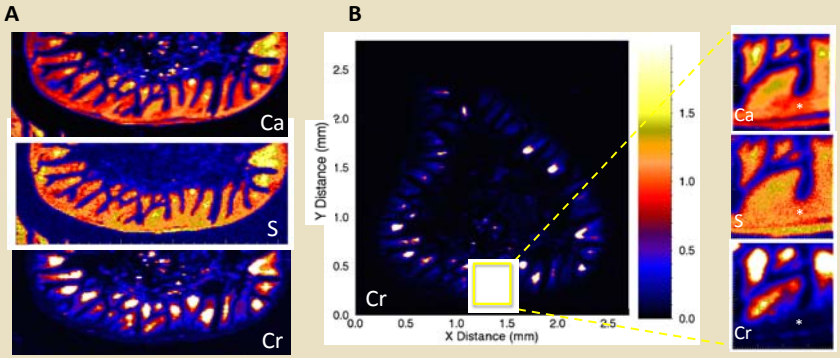
Total number of aberrant nuclei in duodenal villi.

SDD (mg/L)	Day 8		Day 91	
	KN	MN	KN	MN
0	0	1	0	1
0.3	0	3	1	1
4	0	5	0	2
14	0	2	0	0
60	2	1	5*	2
170	3*	6	6*	9*
520	9*	11*	25*	9*

Values represent total number of aberrant nuclei in 15 sections (3 slides per animal; 5 animals per treatment group, except only 4 animals were examined for 14 mg/L SDD treatment group at day 91).
KN = karyorrhectic nuclei; MN = micronuclei.
* Significantly different from control group ($p \leq 0.05$) by Poisson regression.







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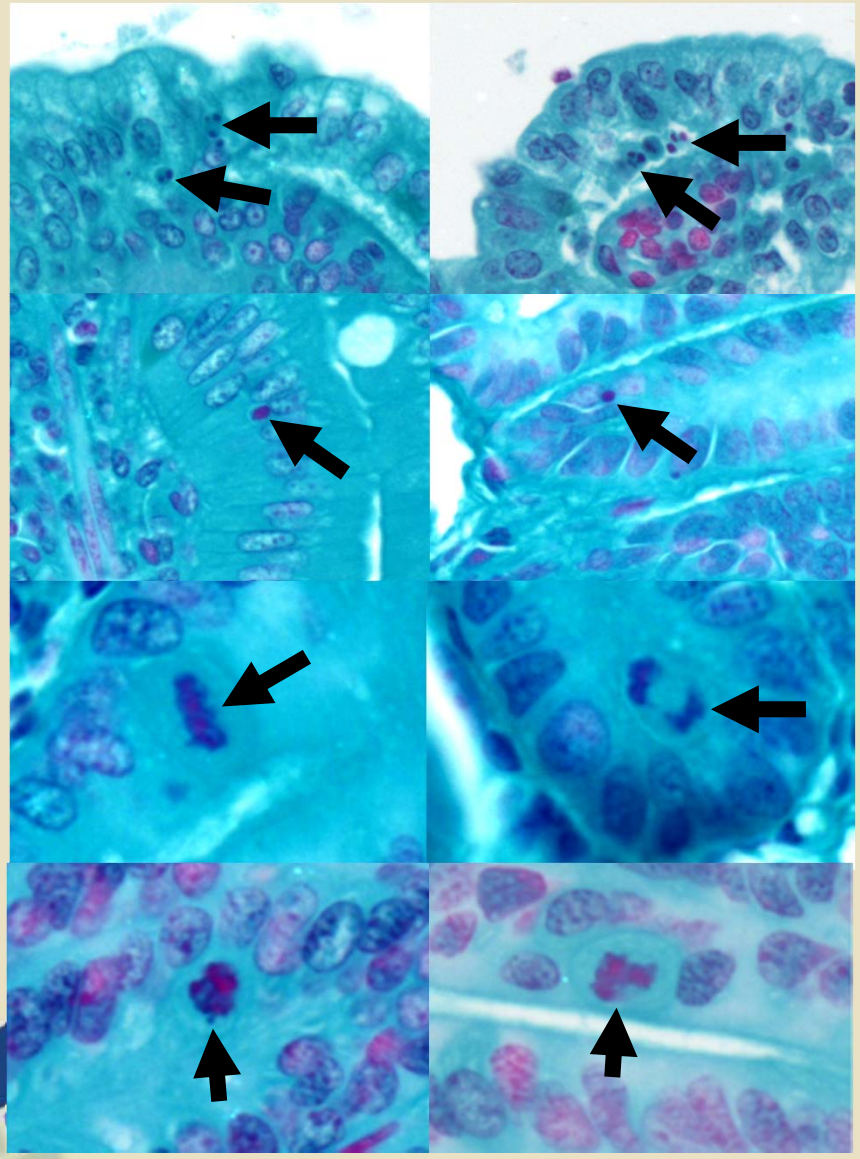
Supplemental Information



Karyorrhectic Nuclei
(individual cell necrosis)

Micronuclei
(chromosome breakage)

Mitotic Figures
(enterocyte renewal)

Apoptotic Nuclei
(physiologic cell loss, or damage to dividing cells)

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