



TOXIC EARTH: TOXIC BODIES

**”Cigarette Smoke and
Effects on Health”**

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Facts about Cigarette smoking

- Smoking-related diseases kill 1 in 10 adults globally. If the same rate continues, by 2030 smoking will kill 1 in 6 people.
- Someone dies every 8 sec from tobacco use.
- Every cigarette smoked cuts at least 5min of life on average – about the time it taken to smoke it.
- Every minute 10 million cigarettes are sold.
- Half of long-term smokers will die from tobacco smoking.

Facts about Cigarette smoking

- Among young teens (aged 13 to 15) worldwide, about 1 in 5 smokes.
- Evidence shows that around 50% of those who start smoking as adolescents go on to smoke for 15 to 20 years more.
- Peer-reviewed studies show teenagers are heavily influenced by tobacco advertising.

Facts about Cigarette smoking

- It is an important factor in heart disease, stroke and chronic lung disease.
- At least 25% of all deaths from heart diseases and about 75% of the world's chronic bronchitis are related to smoking.
- It can cause cancer of the lungs, larynx, oesophagus, mouth, and bladder, and contributes to cancer of the cervix, pancreas, and kidneys.

Types of Cigarette Smoke

First-Hand Smoke

Mainstream Whole smoke (MSW)



Second-Hand Smoke

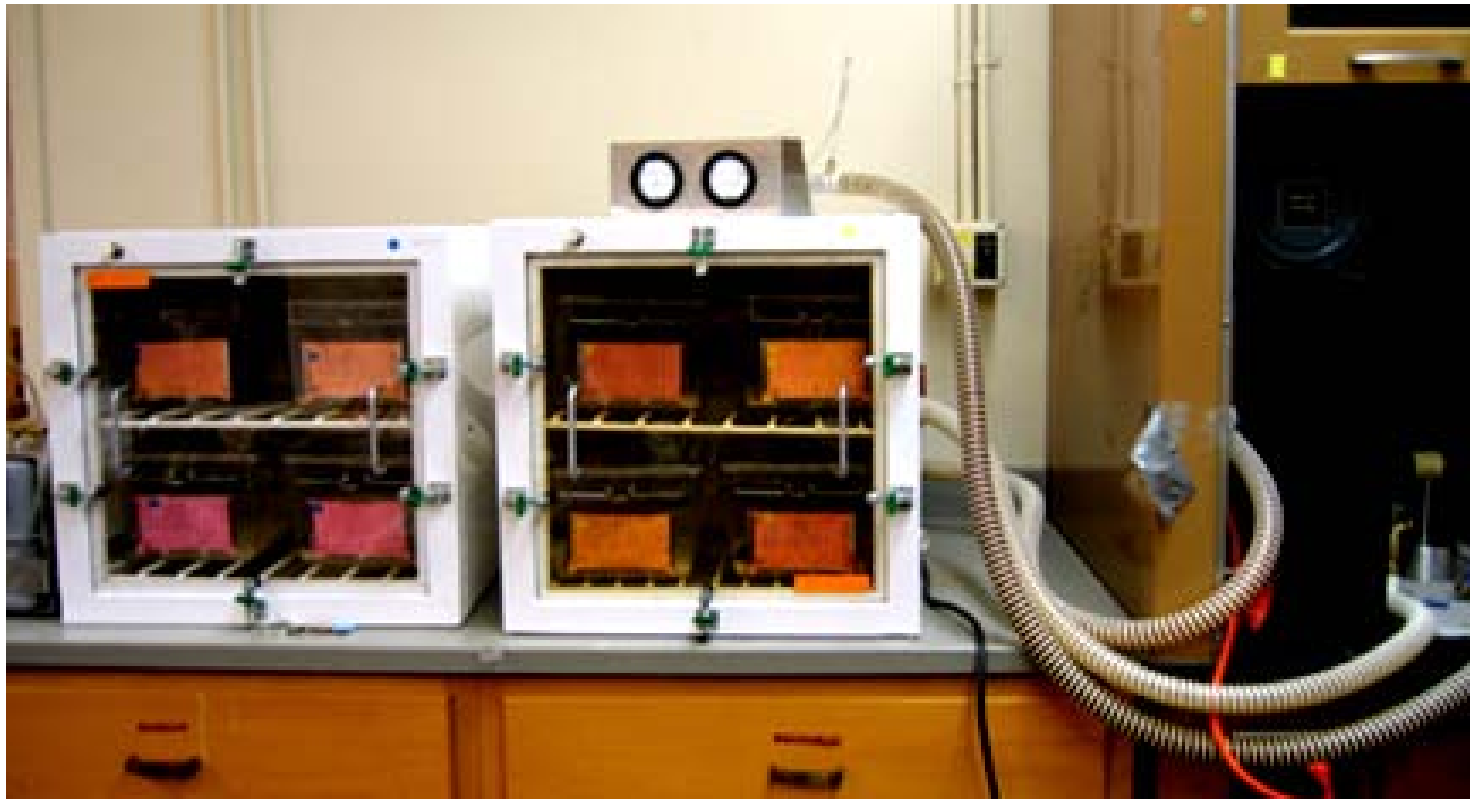
(~85% SSW)

Sidestream Whole smoke (SSW)



The composition of both smokes is very similar but for most components the concentrations are higher in the second-hand smoke.

Mouse Smoking Machine



Mice in chamber are exposed to smoke for 6 hours a day, with 5 minutes break between 10 minute periods of smoking

Wound Healing

Normal



- Response to injury
- Inflammation
- Angiogenesis
- Myofibroblast differentiation

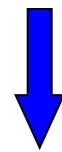
Abnormal



Toxicants



Cigarette Smoke



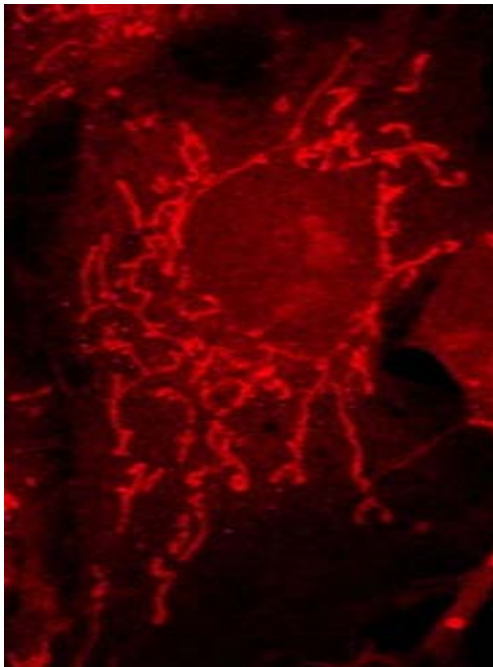
Skin



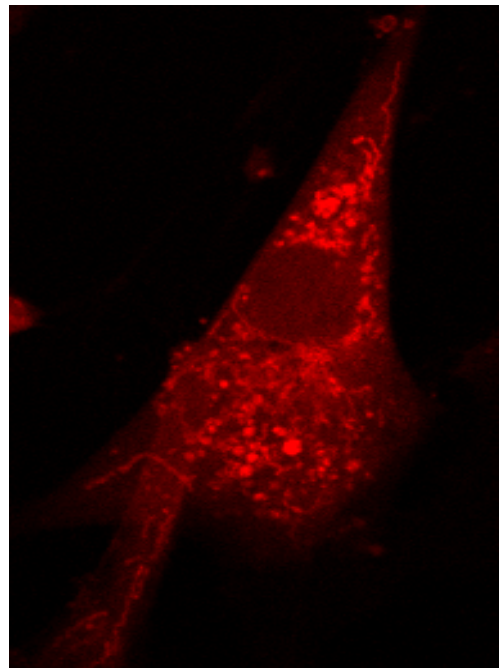
Impaired WH



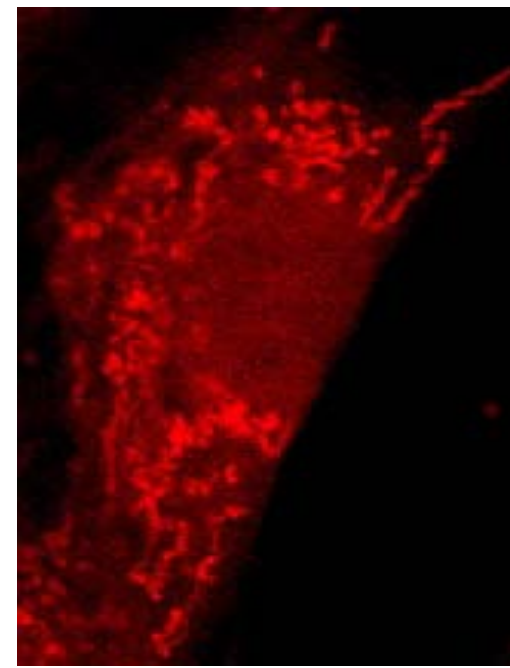
Effects of MSW on the Mitochondria



Control



MSW



MSW+SOD+CAT

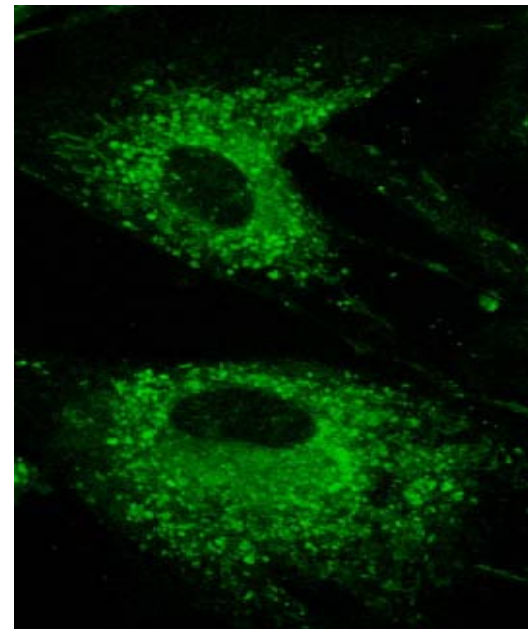
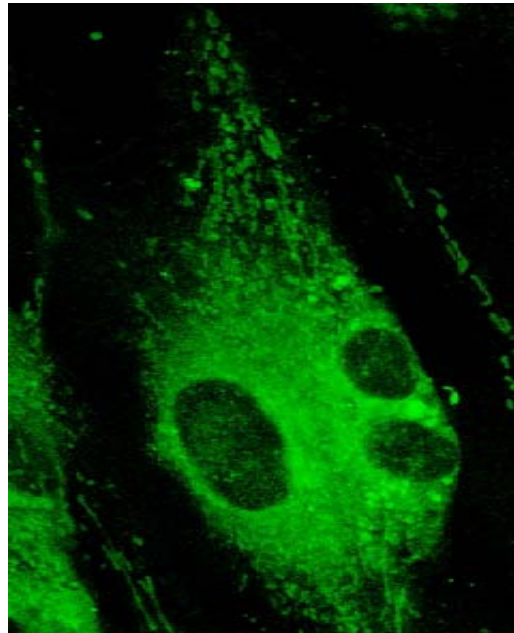


Effects of SSW on the Endomembrane system

Control

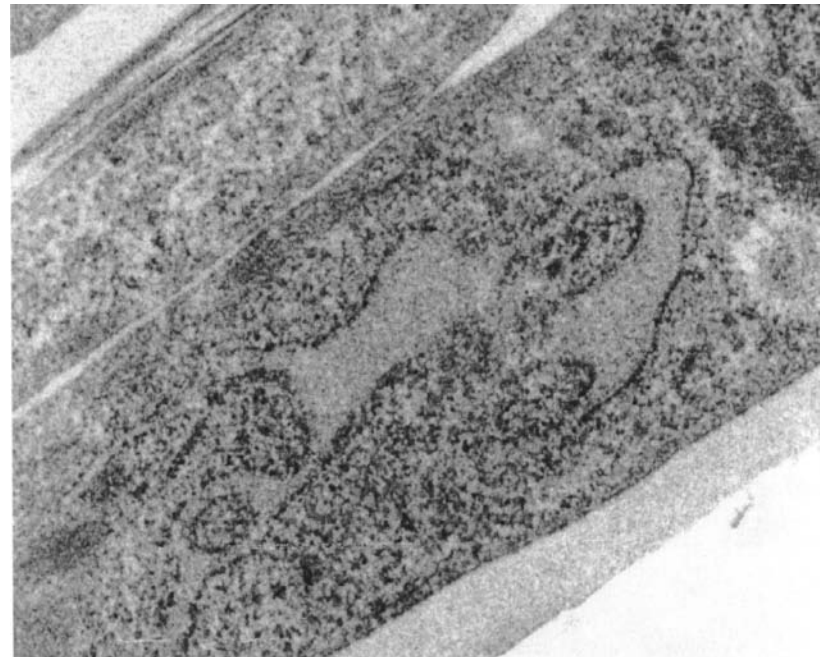
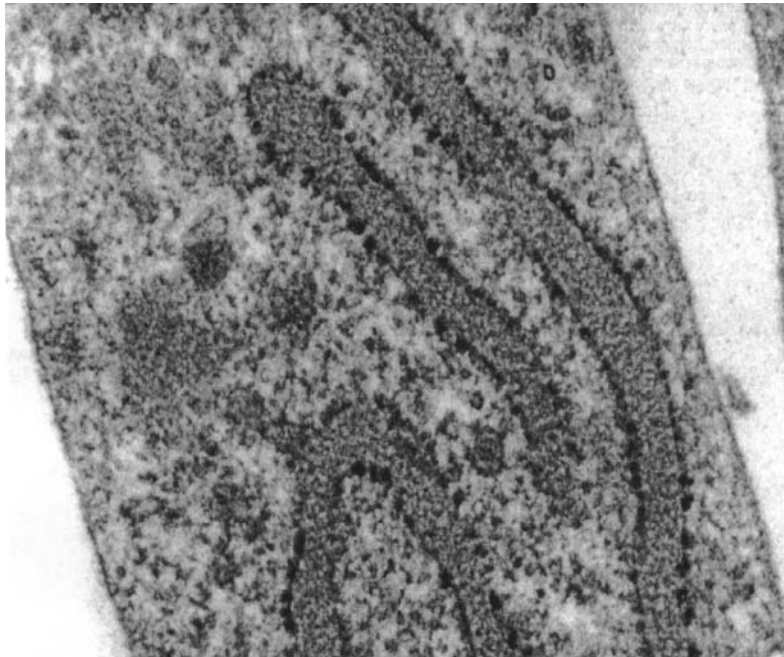
SSW

DIOC6





Effects of SSW on the Endomembrane system



Wound Healing

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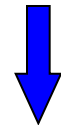
Abnormal



Toxicants



Cigarette Smoke

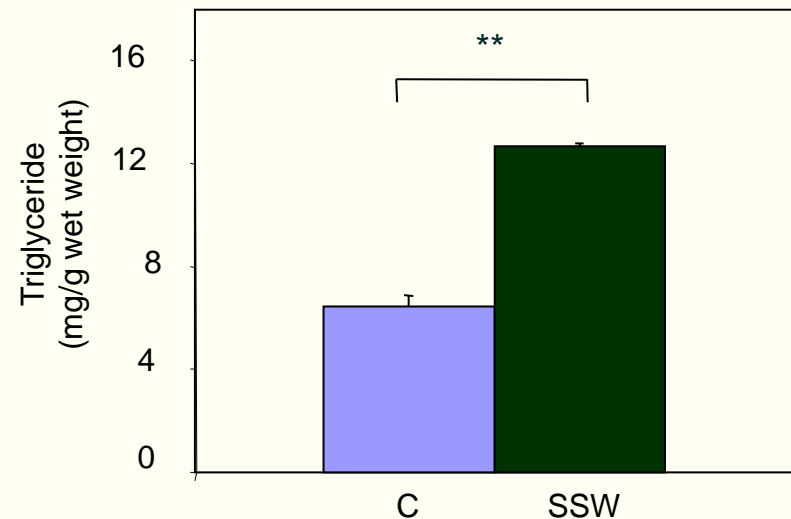
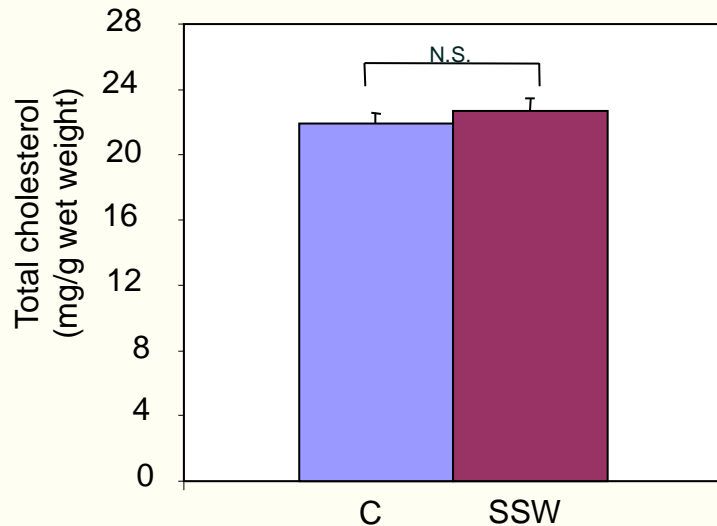


Atherosclerotic plaque
and liver disease



Impaired WH

Lipid Accumulation in Liver Tissue of the Mice Exposed to SSW

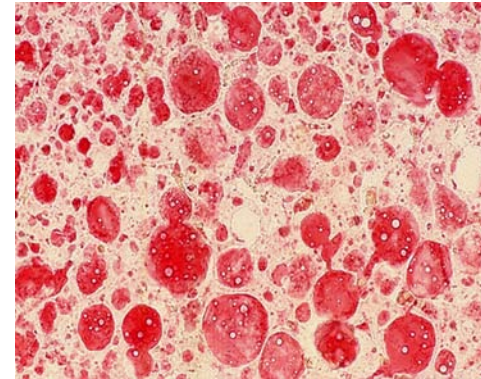
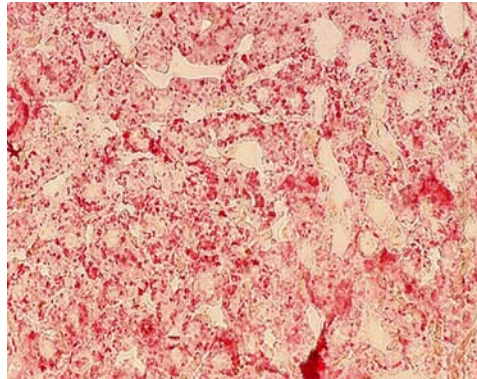


Lipid Accumulation in Liver Tissue of the Mice Exposed to SSW

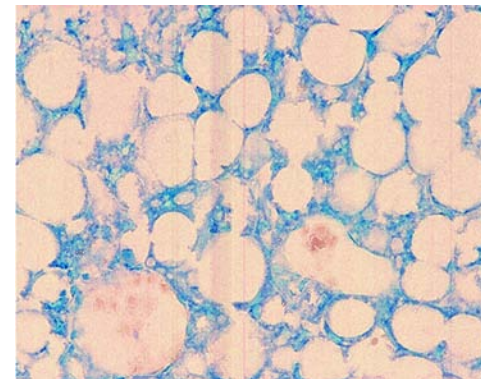
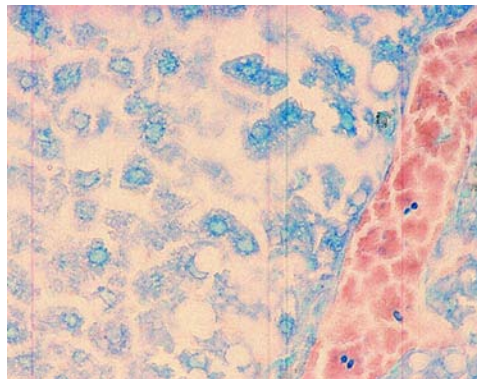
Control

SSW

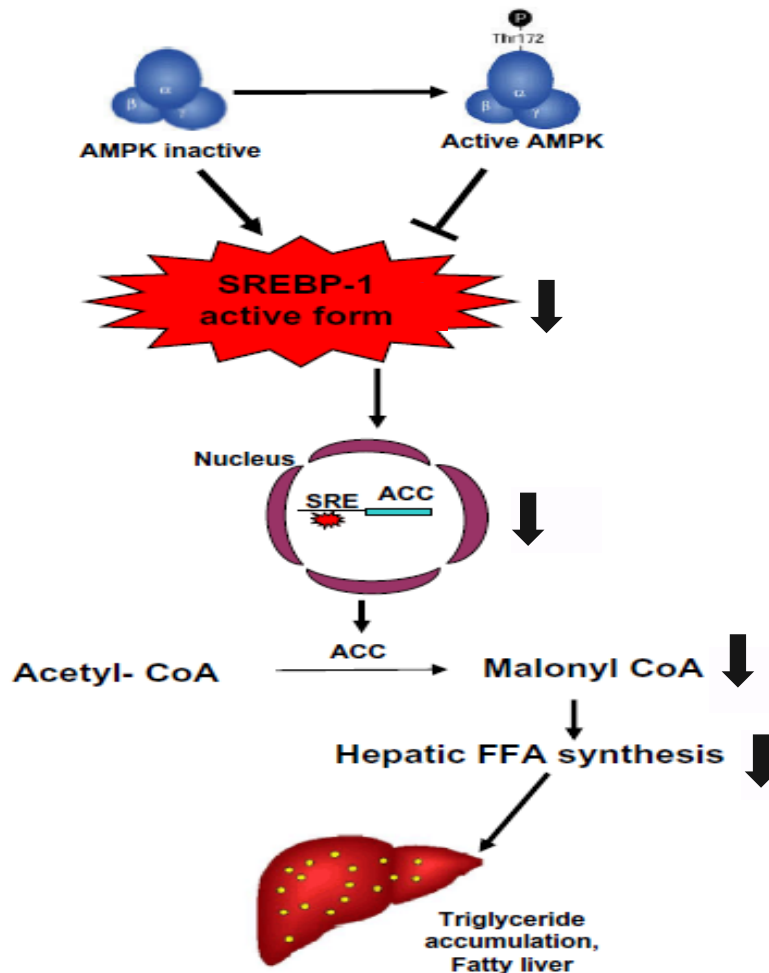
Oil-Red-O



Diff-Quik



Mechanism of Lipid Production by Hepatocytes

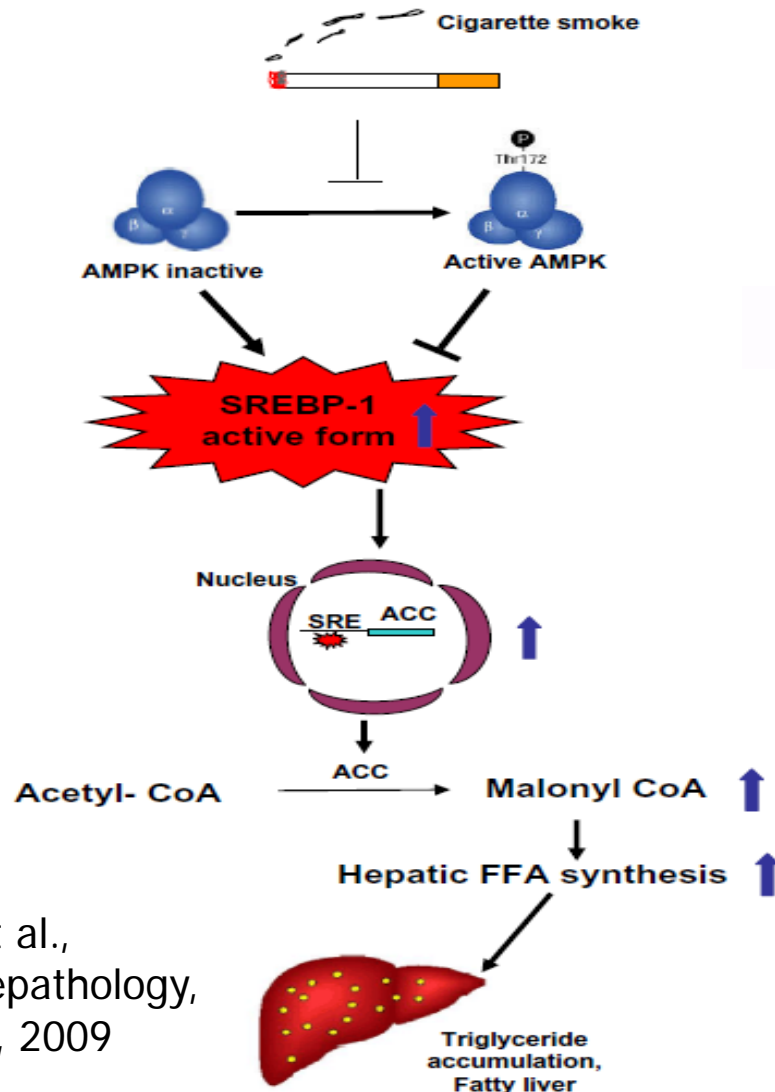


AMPK = Adenosine monophosphate kinase

SREBP = Sterol regulatory element binding protein

ACC = Acetyl- CoA carboxilase

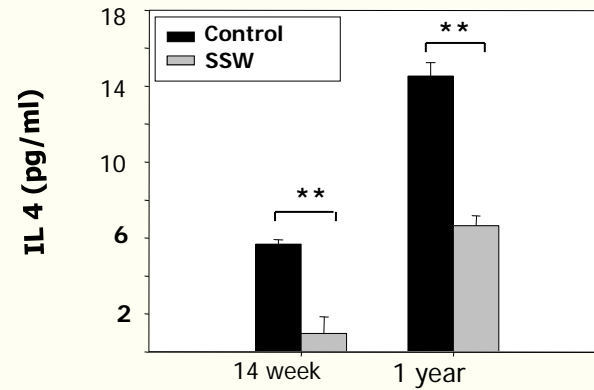
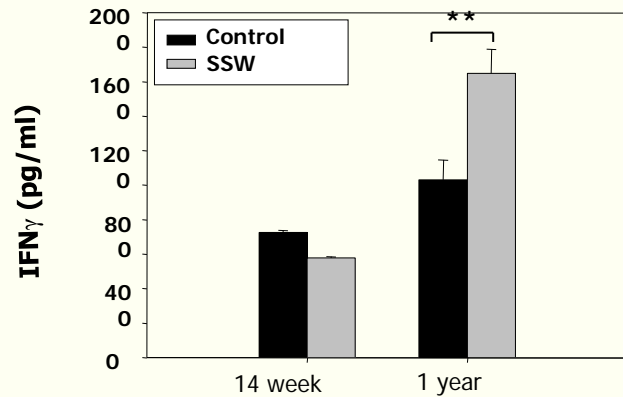
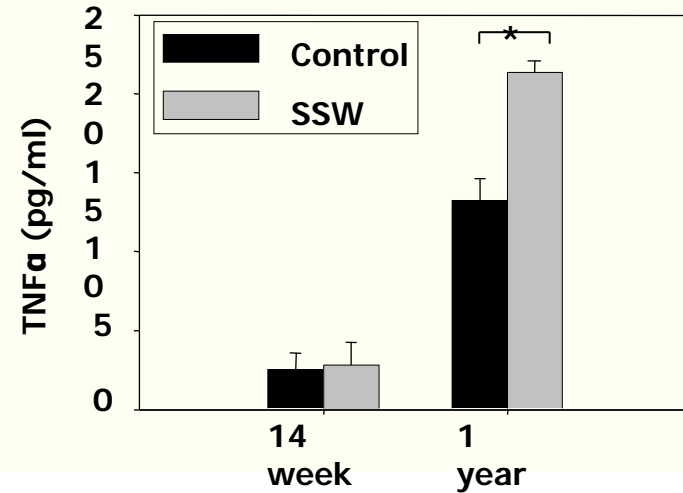
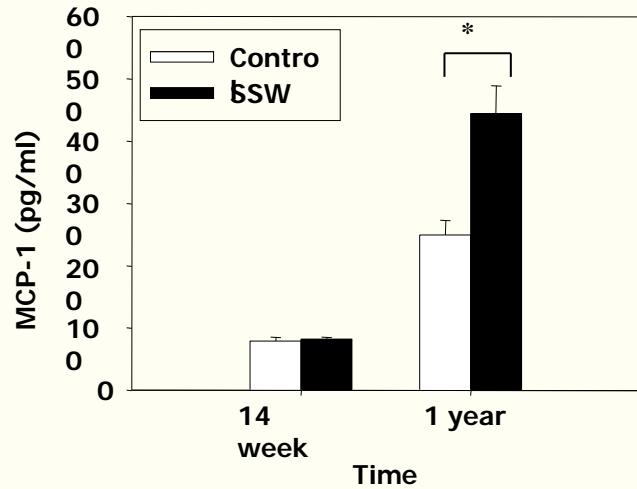
Mechanism of SSW-induced lipid accumulation in hepatocytes



AICAR
(5-aminoimidazole-4-carboxamide-1- β -D-ribofuranoside) activates AMPK.

We showed that it reverses SSW effects on lipid accumulation in the liver.

Plasma levels of pro-inflammatory cytokines



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Toxicants



Cigarette Smoke

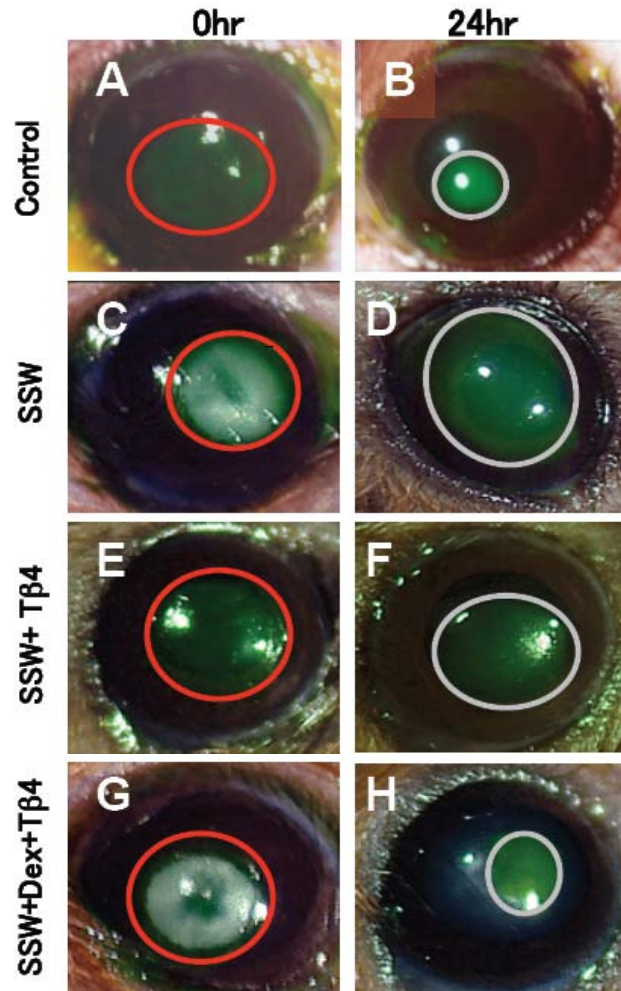


Cornea



Impaired WH

T β 4 Plus Dexamethasone Reverses the SSW Inhibition of Cornea Healing



Importance of these findings:

Both anti-inflammatory agents and T β 4 have been approved by the FDA and hence these findings can be taken right into the clinic

THS = Third Hand Smoke

- Third Hand Smoke (THS) also known as residual or aged tobacco smoke.
- It is derived from the accumulation of tobacco toxins from second hand smoke (SHS) over and over again, on surfaces of a particular compartment.
- Examples are:
 - (i) The upholstery of car seats as well as the dash board and window glass.
 - (ii) In a family room on the curtains, carpet, upholstery of sofas and chairs, throw blankets, pillows etc. This smoke is also present in the hair of smokers, in their clothing, and on their skin.

THS = Third Hand Smoke

- Nicotine is highly sorptive
- This results in surfaces in environments where smoking is habitual to be loaded with large amounts of this alkaloid.
- As a consequence re-emission of nicotine from indoor surfaces continues long after smoking ceases.
- Nicotine adsorbed to a model surface showed high reactivity towards HONO, leading to the formation of three TSNAs: 1-(**N**-methyl-**N**-nitrosamino)-1-(3-pyridinyl)-4-butanal (NNA), 4-(methylnitrosamino)-1-(3-pyridinyl)-1-butanone (NNK) and **N**-nitroso nornicotine (NNN) which are known carcinogenes.



THS = Third Hand Smoke

- Today there is virtually no realization in the population that THS is a danger to their health.
- A recent study by Winickoff from Harvard Medical School showed that only 65.2% of non-smokers and 43.2% of smokers believe that THS is harmful to children and elderly people living in the house of smokers

A decorative graphic consisting of overlapping yellow, red, and blue squares with a black crosshair.

THS = Third Hand Smoke

- Children who live in the household of smokers who smoke inside the house have more byproducts of THS in the urine than do children whose parents smoke outside the house and these more than children of non-smokers.
- Children who live in multi-unit housing apartments where their parents do not allow smoking have 140% higher blood cotinine levels than children who live in detached housing (Wilson et al. 2011).

A decorative graphic consisting of overlapping yellow, red, and blue squares with a black crosshair.

THS = Third Hand Smoke

Levels of cotinine in the urine of infants:

- Infants of “Never Smokers” had levels of 0.33 ng/ml
- Infants of “No indoor smoking” had levels of 2.32ng/ml
- Infants of “Direct exposure” had levels of 15.47ng/ml

Nicotine in infants hair for:

- Never smoker-0.53 ng/mg
- Outdoor smoker-2.75 ng/mg
- Direct exposure-5.95 ng/mg

Current Martins-Green Lab Group



Funding: NCI, NIGMS, NAIAD, AHA and TRDRP





Lesson

Don't smoke and do not spend time in environments where smoking is allowed

Thanks you for listening