The following "Health and Sanitation" material of the 80 Hour Underground Miner Pre-Employment Training Program was developed by the University of Connecticut, Division of Occupational Medicine, in conjunction with the West Virginia University Mining and Industrial Extension.

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Health and Sanitation 80 hour course for underground mining



Topic Areas to be covered :

- 1. Lung Disease and its Prevention
- 2. Injury and Musculoskeletal Diseases
- 3. Drugs Intoxicants and Alcohol
- 4. Hearing Loss and Hearing Protection
- 5. Lifestyle Factors and Cardiovascular Disease



Section I – Lung Disease and Prevention



Coal Miner lung cancer rates

Age-adjusted lung cancer mortality per 100,000 people, 2000-2004





Hendryx, M., O'Donnell, K., & Horn, K. (2008). Lung cancer mortality is elevated in coal-mining areas of Appalachia. *Lung Cancer*, 62(1), 1-7.

Lung Cancer and Coal Mining

- West Virginia coal miners have higher rates of lung cancer than the national average
- The largest risk factor is smoking ~ 80-90%
- Silica dust is a possible carcinogen
- As much as half of the higher rate of lung cancer in West Virginia may be related to coal dust inhalation
- Dutch coal miners who don't smoke and have good respiratory protection and dust suppression have no elevation of cancer risk



Lung cancer deaths and smoking





Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, *85*(6), 457-464.

Playing the Odds

Age at Smoking Cessation	Odds of Dying from Lung Cancer at Specific Age						
	35	45	55	65			
Never Started	0	1 in 25,000	1 in 14,000	1 in 5,000			
Stopped at 35	0	<1 in 25,000	1 in 3600	1 in 1600			
Stopped at 45			1 in 1800	1 in 950			
Stopped at 55			1 in 800	1 in 400			
Never Stopped	1 in 10,000	1 in 2200	1 in 600	1 in 250			

Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, *85*(6), 457-464.



Coal Workers Pneumoconiosis (CWP)

- CWP is a large factor in respiratory decline but it is preventable
- Lung volume is about 5 liters or 5000 cc
- A miner who smokes and has CWP will lose about 100 cc/year
- A miner who has good dust control and does not smoke will lose
 5 cc/year



Respiratory Symptoms and Function in young miners

Prevalence (%) of abnormal functional tests and respiratory symptoms



 Ensure that you follow-up on respiratory symptoms for x-ray and breathing tests are not enough

Carta, P., Aru, G., Barbieri, M. T., Avataneo, G., & Casula, D. (1996). Dust exposure, respiratory symptoms, and longitudinal decline of lung function in young coal miners. *Occupational and environmental medicine*, *53*(5), 312-319.

Types of Respiratory Protection



Dust Filtering Face Mask

Air helmet





Cartridge Respirator Air Stream





Respirators and Protection Factors

ΤΥΡΕ	EXAMPLE	PF	
	½ Face	10	
Air Puritying	Full Face	50	
	Loose Fit (Airstream)	25	
Powered Air Purifying (PAPR)	1/2 Mask	50	
	Helmet/Hood	1000	
Supplied Air	Continuous Flow	1000	
	Pressure Demand	1000	
Pressure Demand (Escape)	SCBA	10,000	

Example of Spirometry (Breathing Test)







The x-ray presents a small part of the disease



Section II – Injury and musculoskeletal disease



Key Points

- Musculoskeletal diseases in mining are the most prevalent in any major occupational group
- Mining equipment is specialized, offering limited space to add interventions
- Some current safety approaches may aggravate hand-arm problems

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. Occupational Medicine, 51(7), 450-455.

McMillan, G., & Nichols, L. (2005). Osteoarthritis and meniscus disorders of the knee as occupational diseases of miners. Occupational and environmental medicine, 62(8), 567-575.



Common Sources of Knee Pain for Miners: Meniscus disorders and knee arthritis

- Frequency
 - Affects 6-24% of miners
 - 3-6 x higher than comparative light manufacturing
- Causes
 - Slips and fall (>50% of knee injuries)
 - Direct pressure from kneeling
 - Shear force (shoveling)
- Interventions
 - Selective mechanization (automatic roof bolting, tools for applying mesh)
 - Non-surgical management (braces, supports and analgesics)



Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, *51*(7), 450-455.

Posture and Joint Loading

Mining has many awkward postures Over time, there is wear and tear on joints









Facts about Knee Disease

- Most people exhibit few symptoms walking on level ground or at the start of walking from a standing position
- Pain usually occurs when climbing up stairs and standing up from a chair
- Findings on X-rays do not predict disease severity
 - People with abnormal X-rays often have no pain
 - Other times people with minimal findings on X-ray report severe pain



Facts about Knee Disease (Con't)

• What to do:

- NSAIDs (ibuprofen) work better than Tylenol
- Be aware of injury as re-injury is a critical problem
- Glucosamine, a nutritional supplement, does not hurt but probably does not help
- Pain reduction may increase force on knee

• What to avoid:

- When using knee pads be aware not to fasten them too tight as they could cut circulation to the leg
- Limit dynamic load (carrying weight) while walking and while bent
- Avoid adduction moment (see next slides)



Reducing Force on the Knee



Mundermann et al. J Biomech. 2008.

Movements that push the knee laterally place extra forces on the knee





Section III – Drugs, intoxicants, and alcohol

<u>REMEMBER</u>: The currently approved WV Law on the following topics will always take precedence over the slides in this presentation.



Part A: Drugs and Alcohol Affect <u>Every</u> Miner's Safety

MSHA says:

"The goal of a drug and alcohol policy is to create a safer, healthier mine for you and for your fellow miners. Its purpose is to protect, not punish.

The idea is to prevent alcohol and drug use and encourage people to voluntarily seek help for alcohol and drug problems BEFORE their behavior becomes a safety hazard."

www.msha.gov/DrugFree/AlcoholDrugFreeMinesSamplePolicyand0Tr



The science behind these policies is clear

Studies on the effects of alcohol have shown impairment at low Blood Alcohol Concentration(BAC) levels:

- All driving-related skills showed impairment by .07 BAC.
- In studies examining divided attention, vigilance, and simulated piloting, 73 percent of the tests showed impairment by .039 BAC.*

The take-away - Skill and judgment are impaired at very low BAC.

National Highway Traffic Safety Administration, Traffic Safety Facts Banner, No. 223, May, 2000



Observations on drug and alcohol use and injury at work

- Drug use has increased in the younger work force
- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Even two drinks can cause dehydration or fatigue which reduce performance and impair judgment
- Worse yet, fellow miners are injured or killed by abusers.



Effect of Blood Alcohol Concentration (BAC) on tasks





www.ct.gov/dmv/cwp/view.asp?a=813&q=249562

Did you know?

- One drink is defined as:
 - One shot, 1.25 oz., of 80 proof liquor (vodka, scotch),
 - or 12 oz. of beer,
 - or 5 oz. of wine
- They all have about the same alcohol content and effect on the body



Approximate Blood Alcohol Percentage - Males

Drinks in 1	Body Weight in Pounds						
hour	140	160	180	200	220	240	
							Only Safe Driving
0	0	0	0	0	0	0	Limit
1	0.03	0.02	0.02	0.02	0.02	0.02	
							Impairment Begins
2	0.05	0.05	0.04	0.04	0.03	0.03	
3	0.08	0.07	0.06	0.06	0.05	0.05	Driving Skills Affect
							Possible Criminal
4	0.11	0.09	0.08	0.08	0.07	0.06	Penalties
							Logally Interviented
-	0.12	0.12	0.11	0.00	0.00	0.00	Criminal Danatti
5	0.13	0.12	0.11	0.09	0.09	0.08	Criminal Penalties



From Pennsylvania Liquor Control Board

Approximate Blood Alcohol Percentage - Females

Drinks in	Body Weight in Pounds						
1 hour	100	120	140	160	180	200	
							Only Safe Driving
0	0	0	0	0	0	0	Limit
1	0.05	0.04	0.03	0.03	0.03	0.02	Impairment Begins
2	0.09	0.08	0.07	0.06	0.05	0.05	Driving Skills Affect
							Possible Criminal
3	0.14	0.11	0.1	0.09	0.08	0.07	Penalties
4	0.18	0.15	0.13	0.11	0.1	0.09	Legally Intoxicated
5	0.23	0.19	0.16	0.14	0.13	0.11	Criminal Penalties

From Pennsylvania Liquor Control Board



Take note

- For *drivers*, the legal BAC limit is .08
- But for *miners*, the legal BAC limit is .039 for mining
- Most miners will risk decertification <u>after their first drink</u>



How long are alcohol and drugs in your system

- Alcohol can go through your system in about 24 hours
- Certain drugs will stay in your body for as long as <u>30</u> <u>days</u> and they are <u>entirely detectable</u>
- The next 2 slides show how long drugs and alcohol are detectable in your body



Approximate detection periods

Substance	Urine	Hair	Blood / Oral Fluid	
	6–24 hours		12–24 hours	
Alcohol	Note: Alcohol tests may measure EtG which can stay in urine for up to 80 hours	up to 2 days		
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days	
Amphetamines (except methamphetamine)	1 to 5 days	up to 90 days	12 hours	
Methamphetamine	3 to 5 days	up to 90 days	1–3 days	
MDMA (Ecstasy)	72 hours	up to 90 days	24 hours	
Barbiturates (except phenobarbital)	1 day	up to 90 days	1 to 2 days	
Phenobarbital	Phenobarbital 2 to 3 weeks		4 to 7 days	
	Therapeutic use: up to 7 days		6 to 48 hours	
Benzodiazepines	Chronic use (over one year): 4 to 6 weeks	up to 90 days		



Approximate detection periods

Substance	Urine	Hair	Blood / Oral Fluid
Cannabis	2 to 7 days, up to >30 days after heavy use and/or in users with high body fat	up to 90 days	2–3 days in blood, up to 2 weeks in blood of heavy users. However, it depends on whether actual THC or THC metabolites are being tested for, the latter having a much longer detection time than the former. THC (found in marijuana) may only be detectable in saliva/oral fluid for 2–24 hours in most cases.
Cocaine	2 to 5 days with exceptions for certain kidney disorders	up to 90 days	2 to 5 days
Codeine	2 to 3 days	90 days	<u><</u> 1 day
Morphine	2 to 4 days	up to 90 days	1 – 3 days
Heroin	1 to 4 days	up to 90 days	1– 2 days
LSD	12 to 24 hours	Undetectable	2 to 4 days
Methadone	3 days	up to 97 days	24 hours
РСР	3 to 7 days for single use; up to 30 days in chronic users	up to 90 days	1 to 3 days

High Energy Drink (HED) and the Heart

• HEDs

- are fairly new products and not a lot is known about their long term affects on the body
- caffeine content varies greatly by brand from 1-3 times as much as an 8oz. cup of coffee*
- they also contain glucose and taurine

But unlike the caffeine in coffee, HEDs additional ingredients, glucose and taurine, can cause increased heart contractibility which places increased stress on the heart.**

This means your heart is doing more work than it needs which may cause problems.

* http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink



Compounding effects

- A German study conducted by, Dr. Jonas Dorner, pointed out the amount of caffeine is typically up to <u>three times higher</u> in energy drinks than in other drinks like coffee or cola, and high intake of caffeine may trigger rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death.*
- Effects are compounded by drugs or alcohol

* http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show


Regulation?

- A study by Consumer Reports tested 27 popular energy drinks.*
 - Eleven didn't list the amount of caffeine on the label
 - Among the 16 products that did:
 - five had more than 20% caffeine than the label claimed
- With little or no regulation, the amounts of caffeine and other ingredients in these drinks are essentially unknown

* http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink



How much caffeine am I drinking?

- The average serving of coffee has about 100 mg of caffeine
- The same Consumer Reports tests showed seven HEDs with more than twice that amount of caffeine, although the label didn't indicate amounts



HEDs and Insomnia

- HEDs are also linked to insomnia
- Even at work, a tired body will try to get rest
- This means that you may be less likely to detect hazards
- Disruptive sleep causes added stress to the body including decreased mental function, increases in blood pressure, irritability, and decreased work capacity.



HED Wrap Up

- HEDs can cause irregularities to your heartbeat (prolonged contractibility)
- HEDs labels don't tell you what's inside, much less how much caffeine is involved
- They are not regulated well
- For sensitive people, they can cause rapid heart rate, palpitations, rises in blood pressure and in severe cases, <u>seizures or sudden death</u>*

* http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show



Part B: What the Apprentice Miner Needs to Know

West Virginia Drug and Alcohol Policies



Substance abuse is not a new topic

- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Their ability to predict hazards is reduced
- Worse, yet, fellow miners are injured or killed by abusers.



West Virginia has problems with substance abuse just like every other state

- But now, the Legislature, the Industry, the Union and the Office of Miners' Health Safety and Training are taking a stronger approach to abuse than in the past. In fact, <u>much stronger</u>
- Miners need to know about these new rules



The State is decertifying miners now

- By the end of 2014, the State will have decertified about 600 miners for violating the state's new drug and alcohol policy
- Protect yourself, protect your career and protect those around you:
 - Know the rules



The policies in everyday language

- **Pre-employment testing** means that all miners will be tested for substance abuse prior to starting work.
- New miners should know that they can be called for a drug <u>and</u> alcohol test as soon as a day after passing the 40 or 80 hour certification test.

WV Title 56, Series 19. Effective May 10, 2014



Here's what this really means

 A miner might be certified one day, and be called for pre-employment testing on short notice, even the next day

• A miner must be **drug free**



Here are some definitions all miners need to know

They come from the May 10, 2014 "Rules Governing Substance Abuse Screening: Standards and Procedures"



"Safety-Sensitive position"

- Means that the person's job responsibilities include duties and activities that involve the personal safety of the employee or others at the mine.
- This is pretty much <u>everyone</u> on the mine site.



"Safety-Sensitive" continued:

- If you fail a drug or alcohol test, you will lose your "safety sensitive" card;
- you lose ALL certifications including your aprentance miners card and...
- you cannot go on mine property



"Serious Accident"

 Means "an accident where bodily injury requires the individual to be admitted to a medical facility overnight for reasons other than strains, sprains or observation as determined by a physician"



In a "Serious Accident"

If you are <u>in a serious accident</u>, you will be tested

If you are <u>even involved</u> in the accident, you will be tested



"Random Testing"

 Means that each person has an equal chance of being tested at random and unscheduled times

• Each year, at least 25 percent of miners must be randomly tested for substance abuse

• This occurs at least 4 times per year



"Split Sample"

- Means that part of a urine specimen is sent on to a *second lab* in the event that an *employee requests it* to be tested following a verified positive test of the primary specimen.
- A lab and a doctor are involved



Something to know

- If you have an expired prescription, you may not take that medicine until the prescription is renewed
- You can't take your wife's or your friend's prescription
- Otherwise you risk decertification for taking unlawful medicine(s)



A miner who fails the drug/alcohol test in West Virginia

- Automatically fails in States that have reciprocity with WV
 - For example, Kentucky or other States with reciprocity agreements with West Virginia



Some other things to know

 A refusal to take the test means automatic decertification for a <u>minimum</u> of nine (9) months

 A second refusal (or fail) means permanent decertification; you can never work in West Virginia's mines again <u>and</u> any other state with an agreement with West Virginia



Employers must test urine for at least the following ten substances:

- Amphetamines
- Cannabinoids (THC)
- Cocaine
- Opiates
- Phencyclidine (PCP)
- Benzodiazepines
- Propoxyphene
- Methadone
- Barbiturates
- Synthetic narcotics including bath salts and others

There is also a <u>breath test</u> for alcohol



And even though we already said this, it is very important:

- An employer must:
 - Randomly test at least 25 per cent of miners
 - Test at least 4 times per year
 - Test any miner who is "accident-involved"
- The likelihood is that a user will get caught



Miners will face immediate suspension if:

- They test positive for drugs
- They test positive for alcohol
- They <u>possess</u> an adulterated specimen or if they <u>submit</u> an adulterated specimen
- They <u>possess</u> a substituted specimen or if they <u>submit</u> a substituted specimen
- The miner refuses to submit to a drug or alcohol test

Don't forget that an employer can require a test at any time for "reasonable suspicion"



The miner may appeal a suspension

- Within 30 days of the notice of suspension or revocation
- By requesting a hearing by the Board of Appeals
- A miner can then get all of his cards back



A miner under suspension may agree to a treatment plan

• The actual legal document that you would sign runs to five pages- - here is part of page 1

WEST VIRGINIA COAL MINE SAFETY **BOARD OF APPEALS** IN THE MATTER OF: WEST VIRGINIA OFFICE OF MINERS' HEALTH, SAFETY AND TRAINING, Petitioner, V. Respondent. SUBSTANCE ABUSE TREATMENT AGREEMENT Comes now the West Virginia Office of Miners' Health, Safety and Training (OMHST), by counsel, Barry L. Koerber, Assistant Attorney General and ------, pro se, (hereinafter referred to as the Parties) and set forth the terms and conditions of this Substance Abuse Treatment Agreement (Treatment Agreement) containing the understanding of the Parties with respect to the resolution of the above-styled



The treatment agreement says basically this:

- The miner must agree and admit that he violated his employer's substance abuse screening policy program
- All certifications are *immediately* suspended
- The miner is *required* to attend substance abuse counseling and treatment
- The miner must comply with applicable laws and rules- - violation of the treatment plan results in revocation of certifications for at least three (3) years



There is more to the treatment plan

- The miner will submit samples regularly
- A test failure may result in permanent revocation
- All costs are paid by the miner
- The miner will submit to drug and alcohol testing at least every 30 days, or more often if required by the counselor.
- There will be a permanent record made of all transactions in the treatment plan



To summarize:

- The new rules are designed to protect miners' safety, not to punish them
- The rules are complicated
- The rules are serious
 - A second failure will result in <u>PERMANENT REVOCATION of ALL</u> <u>certifications</u>
- Company policies may exceed the minimum requirements discussed
- Breaking the rules can impact a miner's career and even bar him from future employment

...why take the risk of ruining a career?



Section IV - Noise Exposure and Effects on Hearing and Health



Consequences of Exposure to Noise

- Immediate short-term effects may involve:
 - temporary hearing loss
 - ringing in, or "dullness" of, the ears (tinnitus)
 - difficulty understanding speech
 - difficulty hearing sounds around you (e.g., warnings)
 - stress, and fatigue
- Persistent long-term effects may include:
 - hearing loss & tinnitus
 - reduced ability to understand speech
 - reduced ability to hear all sounds
 - cardiovascular disease



Photomicrographs of normal hairs and hair cells in the inner ear damaged by noise, causing hearing loss (plan views below)



Normal

Damaged



Percentage of US miners with hearing loss as a function of age showing almost 80% have mild hearing loss, >25dB, by age 60



BAUER, E. R., SPENCER, E. R., SMITH, A. K., & HUDAK, R. L. (2007). Reducing Noise-induced Hearing Loss in Longwall Coal Mine Workers: NIOSH's Approach. *National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, Hearing Loss Prevention Branch.*



Noise exposure data for mining occupations showing the percentage of samples that exceeded the threshold for affecting hearing (>80 dBA), and the percentage that exceeded the threshold for causing substantial hearing loss (>90 dBA)

Occupation	# of Samples	90-dBA threshold	80-dBA threshold
		% of samples >90 dBA(PEL)	% of samples >80 dBA(PEL)
Continuous Miner Helper	68	33.8	88.2
Continuous Miner Operator	262	49.6	96.2
Roof Bolt Operator (single)	234	21.8	85.5
Roof Bolt Operator (twin)	92	31.5	98.9
Shuttle Car Operator	260	13.5	78.5
Scoop Car Operator	94	18.1	74.5
Cutting Machine Operator	22	36.4	63.6
Headgate Operator	20	40	100
Longwall Operator	34	70.6	100
Jack Setter (longwall)	25	23	68
Cleaning Plant Operator	107	36.4	77.6
Bulldozer Operator	225	48.9	94.2
Fron-end-Loader Operator	244	16	76.6
High-wall Drill Operator	83	21.7	77.1
Refuse/Backfill Truck Driver	162	13.6	78.4
Coal Truck Driver	28	17.9	64.3

Bauer, E. R., & Kohler, J. L. (2000, August). Cross-sectional survey of noise exposure in the mining industry. In *Proceedings* of the 31st Annual Institute of Mining Health, Safety and Research. Blacksburg, VA: Virginia Polytechnic Institute and State University. Department of Mining and Minerals Engineering (pp. 17-31).



How can you tell if your hearing is affected?

- Do you turn up the volume on your car radio/music player/cell phone/TV after work, or turn down the volume in the morning?
- Do you have difficulty understanding what people are saying when you are at a noisy restaurant/bar/diner/ concert/party?
- Do your have ringing or buzzing sounds in your ears?

If you answer yes to any of these questions, then it is likely your hearing has been affected. There could be many causes including noise exposure, medications and lifestyle.



What can be done?

At work

- Reduce the noise of machines and machinery
- Change work practices and/or adjust schedules to reduce exposure to noisy situations
- Wear hearing protection (muffs or plugs)

While the first two items may not be within your control as a miner, wearing hearing protection is. (See next slide)

You can decrease your noise exposure by simply moving further away from the source, if possible. For example, standing 5 ft from a 96dBa noise source is hazardous but if you can increase your distance to 20ft the noise drops to 84dBA.*

* Oregon OSHA's Quick Guide to Hearing Protection http://www.orosha.org/pdf/pubs/3349.pdf



Hearing Protection

Types:

- Earplugs
 - Fit inside the ear canal
 - To be effective, need to total block the canal and create an airtight seal
 - Dirty or worn-out plugs will not seal the canal and may irritate it
- Earmuffs
 - Fit over the ear
 - Do not fit properly over glasses or long hair

Both types are equally effective. Using them together increases protection against high noise levels, over 105dBA. You should chose the hearing protection that is the most convenient, compatible and comfortable for you.

* Oregon OSHA's Quick Guide to Hearing Protection http://www.orosha.org/pdf/pubs/3349.pdf


What can be done?

Away from work:

- Reduce noise exposure (as it adds to the effect of exposure at work)
 - Wear hearing protection when working around your home, e.g., using chainsaws, weed whackers, tractors, or mowing the lawn.
 - Wear hearing protection when participating in noisy hobbies such as shooting or hunting, motorcycling, wood working, or attending loud concerts or bars.
 - Guns and chain saws produce noise in excess of 100 dBA, motorcycles and snowmobiles in excess of 90 dBA, and power tools for garden or woodworking in excess of 80 dBA.
- Avoid excessive alcohol consumption, or smoking
- Pay attention to heart health to reduce the cardiovascular effects of noise (e.g., diet, exercise)



Section V – Lifestyle factors and cardiovascular disease



The importance of a health heart:

It is not just being a miner in West Virginia. Americans have the worst health in the industrial world and it is getting worse



Red circles depict newborn life expectancy in the United States. Grey circles depict life expectancy values for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and West Germany. SOURCE: National Research Council (2011)



The issue is health care disparities not mining, alone

Borak et al 2011

N.

Heart disease premature mortality (1995–2001).

Whole Health Considerations:

- At 25 or 35 you are not a heart attack waiting to happen
- What you do for next 10-20 years can determine if you become a young old or an old young
- Between ages 25 55, the risk of a heart attack or a stroke goes up 10 times
- A 25 year old who smokes, has high blood pressure and high cholesterol has a 1 in 70 chance of having a heart attack or stroke by age 35
- At age 55, his or her odds are 1 in 8 (12.5%). They are almost 1 in 2 (50%) if you add in diabetes
- At 55, if you don't smoke, control your blood pressure and your cholesterol and fats and are not diabetic, the odds are no higher than 1 in 50 (<2%)



Health Exposures Contributing to Heart Disease





Reducing Risk Factors Between Ages 25 and 55 to cardiac event



Chronic Diseases do not appear at a young age, but the process is in motion. Controlling blood lipids, blood pressure, blood sugar, and not smoking can make cardiac risks very small Pencina, M. J., D'Agostino, R. B., Larson, M. G., Massaro, J. M., & Vasan, R. S. (2009). Predicting the 30-year risk of cardiovascular disease The Framingham Heart Study. *Circulation*, *119*(24), 3078-3084.



Parting Thoughts

- An apprentice miner who has suitable protection against exposures at work and takes preventive health measures outside of work will live as long as the general US population
- Good dust control and selective use of respiratory protection can eliminate loss of lung function later in life
- Abuse of substances are easily detected with existing required screening and can lead to lifetime loss of employment in mining
- Passive routine health and lung checks may not be enough. Active participation in health and safety and knowledge are the extra mile.

