



WDT IN ITALY: STATISTICAL AND EPIDEMIOLOGICAL FINDINGS ABOUT SECOND STAGE TESTING

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WDT IN ITALY

According to the Italian WDT law, only specific groups of workers are subject to mandatory analyses e.g.: transport workers: truck, bus, taxi and train drivers, ship and aircraft pilots, air traffic controllers, excavator and lift truck operators;
workers handling toxic gases, inflammable materials, explosives and fireworks.

THERE ARE 2 STAGES OF INVESTIGATION

FIRST STAGE - Responsibility of Occupational Physicians

Random urine collection once a year: screening tests for Opiates, Cocaine, Amphetamines, Ecstasy, Cannabis, Methadone and Buprenorphine;
GC-MS or LC-MS confirmation test

NEGATIVE TEST RESULT: business as usual!

POSITIVE TEST RESULT: suspension from service and mandatory second stage tests

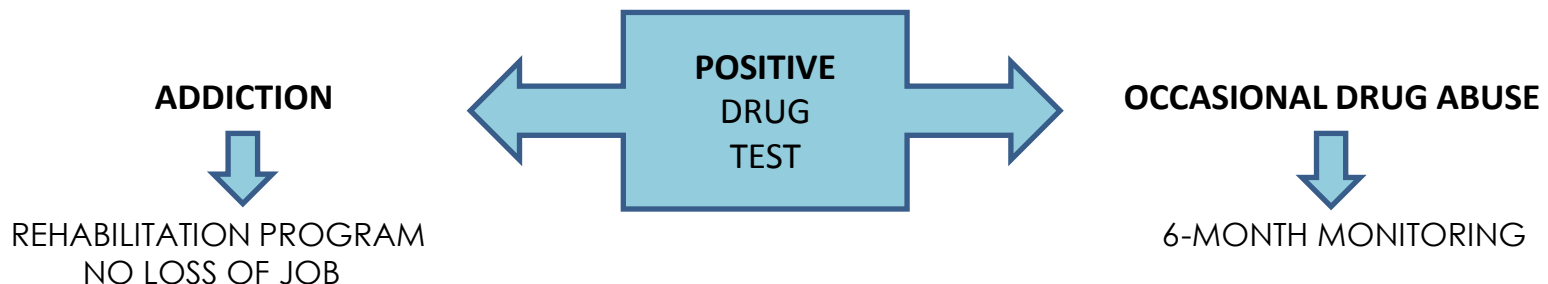
SECOND STAGE - Responsibility of Addiction Treatment Physicians

SECOND STAGE INVESTIGATION

“Second stage” procedures concern only workers who tested positive for drug abuse in urine tests performed randomly once a year. They are referred to an Addiction Treatment Unit where they undergo a **clinical examination** and **toxicological tests** to:

- DETERMINE THE METHOD AND FREQUENCY OF DRUG ABUSE
- ESTABLISH THE PRESENCE/ABSENCE OF DRUG ADDICTION

If second stage drug tests are **NEGATIVE**, occupational physicians **may** monitor the worker over a 6-month period (1 random urine sample in a month + hair analysis at the end of the period)



ANALYSES ARE PAID FOR BY EMPLOYER

SECOND STAGE INVESTIGATION

TOXICOLOGICAL ANALYSES

- **4 urine samples** over a monthly period
- **1 hair sample:** 5 cm divided into two segments (proximal and distal) or pubic hair if hair sample is not available


THE FOLLOWING SUBSTANCES MUST BE TESTED BOTH IN URINE AND HAIR:

OPIATES, COCAINE, CANNABINOIDS, AMPHETAMINES, ECSTASY, METHADONE, BUPRENORPHINE
+ CREATININE CONCENTRATION IN URINE

URINE ANALYSES: IMMUNOASSAY SCREENING (EMIT) + GC-MS


	OPI, COC, AMPH, ECSTASY, MET, BUPR	CAN
HAIR ANALYSIS: INCUBATION	HCl 0.1 N	NaOH 2 N
EXTRACTION	SOLID PHASE	LIQUID/LIQUID
ANALYSES	GC-MS (SIM MODE)	GC-MS (SIM MODE)

CUT-OFF (urine screening test)

	ITALY	
OPIATES	300	300
COCAINE	300	300
CANNABIS	50	50
AMPHET/METAMPH	500	500
MDMA (ecstasy)	500	500
METHADONE	300	300
BUPRENORPHINE	10	5

ALMOST ALL THE CUT-OFF VALUES PROPOSED BY EWDTs FOR URINE SCREENING TESTS HAVE BEEN ADOPTED BY ITALIAN LAW
THE CUT-OFF VALUE FOR BUPRENORPHINE ALONE IS HIGHER IN ITALY

CUT-OFF (urine confirmatory test)

	ITALY	
MOR/COD/DIHYDR	100	300
6-AM	100	10
BENZOYLECGONINE	100	150
THCCOOH	15	15
AMPH/METAMPH	250	200
MDMA, MDA, MDEA	250	200
METHADONE	100	250
BUPRENORPHINE	5	5

CUT-OFF CONCENTRATIONS USED IN ITALY FOR URINE CONFIRMATORY TESTS DIFFER FROM THOSE PROPOSED BY EWDTs: THEY ARE LOWER FOR MORPHINE, METHADONE AND BENZOYLECGONINE, AND HIGHER FOR AMPHETAMINE, ECSTASY AND 6-AM

CUT-OFF (hair test)

ITALIAN LAW

OPI	Morphine 6- AM Codeine	0.2 ng/mg	
COC	Cocaine	0.2 ng/mg	BE ≥ 5% Coc
	Benzoyl ecgonine	0.05 ng/mg	
AMPH	Amph Metamph MDMA MDA MDEA	0.2 ng/mg	
BUPR		0.05 ng/mg	
CAN	THC	0.1 ng/mg	

SoHT

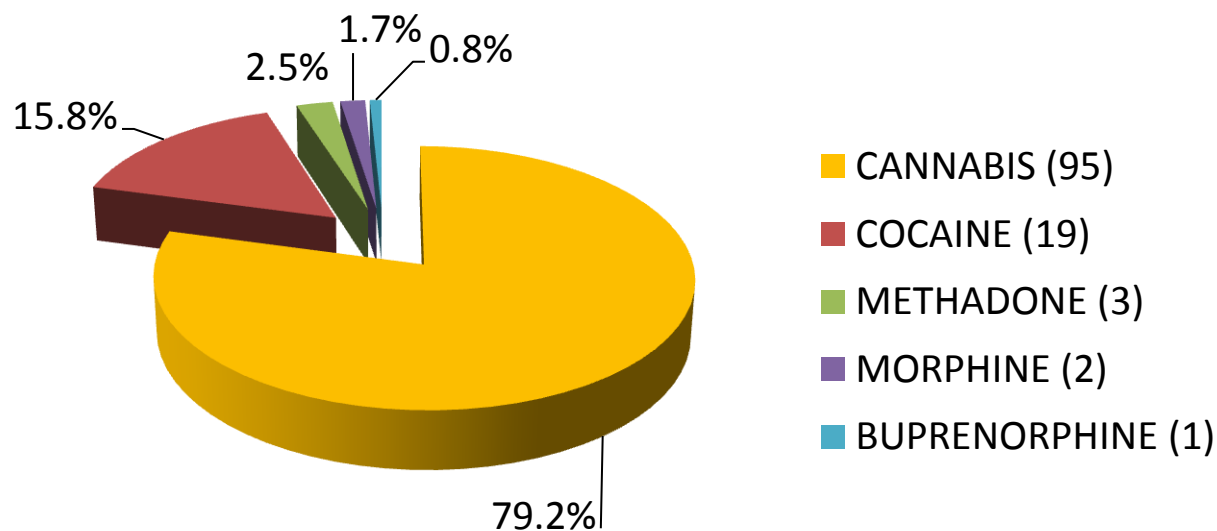
	Morphine 6- AM Codeine	0.2 ng/mg	
COC	Cocaine	0.5 ng/mg	BE ≥ 5% Coc
	Benzoyl ecgonine	0.05 ng/mg	
AMPH	Amph Metamph MDMA MDA MDEA	0.2 ng/mg	
BUPR		0.005 ng/mg	
CAN	THC CBD CBN	0.05 ng/mg	
	THCCOOH	0.0002 ng/mg	

CUT-OFF LEVELS REQUIRED BY ITALIAN LAW ARE HIGHER FOR BUPRENORPHINE AND CANNABINOIDS, AND LOWER FOR COCAINE COMPARED WITH THOSE INDICATED BY SoHT

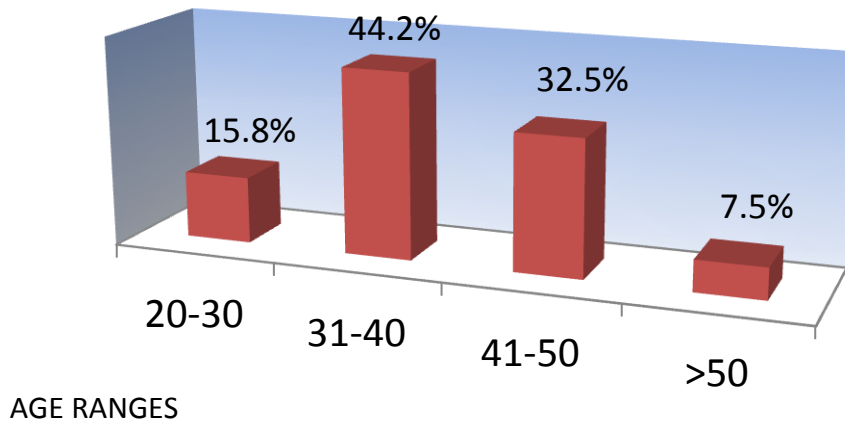
BETWEEN 2009 AND 2012, OUR LABORATORY ANALYZED URINE AND HAIR SPECIMENS OF **120 WORKERS** , COLLECTED BY STAFF AT THE PUBLIC ADDICTION TREATMENT UNIT OF PAVIA.

ALL THESE WORKERS HAD POSITIVE URINE TESTS FOR DRUGS OF ABUSE, AND CONSEQUENTLY UNDERWENT SECOND STAGE TESTING.

DURING FIRST STAGE ANALYSIS, THE FOLLOWING DRUGS WERE FOUND IN URINE SAMPLES OF THE EMPLOYEES:



- ALL 120 WORKERS WERE MALES, AGED BETWEEN 20 AND 53 YEARS
- MOST WORKERS WERE IN THE 31-40 AND 41-50 AGE-RANGES
- 19 SUBJECTS (15.8%) WERE UNDER 30, 9 (7.5 %) WERE OVER 50



OVER 50

1 COC
 1 COD+MOR
 1 BUPR
 6 CAN

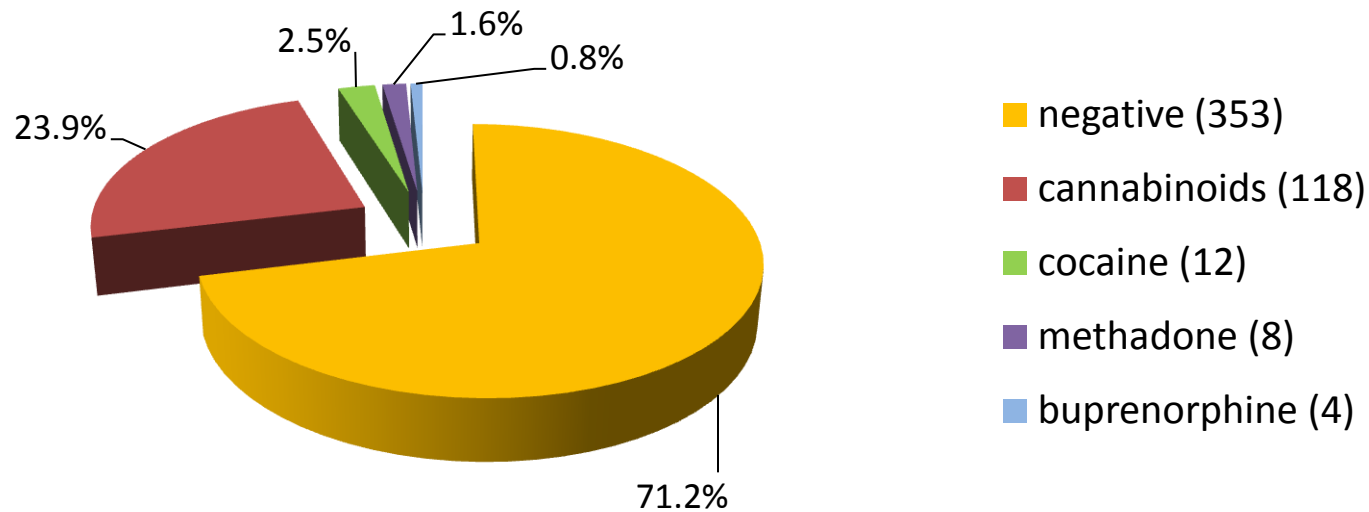
UNDER 30

4 COC
 1 MOR+COC+CAN
 14 CAN

URINE ANALYSIS

- A TOTAL OF **496 URINE SAMPLES** WERE ANALYZED (ABOUT 4 SPECIMENS IN A MONTH FOR EACH WORKER)
- 4 WORKERS WERE LOST AFTER THE FIRST OR SECOND URINE COLLECTION
- SOME WORKERS WERE ASKED TO GIVE MORE THAN 4 URINE SAMPLES (UP TO 7) BY PHYSICIANS OF THE ADDICTION TREATMENT UNIT

ANALYSIS RESULTS ON URINE SAMPLES



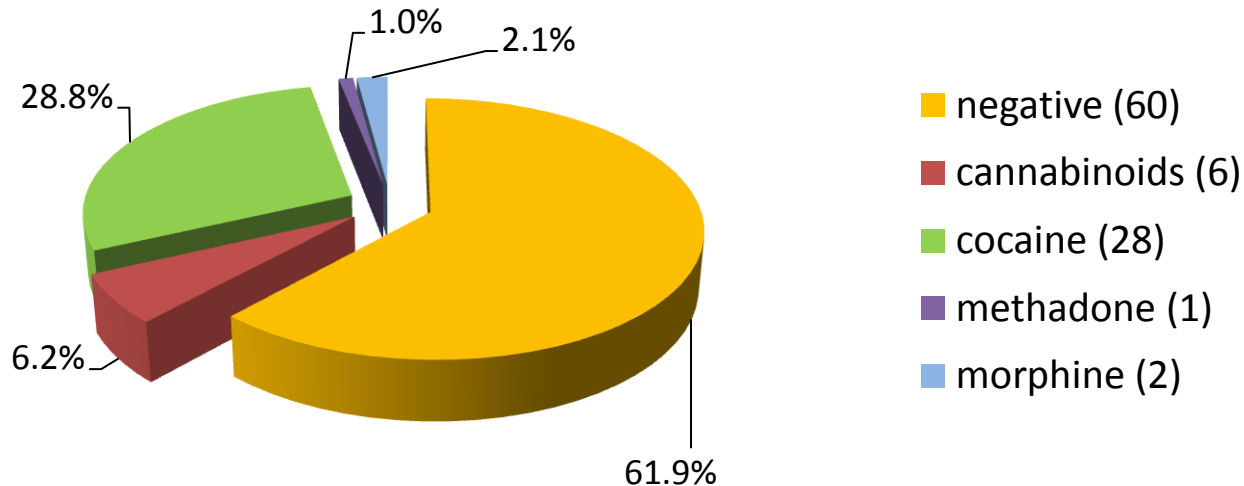
HAIR ANALYSIS

THE SAME WORKERS UNDERWENT HAIR ANALYSIS (PUBIC HAIR IF HEAD HAIR WAS NOT AVAILABLE)

HEAD OR PUBIC HAIR WAS COLLECTED IN ONLY 97 OUT OF 120 CASES

PHYSICIANS AT THE ADDICTION TREATMENT UNIT DID NOT PERFORM HAIR SAMPLE COLLECTION IN 23 CASES DESPITE THE STATUTORY NORMS

ANALYSIS RESULTS ON HAIR SAMPLES

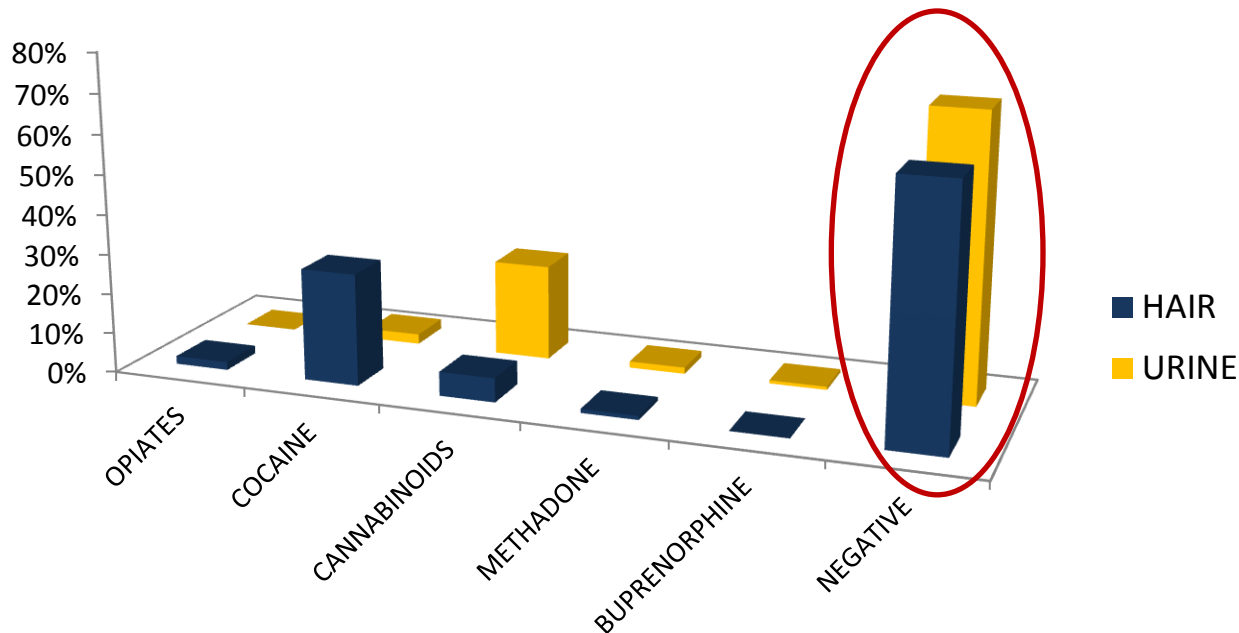


HAIR/URINE ANALYSIS

**MOST OF THE 120 WORKERS CHECKED
TESTED NEGATIVE IN URINE OR HAIR SAMPLES**

IN MOST CASES A POSITIVE URINE TEST DURING THE FIRST STAGE, MAY DERIVE FROM OCCASIONAL DRUG ABUSE

HOWEVER, WE OBSERVED THAT SOME OCCUPATIONAL PHYSICIANS WAIT 6-8 MONTHS BEFORE REFERRING THE WORKER TO ADDICTION TREATMENT UNITS



LESS COMMON DRUGS

	METHADONE		BUPRENORPHINE		MORPHINE	
	HAIR	URINE	HAIR	URINE	HAIR	URINE
1	1.2 ng/mg	neg (4)				
2	NP	POS (4)				
3	NP	POS (4)				
4			NP	POS (7)		
5					4.5 ng/mg	CAN (4)
6					0.5 ng/mg	neg (4)

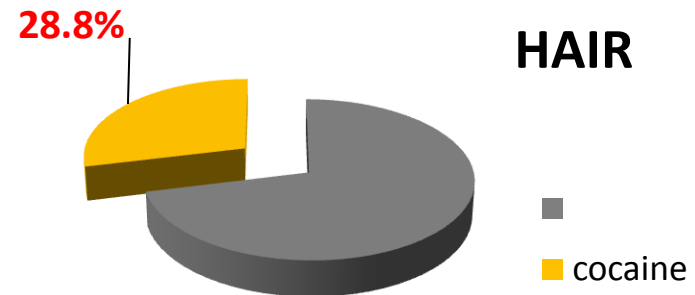
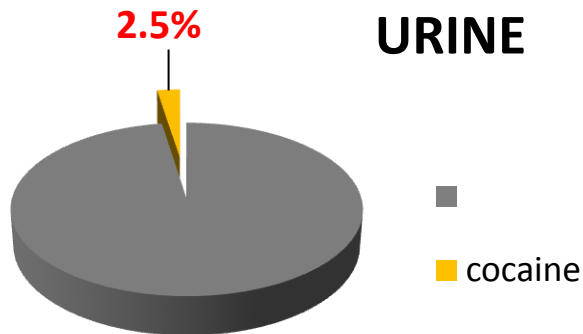
ONLY **6 OUT OF THE 120 WORKERS** WERE POSITIVE FOR DRUGS OTHER THAN CANNABINOIDS OR COCAINE:

- 3 SUBJECTS WERE POSITIVE FOR METHADONE, 1 FOR BUPRENORPHINE. ALL FOUR WERE ALREADY UNDERGOING THERAPY AT THE ADDICTION TREATMENT UNIT, AND WERE TAKING METHADONE OR BUPRENORPHINE FOR HEROIN DETOXICATION
- THE 5thCASE TESTED POSITIVE FOR MORPHINE IN HAIR AND WAS REFERRED TO THE ADDICTION TREATMENT UNIT AFTER A POSITIVE “FIRST STAGE” TEST FOR CANNABINOIDS IN URINE. HEROIN ADDICTION WAS DIAGNOSED
- THE 6thCASE WAS A MALE NURSE WHO OVERDOSED IN A BATHROOM IN THE WORK PLACE

COCAINE

**2.5% URINE SAMPLES AND 28.8 % HAIR SAMPLES
TESTED POSITIVE FOR COCAINE**

Only 15.8% of positive urine tests during the first stage were positive for cocaine

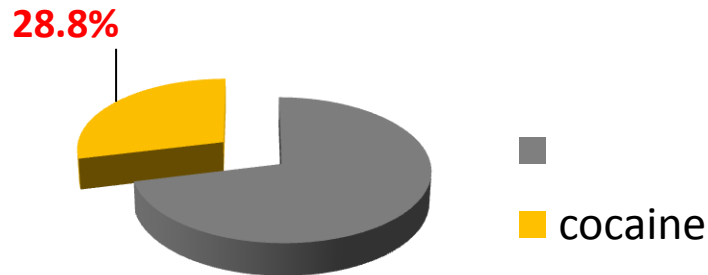


COCAINE WAS ONLY FOUND **OCCASIONALLY** IN URINE SAMPLES : ONLY A MINORITY OF WORKERS TAKING COCAINE , CONTINUED TAKING IT EVEN DURING THE ONE MONTH TESTING PERIOD AT THE ADDICTION TREATMENT UNIT.

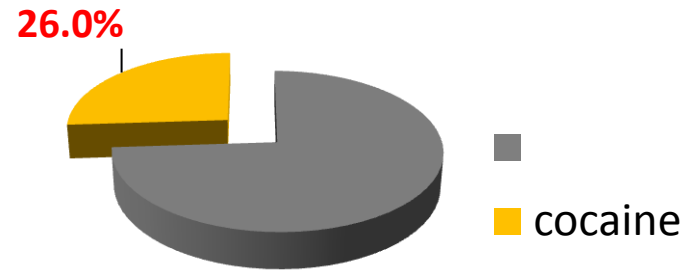
IN ALL CASES, HAIR ANALYSIS CONFIRMED FIRST STAGE INVESTIGATION

COCAINE

HAIR (ITALIAN LAW)



HAIR (SoHT)



CUT-OFF CONCENTRATION FOR COCAINE IN HAIR ESTABLISHED BY ITALIAN LAW (0.2 ng/mg) IS LOWER THAN THAT RECOMMENDED BY SoHT (0.5 ng/mg).

IF WE HAD USED THE SoHT CUT-OFF VALUE, THE NUMBER OF POSITIVE SAMPLES WOULD HAVE BEEN ALMOST SIMILAR.

COCAINE CONCENTRATIONS MEASURED IN HAIR SAMPLES RANGE BETWEEN **0.3 ng/mg** (BE 0.05 ng/mg) AND **76.3 ng/mg** (BE 17.9 ng/mg).

COCAINE CONCENTRATIONS IN HAIR (ng/mg)

2009	1	2	3								
Prox	3.5	6.1	7.8								
Dist	4.2	13.8	-								
2010	1	2	3	4	5	6	7	8	9	10	11
Prox	3.5	30.2	3.7	2.1	9.4	7.1	76.3	6.4	0.95	1.8	0.4
Dist	9.1	73.2	6	1.3	22.2	23.7	-	-	-	-	-
2011	1	2	3	4	5	6	7	8			
Prox	0.8	3.5	2.2	1.7	4.9	0.5	1.6	5.7			
Dist	1.1	3.6	-	-	-	-	-	-			
2012	1	2	3	4	5	6					
Prox	6.5	1.2	3.1	35.5	15.3	0.3					
Dist	-	-	-	-	-	-					

WE REPORT COCAINE CONCENTRATIONS ONLY, BUT BENZOYLECGONINE WAS DETECTED IN ALL CASES

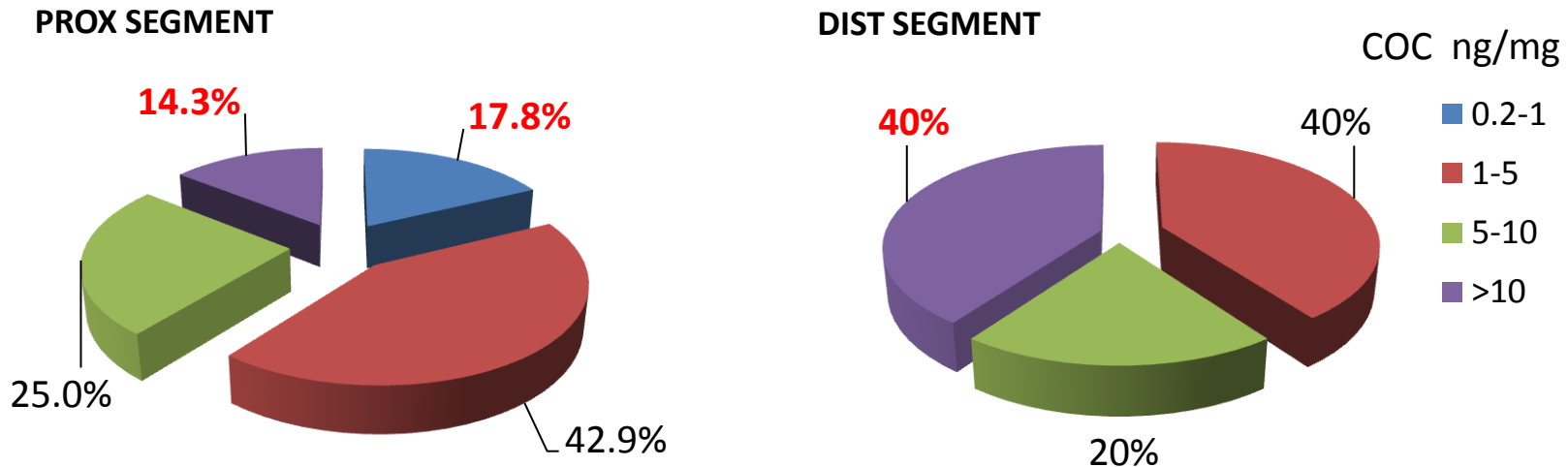


COCAINE

IF WE COMPARE ANALYSES PERFORMED ON PROXIMAL AND DISTAL SEGMENTS WE FIND:

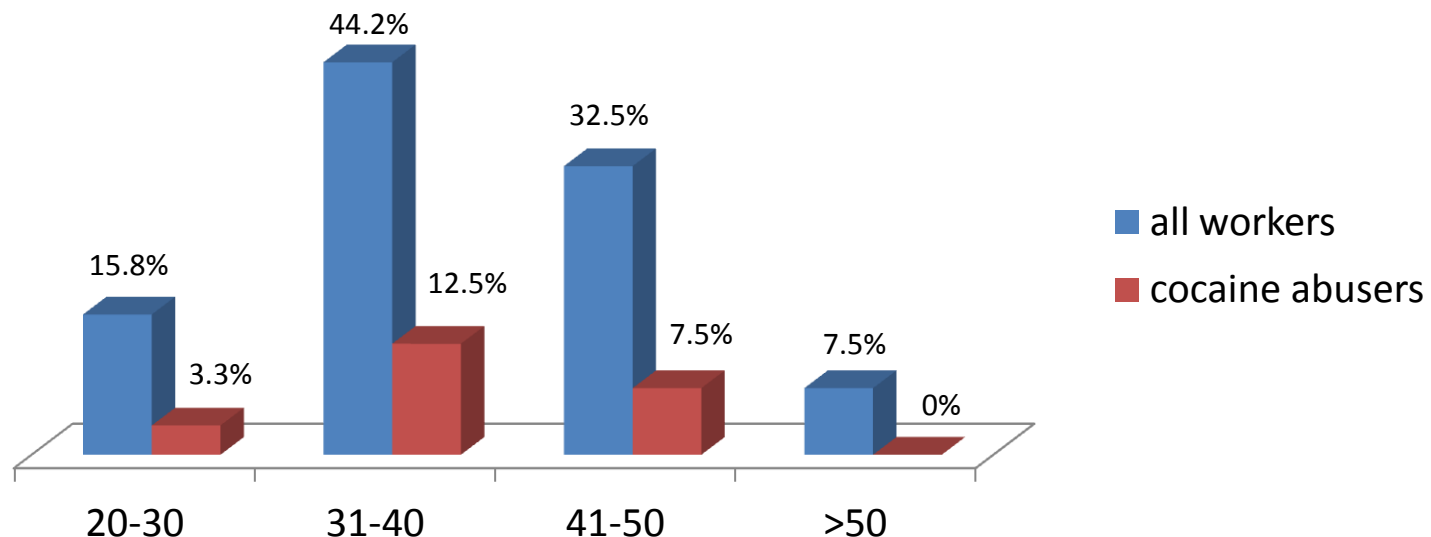
- **HIGHER COCAINE CONCENTRATIONS IN DISTAL SEGMENTS**
(COC > 10 ng/mg INCREASE FROM 14.3% TO 40%)
- **VERY LOW CONCENTRATIONS DISAPPEAR IN DISTAL SEGMENTS**
(COCAINE WAS NOT LOWER THAN 1 ng/mg IN ANY OF THE SAMPLES)

AFTER A POSITIVE TEST RESULT, 6 -8 MONTHS OFTEN PASS BY BEFORE THE WORKER IS REFERRED TO THE ADDICTION TREATMENT UNIT FOR SECOND STAGE TESTING. THUS, WHEN WAITING FOR REFERRAL, WORKERS TAKING COCAINE PROBABLY TEND TO CHANGE AND REDUCE THEIR COCAINE CONSUMPTION



COCAINE

- THE AVERAGE AGE OF COCAINE USERS REFERRED TO OUR ADDICTION TREATMENT UNIT WAS 37.4 YEARS.
- MOST WORKERS TAKING COCAINE WERE BETWEEN 31-40 YEARS OLD, BUT THE 41-50 AGE RANGE IS ALSO WELL REPRESENTED, THUS WE CAN SAY THAT COCAINE ABUSE IS WIDESPREAD EQUALLY AMONG THE WORKERS WE INVESTIGATED IN EVERY AGE GROUP
- WE DID NOT OBSERVE COCAINE ABUSE IN WORKERS OVER 50 (HOWEVER VERY FEW WORKERS OVER 50 WERE INCLUDED IN THE STUDY)



COCAINE - summary

ONLY 19 OUT OF 120 WORKERS EXAMINED (**15.8%**)
TESTED POSITIVE FOR **COCAINE** IN URINE
DURING FIRST STAGE ANALYSES BUT:

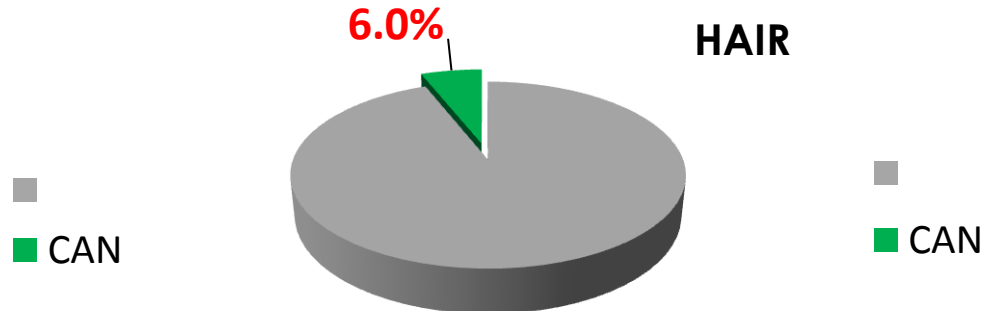
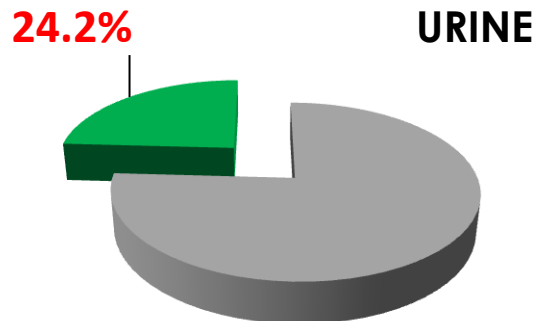
- AFTER SECOND STAGE CONTROLS, WE DISCOVERED THAT COCAINE INTAKE INVOLVED 28 OUT OF 120 WORKERS (23.3%)
- TO BETTER HIGHLIGHT COCAINE ABUSE, HAIR ANALYSIS IS VERY EFFECTIVE: THROUGH HAIR ANALYSIS, COCAINE WAS FOUND IN 16 WORKERS WHO TESTED POSITIVE FOR CANNABIS ONLY IN URINE
- ON THE CONTRARY, 4 URINE TESTS IN A MONTH WERE MUCH LESS EFFECTIVE: POSITIVE TESTS FOR COCAINE IN URINE WERE FOUND ONLY IN 2.5% OF THE WORKERS (3 SUBJECTS)

CANNABINOIDS

AS REGARDS CANNABINOIDS, URINE ANALYSIS SEEMS TO BE MORE EFFECTIVE THAN HAIR ANALYSIS IN DISCOVERING DRUG ABUSE:

IN SECOND STAGE INVESTIGATIONS, 24.2 % OF WORKERS TESTED POSITIVE FOR CANNABINOIDS IN URINE WHILE ONLY 6% IN HAIR SAMPLES

79.2% OF POSITIVE URINE TESTS DURING FIRST STAGE INVESTIGATIONS WERE POSITIVE FOR CANNABINOIDS

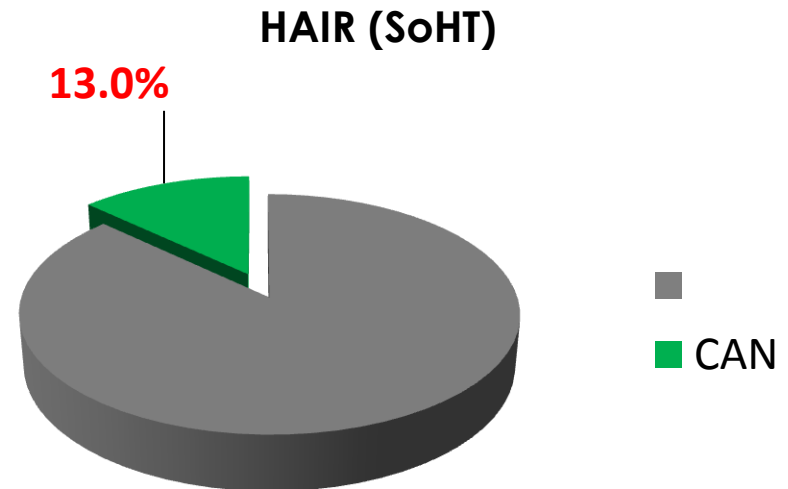
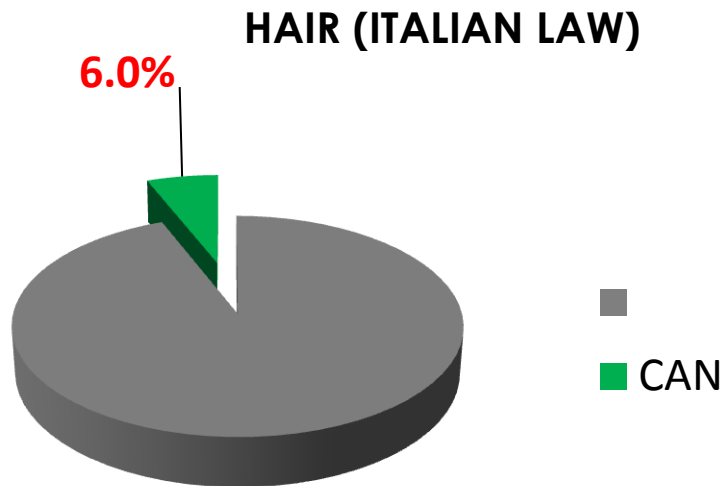


- THE LARGE NUMBER OF POSITIVE URINE SAMPLES IS ALSO DUE TO THE SLOW THCCOOH ELIMINATION IN URINE
- THE SMALL NUMBER OF POSITIVE HAIR SAMPLES IS ALSO DUE TO THE HIGH CUTOFF CONCENTRATION FOR THC ESTABLISHED BY ITALIAN LAW (0.1 ng/mg)

CANNABINOIDS

CUT-OFF CONCENTRATION FOR THC ESTABLISHED BY ITALIAN LAW (0.1 ng/mg) IS TWICE THAT PROPOSED BY SoHT

IF WE HAD USED THE SoHT CUT-OFF VALUE (0.05 ng/mg), THE NUMBER OF POSITIVE SAMPLES WOULD HAVE DOUBLED:



CANNABINOIDS

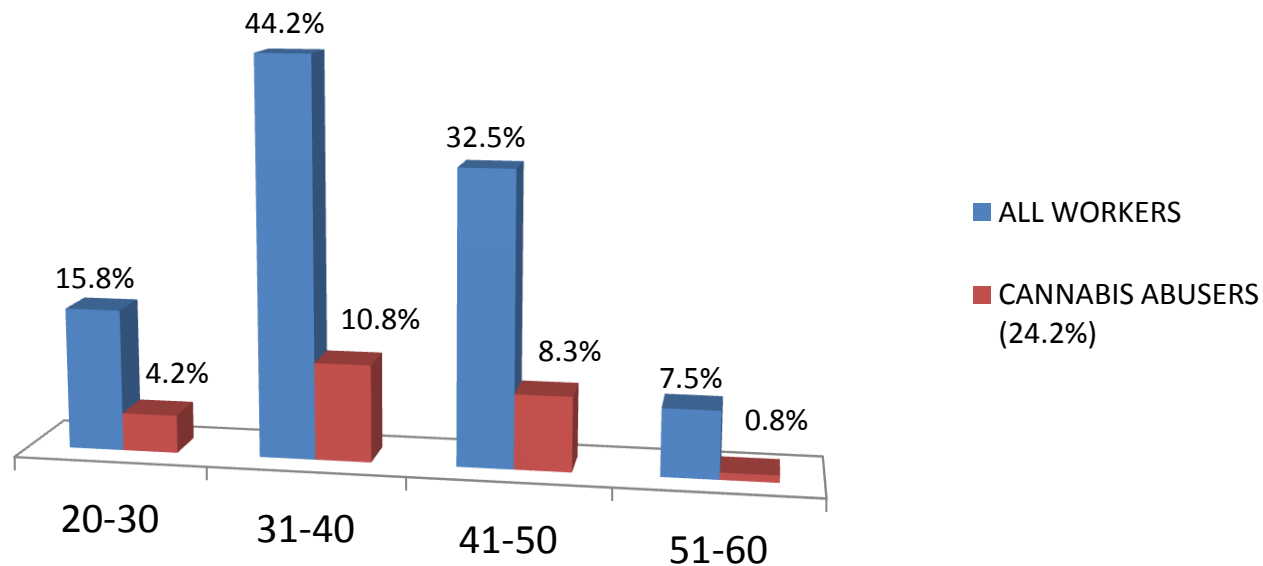
THC CONCENTRATION IN HAIR (ng/mg)				
2009	1	2		
Prox	0.38	0.4		
Dist	1.1	-		
2010	1	2	3	4
Prox	0.1	0.15	0.13	0.18
Dist	0.13	0.3	0.16	1.3

- ONLY 6 OUT OF 97 HAIR SAMPLES TESTED POSITIVE FOR THC
- DURING 2011 AND 2012 WE DID NOT FIND POSITIVE THC HAIR SAMPLES

- 29 OUT OF 120 WORKERS TESTED POSITIVE FOR CANNABINOIDS IN URINE AT LEAST ONCE
- THE 6 WORKERS WHO TESTED POSITIVE FOR THC IN HAIR, ALSO TESTED POSITIVE FOR CANNABINOIDS AT LEAST IN ONE OF THE 4 URINE SAMPLES COLLECTED

CANNABINOIDS

- THE AVERAGE AGE OF CANNABIS USERS WHO UNDERWENT SECOND STAGE TESTING WAS 37.4 YEARS
- THE NUMBER OF WORKERS WHO TESTED POSITIVE FOR CANNABINOIDS IS EQUALLY DISTRIBUTED BETWEEN 20 AND 50 YEARS OF AGE, AND DRAMATICALLY DROPS OVER THE AGE OF 50 (ONLY ONE WORKER WAS POSITIVE)



RESULTS

63 OUT OF 120 WORKERS HAD POSITIVE URINE OR HAIR TESTS IN SECOND STAGE TOXICOLOGICAL ANALYSIS

THESE FINDINGS HIGHLIGHTED THAT CANNABIS AND COCAINE ABUSE AMONG THE 120 WORKERS INVESTIGATED WAS VIRTUALLY THE SAME:

- 28 WORKERS WERE POSITIVE FOR COCAINE(23.9 %)
- 29 WORKERS WERE POSITIVE FOR CANNABINOIDS (24.2%)

COCAINE ABUSE CAN ONLY BE CLEARLY ESTABLISHED AFTER HAIR ANALYSES, INSTEAD URINE ANALYSES IS EFFECTIVE TO DETECT CANNABIS INTAKE

EMCDDA – EUROPEAN DRUG REPORT 2013

- ITALY ESTIMATED '**POTENTIAL PROBLEMS FOR COCAINE USE**' AT **0.34%** AMONG THE GENERAL ADULT POPULATION.
WIDE DIFFERENCES EXIST BETWEEN COUNTRIES, WITH AROUND 90% OF ALL COCAINE USERS BEING REPORTED BY ONLY FIVE COUNTRIES (GERMANY, SPAIN, ITALY, NETHERLANDS, UNITED KINGDOM).
- IN ITALY AROUND **1%** OF ADULTS REPORT USING **CANNABIS** INTENSIVELY (20 OR MORE DAYS A MONTH).
EUROPE HAS SEEN AN INCREASE IN THE NUMBERS OF CANNABIS USERS STARTING TREATMENT (from 45,000 in 2006 to 60,000 in 2011).

RESULTS

In detail, after second stage testing we observed that

AMONG **19 WORKERS** WHO TESTED POSITIVE FOR **COCAINE** IN URINE SAMPLES DURING FIRST STAGE TESTING:

- **2** TESTED NEGATIVE BOTH IN URINE AND IN HAIR SAMPLES
- **12** TESTED POSITIVE FOR COCAINE IN URINE OR IN HAIR SAMPLES
- *hair sample collection was not performed in **5** cases*

AMONG **95 WORKERS** WHO TESTED POSITIVE FOR **CANNABINOIDS** IN URINE SAMPLE DURING FIRST STAGE TESTING:

- **42** TESTED NEGATIVE BOTH IN URINE AND IN HAIR SAMPLES
- **23** TESTED POSITIVE FOR CANNABINOIDS IN URINE OR IN HAIR SAMPLES
- **10** TESTED POSITIVE FOR COCAINE IN URINE OR IN HAIR SAMPLES
- **1** TESTED POSITIVE FOR MORPHINE IN HAIR SAMPLE
- **6** TESTED POSITIVE FOR COCAINE AND CANNABINOIDS IN URINE OR IN HAIR SAMPLES
- *hair sample collection was not performed in **13** cases*

CONCLUSIONS

THE PURPOSE OF SECOND STAGE TESTING IS TO:

**“ DETERMINE THE METHOD AND FREQUENCY OF DRUG ABUSE;
ESTABLISH THE PRESENCE/ABSENCE OF DRUG ADDICTION”**

THUS, SECOND STAGE TESTING IS EFFECTIVE ONLY WHEN
PERFORMED ON BOTH URINE AND HAIR SAMPLES

IN PARTICULAR, HAIR ANALYSIS CAN HIGHLIGHT:

- OCCASIONAL DRUG CONSUMPTION
- INTAKE OF OTHER DRUGS, IN ADDITION TO THOSE FOUND DURING FIRST STAGE TESTING
- REPEATED INTAKE OF DRUGS, A TYPICAL SIGN OF ADDICTION

CONCLUSIONS

HOW CAN SECOND STAGE TESTING BE IMPROVED?

IT IS ALWAYS ADVISABLE:

- TO PERFORM HAIR ANALYSES IN ADDITION TO URINE ANALYSES
- TO REFER WORKERS WITH POSITIVE URINE TESTS TO AN ADDICTION TREATMENT UNIT AS EARLY AS POSSIBLE

FINALLY, WE RECOMMEND THAT THE ITALIAN GOVERNMENT SHOULD INTRODUCE MANDATORY TESTS ALSO FOR OTHER SUBSTANCES, SUCH AS **ETHANOL**.