**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Abizaid,1999[1](#_ENREF_1) | Low osmolaritycontrast medium (Hexabrix, Mallinkrodt, St. Louis,Missouri) | IA  | Not specified, Define, mean 202 ml. Range75-450ml | 1 | 0.45% IV Normal Saline (1 ml/kg/hour) | IV | 1 ml/kg/h 0.45% IV normal saline, Saline 12hrs before and 12hrs after, Prior to CM administration After CM admin | All patients received 0.45% normal saline (1 ml/kg/h) |
|  |  |  |  | 2 | Dopamine (2.5 ug/kg/min) plus 0.45% IV Normal Saline (1 ml/kg/hour) | IV | 2.5 ug/kg/min dopamine + 0.45% IV normal saline hydration 1ml/kg/h, Saline 12hrs before and 12hrs after-others not stated, Prior to CM administration After CM admin |  |
|  |  |  |  | 3 | Aminophylline (4 mg/kg followed by a drip of 0.4 mg/kg/hour) plus 0.45% IV Normal Saline (1 ml/kg/hour) | IV | 4 mg/kg aminophylline followed by a drip of 0.4 mg/kg/hr+0.45% IV normal saline hydration 1ml/kg/hour, Saline 12hrs before and 12hrs after-others not stated, Prior to CM administration After CM admin |  |
| Acikel, 2010[2](#_ENREF_2) | Iohexol | IA | 66-260ml. Comparable between groups | 1 | Control | NR |  | Saline 1ml/kg/h 4h prior until 24 after procedure |
|  |  |  |  | 2 | Atorvastatin | Oral | 40mg/d, 3 days, Prior and after CM administration | Saline 1ml/kg/h 4h prior until 24 after procedure |
|  |  |  |  | 3 | Chronic statins | Oral | At least a month, Prior and after CM administration | Saline 1ml/kg/h 4h prior until 24 after procedure |
| Adolph, 2008[3](#_ENREF_3) | Iodixanol | IA | Mean Arm 1 138 +/- 52 ml Arm 2 141 +/- 50 ml | 1 | Saline plus dextrose | IV | 154 mEq/l of sodium chloride in 5% dextrose solution , 2 ml/kg of body weight per hour for 2 hr before, at a rate of 1 ml/kg of body weight per hour during, and for 6 hafter the administration of iodixanol. |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Adolph, 2008[3](#_ENREF_3) (continued) |  |  |  | 2 | Sodium Bicarbonate in 5% dextrose | IV | 154 mEq/l of sodium bicarbonate in 5%dextrose solution, 2 ml/kg of body weight per hour for 2 h before, at a rateof 1 ml/kg of body weight per hour during, and for 6 h after the administration of iodixanol. |  |
| Alessandri, 2013 [4](#_ENREF_4) | Iomeprol  | IA  | 1.5ml-3ml/kg, Not specified | 1 | Sodium Chloride infusion | IV  | Saline 0.9% 500mls thrice daily, 12hrs before and a day after, Prior to CM administration During CM administration After CM administration  |  |
| Alessandri, 2013 [4](#_ENREF_4) (continued) |  |  |  | 2 | Sodium bicarbonate + NAC | Oral, IV  | NAC 600mg bid + 160 meq of Na 2 HCO 3 in 350 ml of 5% glucose solution 2 ml/kg/h, NAC-day before to day after, nahco3-2hrs before to 6hrs after, Prior to CM administration During CM administration After CM administration  |  |
| Allaqaband, 2002 [5](#_ENREF_5) | LOCM  | IA  | Mean: Arm1 1.47 ml/kg (SD 0.80), Arm2 1.52ml./kg (SD 0.81), Arm3 1.63ml/kg (SD 0.67), Not specified | 1 | 0.45% saline | IV  | 0.45% Saline: 1 ml/kg/h, 12 hour before procedure, during procedure, and 12 hours after procedure, Prior to CM administration During CM administration After CM administration  |  |
|  |  |  |  | 2 | 0.45% saline + nac | IV  | Saline: 1 ml/kg/h + NAC: 600mg 2x daily, Saline same as Arm 1, NAC: given 12 hours before and 12 hours after procedure, Prior to CM administration During CM administration After CM administration  |  |
|  |  |  |  | 3 | 0.45% saline + fenoldopam | IV  | Saline: 1 ml/kg/h + Fenoldopam: 0.1 microgram/kg/hr, Saline: same as Arm 1, Fenoldopam: starting 4 hours before procedure and ending 4 hours after., Prior to CM administration During CM administration After CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
|  |  |  |  | 2 | N-acetylcysteine | Oral | 600mg b.i.d, 24hrs before and 24hrs after, Prior and After CM administration |  |
| Aslanger, 2012 [6](#_ENREF_6) | Ioxaglate  | IA  | Not specified, Define, Mean: Arm1 - 204ml, Arm2 - 193ml, Arm3 - 205ml | 1 | Placebo | IV  | 12ml saline during procedure, placebo capsules presumably twice daily for 2 days, 48 hours, During CM administration After CM administration  | 0.9% saline for 12 hours at 1 ml/kg/h |
|  |  |  |  | 2 | IV NAC | IV  | 1200mg IV during procedure, 1200mg by mouth twice daily for 2 days, 48 hours, During CM administration After CM administration  |  |
|  |  |  |  | 3 | IA NAC |  Other, IA | 600mg IA before procedure, 1200mg by mouth twice daily for 2 days, 48 hours, Prior to CM administration After CM administration  |  |
|  |  |  |  | 2 | NAC | Oral  | 600mg, 72 hours, Prior to CM administration During CM administration After CM administration  | 2 doses prior to procedure, 2 doses day of procedure, 1 dose after procedure |
| Bader,2004 [7](#_ENREF_7) | Iohexol, Iopromide, LOCM  | IA  | Arm 1:mean 217ml Arm 2 mean 205mlDose/duration not specified | 1 | Saline infusion before and after procedure | IV  | 2000ml/24hours, 12h before and 12h after, Prior to CM administration After CM administration. All patients allowed oral hydration after procedure.  | Total volume of saline=2000mls. Type of saline not specified. |
|  |  |  |  | 2 | Saline infusion during procedure | IV  | 300ml bolus, Bolus during procedure, During CM administration. All patients allowed oral hydration after procedure. | 300mls bolus. Type of saline not specified. |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Baskurt, 2009[8](#_ENREF_8) | LOCM, Other description, Ioversol | IA  | Not specified | 1 | Hydration | IV  | 1 ml/kg/h for 12 h before and after contrast exposure, 12 h before and after contrast exposure, Prior to CM administration After CM administration  |  |
|  |  |  |  | 2 | Hydration + N-acetylcysteine | Oral, IV  | 1 ml/kg/h of Isotonic Saline for 12 h before and after contrast exposure + NAC: 600 mg p.o. Twice daily the preceding day and the day of angiography, 12 h before and after contrast exposure, Prior to CM administration  |  |
|  |  |  |  | 3 | Hydration + N-acetylcysteine + theophylline | Oral, IV  | 1 ml/kg/h of isotonic saline for 12 h before and after contrast exposure. NAC + theophylline (600 mg NAC p.o. And 200 mg theophylline p.o. Twice daily for the preceding day and the day of angiography, 12 h before and after contrast exposure, Prior to CM administration  |  |
| Brar, 2014[9](#_ENREF_9) | Ioxilan | IA | Dose: 350 mg iodine/mlVolume: NRDuration: NR | 1 | IV Normal Saline | IV | 0.9% Saline infusion 3ml/kg for 1 hr before CM +1.5 ml/kg/h, 5 hr (1h pre - 4h post) |  |
|  |  |  |  | 2 | LVEDP-guided IV hydration  | IV | 0.9% Saline infusion 3ml/kg for 1 h before CM +5ml/kg/h LVEDP <13mmHg - 3ml/kg/h LVEDP =13-18 mmHg 1.5 ml/kg/h LVEDP >18mmHg, 5 h (1h pre - 4h post) |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Briguori, 2004 [10](#_ENREF_10) | Iodixanol,  | IA  | Not specified, Define, Mean: Arm1 160 (SD 82), Arm2 168ml (SD 104) | 1 | 0 | NR  |  |  |
|  |  |  |  | 2 | NAC + saline | Oral, IV  | 0.45% saline 1ml/kg, 1,200mg NAC twice daily = 4800mg total, 48 hours, Prior to CM administration During CM administration After CM administration  | Saline given before and after procedure, NAC given day before and day of procedure |
|  |  |  |  | 3 | Fenoldopam mesylate + saline | Oral, IV  | 0.45% saline 1ml/kg, Fenoldopam given at 0.10 ug/kg/min, 24 hours, Prior to CM administration During CM administration After CM administration  | Saline given before and after procedure, Fenoldopam started 1 hour before procedure and continued through till 12 hours after. |
| Briguori, 2004[11](#_ENREF_11) | Other description, Iobitriolol | IA  | Not specified, Mean: Arm2 184ml (SD 122), Arm3 174 ml (SD 108) | 1 | 0 |  |  | All pts had saline 0.45% 1/ml/kg 12h before-12h after CM |
|  |  |  |  | 2 | NAC single dose | Oral  | NAC 600g bid, 2 days, Prior to CM administration After CM administration  | 1 day before-1 day after CM |
|  |  |  |  | 3 | NAC double dose | Oral | NAC 1200 mg bid, 2 days, Prior to CM administration After CM administration  | 1 day before-1 day after CM |
| Briguori, 2007[12](#_ENREF_12) | Iodixanol | IA  | Dose and duration not specified. Mean volume: Arm 1: 179ml, Arm 2: 169ml, Arm 3: 169ml | 1 | IV Normal Saline + oral NAC | Oral, IV  | IV 0.9% saline, 1ml/kg/h, 12 hours before and 12 hours after contrast media administration. NAC given at 1200mg twice daily the day before and day after procedure. | All patients given Arm 1 intervention. |
|  |  |  |  | 2 | IV NaHCO3 + oral NAC | Oral, IV  | 154mEq/L sodium bicarbonate in dextrose and water. Initial bolus 3ml/kg/h given 1 hour before contrast media, 1ml/kg/h during procedure and for 6 hours after.  | All patients given Arm 1 intervention, along with sodium bicarbonate. |
|  |  |  |  | 3 | IV Normal Saline + IV ascorbic acid + oral NAC | Oral, IV  | 3g of ascorbic acid IV 2 hours before contrast media, and received 2g the night and morning after procedure.  | All patients given Arm 1 intervention, along with ascorbic acid. |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Briguori, 2011 [13](#_ENREF_13) | Iodixanol | IA | Not specified | 1 | IV Sodium bicarbonate + oral NAC | Oral, IV  | IV 154 meq/L sodium bicarbonate, 1200mg NAC twice daily for 2 days, 7 hours sodium bicarbonate, 2 days NAC, Prior to CM administration During CM administration After CM administration  |  |
|  |  |  |  | 2 | RenalGuard: IV 0.9% saline + IV NAC + RenalGuard System + IV furosemide | Oral, IV  | Furosemide 0.25 mg/kg, NAC 1500mg, ~ 8 hours, Prior to CM administration During CM administration After CM administration  | Includes hydration with 0.9% saline and use of renalguard system. Renalguard system includes a closed-loop fluid management system, a high-volume fluid pump, a high-accuracy dual weight measuring system, motion-detection artifact reduction, a single-use intravenous set and urine collection system that interfaces with a standard Foley catheter, real-time display of urine and replacement fluid volume, timely alerts to drain the urine bag or to replace the hydration fluid bag, and safety features such as automatic air and occlusion detection. |
| Chen, 2008[14](#_ENREF_14) | IOCM  | IA  | mean 285 +/- 107 (for both groups with normal renal function), 298 +/- 125 (for both groups with abnormal renal function), Not specified  | 1 | Normal renal function-Non hydration |  Other, usual care | NR | Non-hydration intervention not specified |
|  |  |  |  | 2 | Normal renal function-0.45% saline | IV  | Saline 0.45% 1ml/kg/h, 18h, Prior to CM administration After CM administration  |  |
|  |  |  |  | 3 | Abnormal renal function-NAC + Non hydration | Oral  | NAC 1200 mg bid, 18h, Prior to CM administration After CM administration  | Non-hydration intervention not specified |
|  |  |  |  | 4 | Abnormal renal function-NAC+-0.45% saline | Oral, IV  | NAC 1200 mg bid + Saline 0.45% 1ml/kg/h, 18h, Prior to CM administration After CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Cho, 2010 [15](#_ENREF_15) | Isoversol | IA  | 320mg iodine/ml, duration not specified, 118-136 ml | 1 | IV 0.9% saline | IV  | Saline infusion 3 ml/kg/h 1 h pre - 1ml/kg/h 6 h after, 7H, Prior to CM administration During CM administration After CM administration  | 154 meq, normal saline |
|  |  |  |  | 2 | IV sodium bicarb + IV 0.9% saline | IV  | Sodium bicarb infusion 3ml/kg/h 1 h pre - 1ml/kg/h 6 h after, 7H, Prior to CM administration During CM administration After CM administration  | 154 meq |
|  |  |  |  | 3 | Oral fluids (water) | Oral  | Water 500 ml 4 hr before procedure stop 2 hr prior + 600 ml after procedure, 2 hr, Prior to CM administration After CM administration  |  |
|  |  |  |  | 4 | Oral fluids (water) + oral bicarb | Oral  | Water 500 ml 4 h before procedure- stop 2 hr prior + 3.9g sodium bicarb oral 20 min before procedure +600 ml after procedure, 2H, Prior to CM administration After CM administration  | 46.4 meq |
| Demir, 2008 [16](#_ENREF_16) | Iomeprol, Iopamidol  | IV | 100ml: Iomeprol (61.25 g/ml) Iopamidol (61.25 g/ml), Not specified, Define, 100ml: Iomeprol (61.25 g/ml) Iopamidol (61.25 g/ml) | 1 | Saline | IV  | 2000ml 0.9% saline hydration, 48 hours (24 pre and 24 post), and after CM administration  | Normal saline given to all arms |
|  |  |  |  | 2 | Saline +NAC (NAC) | Oral  | Hydration as arm 1 + NAC 600 ml/d, 3 days prior, day of, 1 day post procedure  | In the morning plus control |
|  |  |  |  | 3 | Saline + Misoprostol (M) | Oral  | Hydration as arm 1 + misoprostol 400 mg/d (200mg, 2x/day), 3 days prior, day of, 1 day post CM  | Plus control |
| Demir, 2008 [16](#_ENREF_16)  |  |  |  | 4 | Saline + Theophylline (T) | Oral  | Hydration as arm 1 + theophylline 200mg/d, 3 days prior, day of, 1 day post CM  | In the morning plus control |
|  |  |  |  | 5 | Saline + Nifedipine (N) | oral | Hydration as arm 1 + nifedipine 30 mg/day, 3 days prior, day of, 1 day post CM  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Durham, 2002[69](#_ENREF_69) | Iohexol | IA  | Mean: Arm1 48.1 min (SD 30.9), Arm2 44.8 min (SD 19.1), Define, Mean: Arm1 84.7 ml, Arm2 77.4 ml | 1 | IV hydration plus placebo | Oral  | Saline 0.45% 1 ml/kg/h, placebo NR, 1h before and 3h after, Prior to CM administration After CM administration  | Saline hydration given for 12 hours before and up to 12 hours after procedureAll patients were placed on conventional iv hydration but actual rate and duration was left to physician |
|  |  |  |  | 2 | IV hydration plus NAC | Oral  | Saline 0.45% 1 ml/kg/h, 1200mg NAC, 1h before and 3h after, Prior to CM administration After CM administration  | Saline hydration given for 12 hours before and up to 12 hours after procedure |
| Erol, 2013 [17](#_ENREF_17) | Iohexol | IA  | 780mosm/kg +50mg iodine/mL, Not specified | 1 | Saline hydration | IV  | 1 mg/kg/h normal saline, 24 hours, Prior to CM administration After CM administration  | 12 hours pre and 12 hours post contrast |
|  |  |  |  | 2 | Saline hydration + alloprinol | Oral, IV  | 300mg allopurinol + 1 mg/kg/hr normal saline, 24 hours, Prior to CM administration After CM administration  | Allopurinol 24 hours before+ hydration: 12 hours pre and 12 hours post contrast |
| Firouzi, 2012[18](#_ENREF_18) | Iodixanol, Iopromide | IA  | 325.34(101.41) vs 319.28(98.1) p=0.6 | 1 | Control | NR  | Normal Saline |  |
|  |  |  |  | 2 | Pentoxifylline | IV  | Hydration as arm 1 + pentoxifylline 400mg 3xd for 2 days  |  |
| Frank, 2003[19](#_ENREF_19) | Iomeprol | IA | mean dose was 80 mL; 3 CM injections into LCA and 2 injections into the RCA + biplane levocardiography using 25 mL | 1 | 0.9% saline volume expansion | IV | 1000 ml 0.9% saline, 12 Hours. Prior and After CM administration  | 6 hours pre and 6 hours post CM admin |
|  |  |  |  | 2 | 0.9% saline volume expansion + high-flux HD | control + HD | 1000 ml 0.9% saline (same as control) + HD, saline duration was the same as in the control group; HD was over 4 hours during CM admin. Prior and After CM administration | Plus control regimen |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Gu, 2013 [20](#_ENREF_20) | Not specified | IA  | Not specified | 1 | Control--saline | IV  | 1ml/kg/h saline, From 4 h before to 24 hours after surgery, Prior to CM administration During CM administration After CM administration  | New York Heart Association stage 2 and 3 had limited oral intake of fluids |
|  |  |  |  | 2 | Furosemide | IV  | 20mg furosemide, over 30 seconds 7-13 minutes (~10.1 +/- 3.2 min) after procedure, After CM administration  | This group also received same saline protocol as control |
| Gulel, 2005 [72](#_ENREF_72) | Ioxaglate  | IA  | Not specified, Not specified | 1 | Control | NR  |  | All patients received saline 1ml/kg/h infusion 12 h before-12 h after CM |
|  |  |  |  | 2 | NAC | Oral  | 600mg bid, 2days, Prior to CM administration After CM administration  | The day before and the day of the day of CM |
| Gunebakmaz, 2012[21](#_ENREF_21) | Iopromide, LOCm | IA | 61-64, Not specified, Not specified | 1 | Saline | IV | 1ml/kg/h, 18 hours, staring 12 hours before the procedure, Prior, during and after CM administration | 0.9% saline for all arms |
|  |  |  |  | 2 | Saline + nebivolol | NR | 600mg bid, 4 days, starting 2 days before the procedure, Prior, during and after CM administration |  |
|  |  |  |  | 3 | Saline + NAC | IV | 5mg day, 4 days, starting 2 days before the procedure, Prior, during and after CM administration |  |
| Hafiz, 2012 [22](#_ENREF_22) | LOCM  | IA  | Not specified, Not specified | 2 | NS with or without NAC | Oral, IV  | 0.9% saline 1ml/kg, 1200mg NAC administered twice, 2400mg total, 24 hours saline, Prior to CM administration After CM administration  | NAC administered 2-12 hours before procedure and 6-12 hours after procedure |
|  |  |  |  | 3 | Sodium Bicarbonate with or without NAC | Oral, IV  | 154 meq/l NAHCO3 3ml/kg/hour, 1200mg NAC administered twice, 2400mg total, 7 hours NAHCO3, Prior to CM administration After CM administration  | NAC administered 2-12 hours before procedure and 6-12 hours after procedure |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Hans,1998[23](#_ENREF_23) | Iohexol, Other description, the brand is Omnipaque 300 (concentration is listed below under dose) | IA  | OMNIPAQUE 300 contains 647 mg of iohexol equivalent to 300 mg of organic iodine per mL (per package insert), Not specified, Define, 140 ml (SD=29.6) for control group and 146 mls (SD=46) for dopamine group | 1 | Placebo | IV  | NR, Does not specifically say, but may also be 12 hours (see below), Not stated | Article says that patients in the control group received an equal volume of normal saline. The timing is not stated. It may be the same timing as the dopamine, but it does not explicitly sayPatients were encouraged to drink liquids before and after the arteriography (assumption is that this means all patients). |
|  |  |  |  | 2 | Dopamine | IV  | 2.5 mcg/kg/min of dopamine, 12 hours, Prior to CM administration During CM administration After CM administration  | It seems that the dopamine is continued during the contrast administration also (does not say it was stopped during that time, so it sounds like it is given prior, during, and after CM administration) |
| Hashemi, 2005 [24](#_ENREF_24) | Other description, Meglumin compound | IA  | 370 mg/ 20ml, Define, 2 hours prior procedure to 48 hours after, Define, Mean: Arm1 223.3ml (SD 130), Arm2 225ml (SD 120) | 1 | Placebo | Oral  | Placebo NR, 2 hours prior to procedure until 48 hours after procedure  | All the patients had received aspirin 100mg/d and ticlopidin 250 mg/bid from one weekprior to angioplasty, and normal saline 0.9%infusion (total volume of 1.5 liter) at a rate of60 ml/h from 12 hours before angioplasty until12 hours after the procedure. |
|  |  |  |  | 2 | Captopril | Oral  | 12.5mg captopril every 8 years, 2 hours prior to procedure until 48 hours after procedure, Prior to CM administration During CM administration After CM administration  |  |
| Heguilen, 2013 [25](#_ENREF_25) | Ioversal | NR | Dose: 678mg/dose, duration not specified. Mean Volume: Arm2 179.8ml, Arm3 209.9 ml, Arm4 186.6ml | 1 | Sodium bicarbonate | IV  | 154 mmol nahco3, at 3ml/kg, 15 hours, Prior to CM administration During CM administration After CM administration  | All arms fluid mixed with 5% dextrose |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Heguilen, 2013 [25](#_ENREF_25) (continued) |  |  |  | 2 | NAC+NaHCO3 | Oral, IV | 600mg NAC, twice daily., 2 days, Prior to CM administration During CM administration  |  |
|  |  |  |  | 3 | NAC + NaCl | Oral, IV  | 600mg NAC plus 154 mmol NaCl solution at 3 ml/kg/h, 2 days, Prior to CM administration During CM administration After CM administration  | Saline solution given 2 hours before procedure and 12 hours after. NAC given in same schedule as Arm3 |
| Holscher, 2008[26](#_ENREF_26) | Iopromide  | NR | Not specified | 1 | Hydration only | IV  | 500 ml 5% glucose and 500 ml 0.9% sodium chloride, 12 h before and after, Prior to CM administration After CM administration  |  |
|  |  |  |  | 2 | Hydration plus dialysis | IV  | 500 ml 5% glucose and 500 ml 0.9% sodium chloride, 12 h before and after, Prior to CM administration After CM administration  |  |
|  |  |  |  | 3 | Hydration plus NAC | Oral, IV  | 500 ml 5% glucose and 500 ml 0.9% sodium chloride plus 600mg NAC, NR, Prior to CM administration After CM administration  |  |
| Huber, 2006[27](#_ENREF_27) | Iomeprol, Other description, Imeron | IA and IV | Not specified, Define, 100-400ml | 1 | 0 |  |  |  |
|  |  |  |  | 2 | Theophylline | IV  | 200 mg infusion 30 min before CM, short infusion, Prior to CM administration  | Started 30min before contrast procedure. Hydration for all arms dependent on physician and patient condition. |
|  |  |  |  | 3 | Acetylcysteine | IV  | 600 bid, 2 days, day before and day of procedure, Prior to CM administration During CM administration  | Starting the day before. Hydration for all arms dependent on physician and patient condition. |
|  |  |  |  | 4 | Theophylline + Acetylcysteine | IV  | 200 mg infusion 30 min before CM, 600mg bid of acetyl, 2 days, day before and day of procedure, Prior to CM administration  | Starting the day before. Hydration for all arms dependent on physician and patient condition. |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Kimmel, 2008[28](#_ENREF_28) | Iomeprol  | IA  | Not specified | 1 | Placebo | Oral  | NR, 48 h, Prior to CM administration During CM administration  | Day before and day of procedureAll patients received a peri- procedural intravenous infusion (‘volume expansion’) of 1 ml/kg/h with 0.45% saline for 24 h (12 h before and 12 h after exposure to CM) |
|  |  |  |  | 2 | Nac | Oral  | 600mg b.i.d, 48 h, Prior to CM administration During CM administration  | Day before and day of procedure |
|  |  |  |  | 3 | Zinc | Oral  | 60mg daily, 24 hours, Prior to CM administration  | Day before |
| Kinbara, 2010[29](#_ENREF_29) | Iopamidol, | IA | 0.755g/ml | 1 | Hydration | IV | 1 ml/kg/h, 30min before and 10hs after angiography, prior and after CM administration | Arm 2: NAC and Arm 3: Aminophylline |
|  |  |  |  | 2 | Hydration and aminophylline | IV | 250mg +control treatment, 30min before + control treatment, Prior to CM administration |  |
|  |  |  |  | 3 | Hydration and N-acetylcysteine | Oral | 704mg twice daily + control treatment, day before and during procedure + control, prior and during CM administration |  |
| Klima, 2012 [30](#_ENREF_30) | LOCM, IOCM  | IA or IV | Not specified | 1 | 0.9% saline | IV  | 0.9% saline, 1 ml/kg/h, ~20 hours, Prior to CM administration During CM administration After CM administration  | Saline started at 8pm day before procedure and for at least 12 hours after procedure |
|  |  |  |  | 2 | Long term sodium bicarbonate | IV  | 166 meq/L, ~8 h, Prior to CM administration During CM administration After CM administration  | Sodium bicarbonate given for 1 hour before CM administration during CM administration and 6 hours after procedure |
|  |  |  |  | 3 | Short term sodium bicarbonate | Oral, IV  | 166 meq/L + 500mg, 20 min, Prior to CM administration During CM administration  | Given 20 min sodium bicarbonate though IV, and then 500mg sodium bicarbonate orally at start of infusion |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Koc, 2012[31](#_ENREF_31) | Iohexol | IA  | Dose and duration not specified. Volume Mean: Arm1 130ml, Arm2 130ml, Arm3 120ml | 1 | IV 0.9% saline | IV  | 0.9% saline 1 ml/kg/h, 12 h before and 12 h after the coronary procedure, Prior to CM administration After CM administration  |  |
|  |  |  |  | 2 | IV NAC plus high-dose IV 0.9% saline | IV  | IV bolus of 600 mg of NAC twice daily, before and on the day of the coronary procedure, Prior to CM administration During CM administration After CM administration  | IV 0.9% saline 1 ml/ kg/h before, on and after the day of the coronary procedure |
|  |  |  |  | 3 | IV 0.9% saline | IV  | IV 0.9% saline 1 ml/kg/, before, on and after the day of coronary procedure, Prior to CM administration During CM administration After CM administration  |  |
| Kong, 2012 [32](#_ENREF_32) | Iopromide | IA  | Not specified | 1 | IV 0.9% saline | IV  | 12 h before the procedure and continued for 24 h after procedure, Prior to CM administration During CM administration After CM administration  | Normal saline, 1ml/kg/hDuration is difficult to describe and details are under dose |
|  |  |  |  | 2 | Oral hydration before and after procedure | Oral  | 500 ml 2 h before procedure and 2000 ml within 24 h following procedure, Prior to CM administration After CM administration  | Tap water |
|  |  |  |  | 3 | Oral hydration after procedure | Oral  | 2000 ml within 24 h following procedure, After CM administration  | Tap water |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Kooiman, 2014[33](#_ENREF_33) | Iopromide, Iobitridol, Iodixanol | IA  | Mean Iodine dose: Arm1: 24.9g, meant Arm2: 24.7gMean Contrast Volume: Arm1: 74.5ml, Arm2: 73.5ml | 1 | No hydration | NR | No hydration administered before or after procedure. | No other CIN preventive treatments were used, such as oral hydration or NAC. |
|  |  |  |  | 2 | IV 1.4% NaHCO3 | IV | 250ml IV 1.4% NaHCO3 1 h before procedure. No hydration given after procedure | No other CIN preventive treatments were used, such as oral hydration or NAC. |
| Kotlyar, 2005[34](#_ENREF_34) | Iopromide, Other description, Ultravist-370, 0.769 mg/ml, 370mg iodine/ml; Schering Berlin, Germany | IA  | Not specified, Define, mean 87ml in Arm 1, mean 89 ml in Arm 2 and mean 86ml in Arm 3 | 1 | IV hydration | IV  | 0.9% saline commenced at 200 ml/h 2 h before angiography and continued for a further 5 h after the procedure, NR, Prior to CM administration After CM administration  | All patients, scheduled for angiography, receivedwritten instruction to drink 1 l of fluid the evening priorto the procedure |
|  |  |  |  | 2 | NAC 300mg | Oral  | IV NAC 300mg +IV Hydration0.9% saline (NaCl at 200 ml/h 2 h before angiography and continued for a further 5 h after the procedure), NR, Prior to CM administration After CM administration  | NAC was prepared in 100 ml of 5% dextrose and administered over 20 min, 1–2 h before angiography and again 2–4 h after angiography |
|  |  |  |  | 3 | NAC 600mg | Oral  | IV NAC 600mg +IV hydration0.9% saline (NaCl at 200 ml/h 2 h before angiography and continued for a further 5 h after the procedure), NR, Prior to CM administration After CM administration  | NAC was prepared in 100 ml of 5% dextrose and administered over 20 min, 1–2 h before angiography and again 2–4 h after angiography |
| Krasuski, 2003[35](#_ENREF_35) | Not specified | IA | Arm 1 mean=1.7cc/kg; Arm 2 mean 1.6cc/kgArm 1 mean=136cc; Arm 2 mean=131cc | 1 | Overnight hydration dextrose plus saline | IV | 5% dextrose in half normal saline -1cc/kg/h, 12h before. Prior to cm administration | Upon completion of the study, all patients were encouraged to take oral fluids and received 12 hours of iv 5% dextrose in half normal saline at 1cc/kg/h |
|  |  |  |  | 2 | Bolus normal saline | IV | Bolus-250cc normal saline, 20mins. Prior to CM administration |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Kumar, 2014[36](#_ENREF_36) | IohexolIodixanol | IA | Iohexol: 350 mgIodixanol: 320 mg | 1 | IV NS | IV |  1ml/kg/hr, 12 hours before and after administration of radio contrast agent |  |
|  |  |  |  | 2 | Oral NAC + IV NS | Oral, IV |  600 mg bd, 12 hours before and after administration of radio contrast agent |  |
|  |  |  |  | 3 | Allpurinol + IV NS | Oral, IV |  300 mg/day, 12 hours before and after administration of radio contrast agent |  |
| Lawlor, 2007 [37](#_ENREF_37) | Not specified | IA | 100-200mg, Not specified, Define, Arm 1 mean=163ml; Arm 2 mean=158; Arm 3 mean=165ml | 1 | IV 0.9% saline | Oral, IV  | IV 0.9 NaCl 1 ml/kg/h+ placebo(3 ml of 0.9% NaCl in 30 ml of ginger ale), 112 h of IV hydration before and after, Prior to CM administration After CM administration  | Placebo given at same time as NAC was given to Arm 2Unlimited oral hydration was encouraged in the post procedure period in all groups |
|  |  |  |  | 2 | IV 0.9% saline + NAC | Oral, IV  | 600 mg NAC in 30 ml of ginger ale orally twice daily the day prior to and the day of angiography and 12 h of IV hydration (0.9 NaCl 1 ml/kg/h) both prior to and following the procedure, 48hours, Prior to CM administration  |  |
|  |  |  |  | 3 | Oral hydration + NAC | Oral  | NAC (600 mg in 30 ml of ginger ale orally twice daily the day prior to and the day of angiography)+outpatient oral hydration preparation of 1,000 ml water in the 12 h prior to the procedure + followed by IV hydration (0.9 NaCl 1 ml/kg/h) beginning 1-2 h prior to the procedure and continuing for a total of 6 h afterward, Prior to CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Lehnert, 1998 [70](#_ENREF_70) | Iopentol, Other description, the concentration of the iopentol: 350 mg iodine/mL = 810 mOs/kg H2O) | IA and IV | 3.0ml/kg(SD=0.4) for control and 3.5 ml/kg(SD=0.6) for the hemodialysis group, Not specified | 1 | Conservative treatment | IV  | 0.9% saline at 83 ml/hour, 24 hours (IVF beginning 12 hs before contrast, then continued at the same rate for 12 hours after contrast), Prior to CM administration After CM administration  | All patients received 0.9% saline as described. If the patient was not on a calcium channel blocker, then 10 mg nitrendipine per 12 hours was scheduled beginning 12 hours before catheterization.Arm 1: IVF + oral Ca blocker if not on one (see above)Arm 2: IVF + HD + oral Ca blocker if not one (see above) |
|  |  |  |  | 2 | Hemodialysis | Other, Vascular access shaldon catheter (femoral vein) | High flux polysulphone membrane, average blood flow 139 +/- 8 ml/min, dialysate flow 500 ml/min. No fluid withdrawal., 3 hours (also 24 hours of IVF as in the control group), After CM administration  | All patients received 0.9% saline as described in Arm 1. If the patient was not on a calcium channel blocker, then 10 mg nitrendipine per 12 hours was scheduled beginning 12 hours before catheterization. Dialysis was started as soon as possible after termination of contrast (mean 63 +/- 6 min) |
| Li, 2011[39](#_ENREF_39) | Not specified  | IA  | Not specified | 1 | Control | NR  | Normal Saline | Saline 1ml/kg/h infusion 6 h before- 6 h afterAll patients had 2 weeks washout for all ACEI before starting the trial |
|  |  |  |  | 2 | Benazepril | Oral  | Benazepril 10mg/day, 3 days, Prior to CM administration  | Normal saline 1ml/kg/h infusion 6 h before- 6 h after |
| Li,2009 [38](#_ENREF_38) | Iohexol | IA  | Not specified, Define, 121 +/- 56 for arm 1, 116 +/- 65 for arm 2 | 1 | Control | NR  | Normal Saline | Saline 1ml/kg/h infusion for 12 h after CM |
|  |  |  |  | 2 | Probucol | Oral  | Probubcol 500mg bid, 3d before and after procedure  | Saline 1ml/kg/h infusion for 12 h after CM |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Li, 2014 [40](#_ENREF_40) | Iohexol | IA | Mean Volume:Arm1: 168 mlArm2: 172 ml | 1 | IV Normal Saline | IV | 0.9% saline IV for routine hydration only | Participants in hydration group were routinely offered antiplatelets, anticoagulation, antianginal agents, and conventional hydration treatment. |
|  |  |  |  | 2 | IV Prostaglandin E1 | IV | 20 ng/kg/min IV prostaglandin E1, beginning1 hour prior to CM administration for 6 hours. Prior, during and after CM admin |  |
| Liu, 2013[41](#_ENREF_41) | Iodixanol | IA | Not specified | 1 | Statin | NR | 40 mg/day, 12-24 hours prior and 7 days post procedure:Statins in all initially include patients. (Drug: N)20mg atorvastatin: 5940mg atorvastatin: 4010mg rosuvatatin: 4120mg simvastatin: 1940mg fluvastatin: 11 | If patients were on statin therapy prior to the procedure, their dose regimen was not changed (details on this were not provided beyond this statement). All patients received hydration (IV Normal saline, 1-1.5 ml/kg/h, 3-12 h pre and 6-24 hours post procedure). |
|  |  |  |  | 2 | Statin plus alprostadil | IV | 40 mg/day statin (see Arm1) + 20 mcg/day IV alprostadil, 1 day prior and 6 days post procedure | See notes for Arm 1. All patients received hydration (IV Normal saline, 1-1.5 ml/kg/h, 3-12 h pre and 6-24 hours post procedure). |
| Ludwig, 2011 [42](#_ENREF_42) | Iomeprol  | IA  | Not specified, Define, 120-200 (comparable in both arms | 1 | Control | IV  | Placebo before CM, NS, Prior to CM administration During CM administration After CM administration  | Plus NaCl 1000 ml before and 500 ml after |
|  |  |  |  | 2 | Mesna | IV  | 1600 mg MESNA before CM, NS (pulse regime), Prior to CM administration During CM administration After CM administration  | Plus NaCl 1000 ml before and 500 ml after |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Maioli, 2008[43](#_ENREF_43) | IOCM | IA | Not specified | 1 | IV Isotonic Saline plus oral NAC | IV, Oral | 1ml/kg/h 0.9% Sodium Chloride plus oral NAC 600mg, twice day, 12h. Prior and After CM administration | The two arms also got oral NAC 600mg, twice daily, day before and day after the procedure in addition to the IV saline versus bicarbonate. |
|  |  |  |  | 2 | IV Sodium Bicarbonate plus oral NAC | IV, Oral | 1ml/kg/h 0.9% Sodium Chloride plus oral NAC 600mg, twice day, 1h, 6h. Prior and After CM administration |  |
| Maioli, 2011 [44](#_ENREF_44) | Iodixanol, IOCM  | IA  | Dose and duration not specified. Mean Volume: Arm1 224ml, Arm2 216 ml. Arm3 208ml | 1 | No hydration | No hydration | Not stated |  |
|  |  |  |  | 2 | Late IV 0.9% saline | IV  | 1ml/kg 0.9% saline solution, 12, After CM administration  |  |
|  |  |  |  | 3 | Early IV sodium bicarbonate | IV  | 3ml/kg, 154 meq/L sodium bicarbonate, for 1 hour before and 12 hours after PCI, Prior to CM administration During CM administration After CM administration  |  |
| Manari, 2014[45](#_ENREF_45) | Iodixanol | IA | Not specified | 1 | IV normal saline | IV | 0.9% isotonic normal saline 1ml/kg/h, 12 hours.  | All patients received 70-100 IU/kg unfractionated heparin; aspirin at 162 mg or more; 300/600 loading dose of clopidogrel |
|  |  |  |  | 2 | High-dose infusion of IV normal saline | IV | 0.9% isotonic normal saline 3ml/kg/h for 1 hour followed by normal saline 1 ml/kg/h for 11 hours |  |
|  |  |  |  | 3 | IV standard bicarbonate | IV | NaCOH3 solution: 154mEq/L sodium bicarb 1 ml/kg/h, 12 hours |  |
|  |  |  |  | 4 | High-dose IV bicarbonate | IV | NaCOH3 solution: 154mEq/L sodium bicarb 3 ml/kg/h for 1 h followed by 1 ml/kg/h for 11 hours |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Marenzi, 2006 [46](#_ENREF_46) | Iohexol, LOCM, Other description, 350 mg of iodine per milliliter; Omnipaque, Amersham Health | NR | Define, Arm 1 mean 274;Arm 2mean= 264;Arm 3 mean= 253 | 1 | Placebo | Other, NR |  | All treated patientsand control patients underwent hydration with intravenous isotonic saline (0.9 percent) at a rate of1 ml per kilogram of body weight per hour (or0.5 ml per kilogram per hour in cases of overt heartfailure) for 12 hours |
|  |  |  |  | 2 | Standard dose NAC | Oral, IV | Total dose of 3000mg, Prior to CM administration After CM administration  | Intravenous bolus of 600 mg of N-acetylcysteine before primary angioplasty and a 600-mg tablet orally twice daily for the 48 hours after intervention |
|  |  |  |  | 3 | High dose NAC |  | Total dose of 6000mg, Prior to CM administration After CM administration  | Intravenous bolus of 1200 mg of N-acetylcysteine before intervention and 1200 mg orally twice daily for the 48 hours after intervention |
| Marenzi, 2012 [47](#_ENREF_47) | Iomeprol  | IA  | Not specified, Define, comparable between groups | 1 | Saline hydration | IV  | Saline 0.9%1 ml/kg/h (0.5 ml/kg/h in case of left ventricular ejection fraction < 40%, 24 h infusion- 12h before and 12h after, Prior to CM administration After CM administration  | Saline for all arms |
|  |  |  |  | 2 | Furosemide plus matched hydration | IV  | Furosemide- single IV bolus of 0.5 mg/kg (up to a max of 50 mg), over 30 min, Prior to CM administrationSaline infusion 90mins before and up to 4h after | Saline infusion 90mins before and up to 4h after |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Marron, 2007[48](#_ENREF_48) | Iodixanol  | IA  | Not specified | 1 | Isotonic 0.9% saline | IV  | 12h before and 12h after, Prior to CM administration After CM administration  | Volume of iv fluid=2000mls in total |
|  |  |  |  | 2 | Hypotonic 0.45% saline | IV  | 12h before and 12h after, Prior to CM administration After CM administration  |  |
| Mehran, 2009[73](#_ENREF_73) | Iodixanol, Ioxaglate  | IV | Not specified | 1 | 0 | IV  | Diphenydramine 25 mg IV before and IV one-half isotonic saline at 100 ml/h for 3-5 h and for 12 h after CM administration During CM administration  | N-acetylcysteine administered at discretion of investigator |
|  |  |  |  | 2 | Iodixanol | IV  | Diphenydramine 25 mg IV before and IV one-half isotonic saline at 100 ml/h for 3-5 h and for 12 h after CM administration During CM administration  | N-acetylcysteine administered at discretion of investigator |
|  |  |  |  | 3 | Ioxaglate |  |  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Mohamed,2008 [74](#_ENREF_74) | Iohexol, LOCM  | IA  | Not specified, Define, Arm 1 mean(SD)=126.67(94.37)ml; Arm 2 mean (SD)=136.73 (100.23)ml | 1 | IV hydration | IV  | Saline (0.45% NS) was given intravenously at a rate of I ml/kg/h 12 hours before and after coronary angiogram, 24h, Prior to CM administration After CM administration  |  |
|  |  |  |  | 2 | IV hydration + oral NAC | Oral, IV | Oral NAC 600mg twice daily for four doses starting 12 hours before procedure + Saline (0.45% NS) was given intravenously at a rate of I ml/kg/h 12 hours before and after coronary angiogram, 24h, Prior to CM administration After CM administration  |  |
| Mueller,2002 [49](#_ENREF_49) | LOCM, Other description, Ultravist 370; Schering, Berlin, Germany; and Imeron 350; Byk Gulden, Konstanz, Germany | IA  | Dose and duration not specified. Mean Volume: Arm 1mean=232ml; Arm 2 mean=236ml | 1 | Isotonic Saline hydration | IV  | 1ml/kg of 0.9% saline, 24h, Prior to CM administration During CM administration After CM administration  | Sodium concentration of 154mmol/l |
|  |  |  |  | 2 | .45% sodium chloride plus 5% glucose | IV  | 1ml/kg of 0.45% sodium chloride plus 5% glucose, 24h, Prior to CM administration During CM administration After CM administration  | Sodium concentration of 77mmol/l |
| Ng, 2006 [50](#_ENREF_50) | Iodixanol, Iohexol, Ioxaglate  | IA  | Not specified, Define, 172.2 +/- 73.2 NAC group, 164.4 +/- 85.0 fenoldopam group | 1 | Hydration | IV | normal saline 1ml/kg/h, 1-2 h before CM and for 6-12 h after CM | All pts received hydration with normal saline  |
|  |  |  |  | 2 | NAC | Oral  | NAC 600mg bid 4 doses, 2days, Prior and after CM administration  | 3 doses before CM - 1 dose after CM |
|  |  |  |  | 3 | Fenoldopam | IV  | 0.1 mcg/kg/min, 8h, , during and after CM administration  | Infusion started 2 h before CM |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Oguzhan, 2013[51](#_ENREF_51) | Iopromide | IA | Not specified | 1 | AVH (amlodipine valsartan hydration group) | Oral, IV | 5/160 mg; 1ml/kg/h, amlopidine/valsartan was given in 3 doses- one dose 24 h before the procedure, second on the morning before and third dose was given 24 h after contrast media exposure. Hydration therapy with isotonic NaCl was administered 12 h before and after contrast media exposure, both arm received hydration, prior and after cm administration |  |
| Oguzhan, 2013[51](#_ENREF_51) (continued) |  |  |  | 2 | H (hydration group) | IV | 1ml/kg/h, Hydration therapy with isotonic NACL was administered 12 h before and after contrast media exposure, both arms received hydration, Prior and after CM administration |  |
| Ozhan, 2010[52](#_ENREF_52) | Iopamidol  | IA  | Not specified, Define, comparable between groups | 2 | Nac | Oral  | NAC 600 mg twice daily, day after procedure, 1 day, After CM administration  | Saline 1000 ml infusion for 6 h after procedure. Saline not specified. |
|  |  |  |  | 3 | Nac + atorvastatin | Oral  | NAC 600 mg and Atorvastatin 80 mg twice daily on day 1 after procedure. Atorv 80mg d for 2 days after procedure, 3 days, After CM administration  | Saline 1000 ml infusion for 6 h after procedure. Saline not specified. |
| Pakfetrat, 2009[53](#_ENREF_53) | IOCM (Iodixanol) | IA | Not specified | 1 | Sodium chloride | IV | 1ml/kg/h normal saline in 5% dextrose, 6h before and 6h after. Prior and after cm administration |  |
|  |  |  |  | 2 | Sodium bicarbonate in dextrose solution | IV | 3ml/kg/h before and 1ml/kg/h after, 1h before and 6hrs after. Prior and after cm administration |  |
|  |  |  |  | 3 | Sodium chloride plus oral Acetazolamide | IV | 250mg, 2h before and 6h after. Prior and after cm administration |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Ratcliffe, 2009 [54](#_ENREF_54) | Iodixanol, IOCM, Other description, nonionic 320 mg iodine/mL; 290 mOsm/kg water [Visipaque, GE Healthcare, USA | IA  | Dose and duration not specified, Mean Volume; Arm 1mean=131, arm 2 mean=175, Arm 3 mean 169, arm 4 mean =125 | 1 | IV normal saline | IV  | NaCl (154 meq/L NaCl in 5% dextrose), at an infusion rate of 3 ml/kg/h for 1 h before contrast, and continued at 1 ml/kg/h during the procedure and for 6 h following contrast exposure., 7 h, Prior to CM administration During CM administration After CM administration  | All patients given saline or sodium bicarbonate in 5% dextrose. |
|  |  |  |  | 2 | IV normal saline + IV/oral NAC | Oral, IV | IV bolus of 1200 mg of NAC 1 h before intervention and 1200 mg orally twice daily for 48 h after intervention + IV NaCl (154 meq/L NaCl in 5% dextrose), at an infusion rate of 3 ml/kg/h for 1 h before contrast, and continued at 1 ml/kg/h during the procedure and for 6 h following contrast exposure, 2 days, Prior to CM administration During CM administration After CM administration  |  |
|  |  |  |  | 3 | IV NaHCO3 | IV  | IV nahco3 (154 ml of 1000 meq/L nahco3 to 846 ml of 5% dextrose, slightly diluting the dextrose concentration to 4.23%) at an infusion rate of 3 ml/kg/h for 1 h before contrast, and continued at 1 ml/kg/h during the procedure and for 6 h following contrast exposure., 7h, Prior to CM administration During CM administration After CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Ratcliffe, 2009 [54](#_ENREF_54) (continued) |  |  |  | 4 | IV NaHCO3+ IV/oral NAC | Oral, IV | IV bolus of 1200 mg of NAC 1 h before intervention and 1200 mg orally twice daily for 48 h after intervention + nahco3 (154 ml of 1000 meq/L nahco3 to 846 ml of 5% dextrose, slightly diluting the dextrose concentration to 4.23%) at an infusion rate of 3 ml/kg/h for 1 h before contrast, and continued at 1 ml/kg/h during the procedure and for 6 h following contrast exposure, 2 days, Prior to CM administration During CM administration After CM administration  |  |
| Recio-Mayoral, 2007 [55](#_ENREF_55) | Iomeprol, LOCM, Other description, Iomeron, Bracco s.p.a, Milan, Italy) with 350 mg/ml of iodine content | IA  | Not specified, Define, Arm 1 mean+/-SD=279+/-94; Arm 2=290+/-114ml | 1 | Saline + NAC after procedure | Oral, IV | IV isotonic saline (0.9%) at rate of 1 ml/kg/h for 12 h after PCI + 2 doses of 600 mg NAC orally the next day, 24h, After CM administration  | Standard institution protocolis perfusion with isotonic saline (0.9%) at rate of 1 ml/kg/h for 12 h after PCI |
|  |  |  |  | 2 | IV Bolus+ NAC before procedure +NAC after procedure | IV  | 2400mg NAC in an IV bolus solution of 5 ml/kg/h of alkaline saline with 154 meq/l of sodium bicarbonate in 5% glucose and H2O (adding 77 ml of 1,000 meq/l sodium bicarbonate to 433 ml of 5% glucose in H2O) over 1 h, in the 60 mins before contrast + 1.5 ml/kg/h fluid therapy in the 12 h after the procedure + 2 doses of 600 mg NAC orally the next day, 24h, Prior to CM administration After CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Reinecke, 2007 [56](#_ENREF_56) | Iopromide, IOCM, Other description, (Ultravist 370TM, Schering AG, Berlin, Germany). | NR | Arm1:mean 188; Arm 2 mean184; Arm3 mean197mg/dl, Not specified | 1 | Hydration only | IV  | Glucose 5% + Saline 0.9% 24 h (1000 ml 12 h before- 1000ml 12 h after CM) |  |
| Reinecke, 2007 [56](#_ENREF_56) (continued) |  |  |  | 2 | Hydration + dialysis | IV, Other, hemodialysis | Glucose 5% + Saline 0.9% 24 h (1000 ml 12 h before- 1000ml 12 h after CM)Low-flux HD started within 20 min after procedure for 2 hours  |  |
|  |  |  |  | 3 | Hydration + NAC | Oral, IV | Glucose 5% + Saline 0.9% 24 h (1000 ml 12 h before- 1000ml 12 h after CM)NAC 600 mg x4 (2 doses before and after)  | One dose NAC 600 mg was given at the evening before catheterization, the second dose was given on the morning before catheterization; the third was given at the evening after catheterization and the last dose was given on the morning the day after angiography. |
| Rosenstock, 2008 [57](#_ENREF_57) | IOCM, Not specified, Other description, 95% IOCM other 5% not specified | IA  | Not specified, Define, Arm 1 125 +/- 75, arm 2 142 ± 76, arm 3 149 ± 90 | 1 | Naive to angiotensin blockade | Other, No prior use of angiotensin blockade | N/a  | 79% had acetylcysteine + hydration(71%, 1/2 normal, 32% normal)Metformin and diuretics were withheld in all patients |
|  |  |  |  | 2 | Continue angiotensin blockade during and after procedure | Other, Angiotensin blockade continued during and after procedure | N/a  | 74% had acetylcysteine (68%, 1/2 normal, 20% normal) |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Rosenstock, 2008 [57](#_ENREF_57) (continued) |  |  |  | 3 | Discontinue angiotensine blockade morning of procedure and 24h after procedure | Other, angiotensin blockade stopped morning of procedure and 24h after procedure | N/a  | 78% had acetylcysteine + hydration(79%, 1/2 normal, 27% normal) |
| Seyon, 2007[75](#_ENREF_75) | Iohexol | IA | 147.5+/- 74.5 ml (tc); 133.68+/-58.04 (control) | 1 | Placebo + hydration | Oral | Placebo similar to NAC, once before procedure and then twice daily after for total of 4 doses. Prior and After CM administration | IV saline 0.45% 1 ml/kg/h; 4-6 hours pre and 12 hours post |
|  |  |  |  | 2 | N-Acetylcysteine + hydration | Oral | 600mg, once before procedure and then twice daily after for total of 4 doses. Prior and after cm administration | Iv saline 0.45% 1 ml/kg/h; 4-6 hours pre and 12 hours post |
| Shavit, 2009 [76](#_ENREF_76) | Iopamidol  | NR | 755 mg iopamidol per milliliter, and 370 mg iodine per milliliter, Not specified | 1 | Sodium bicarbonate | IV  | 154 meq/L sodium bicarbonate in 5% dextrose. The initial IV bolus was 3 ml/kg for 1 hour before cardiac catheterization. Following this bolus, patients received the same fluid at a rate of 1 ml/kg per hour during the contrast exposure and for 6 hours after the procedure, Prior to CM administration During CM administration After CM administration  | Bolus 3mefore procedure followed by infusion lml/kg/h for 12 hoursBoth arms 154 meq |
|  |  |  |  | 2 | Sodium chloride + NAC | Oral, IV  | NAC 600 mg× 2/d PO the day before and the day of the procedure., 2d, Prior to CM administration  | 12-hour infusion 1 ml/kg/h before cardiac catheterization |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Shehata, 2014[59](#_ENREF_59) | Iopramide | IA | Dose: <4 ml/kg | 2 | IV Normal Saline + Oral NAC | Oral, IV  | IV 0.9% normal saline (1 ml/kg/hour) starting 12 hours before PCI and up to 24 hours thereafter plus oral NAC (1,200 mg) was administered to patients in both groups, 24 hours before and after the procedure. Prior, during and after CM administration | Regimen given to all participants in study |
|  |  |  |  | 3 | IV Normal Saline + Oral NAC + Oral Trimetazidine | Oral, IV  | Oral trimetazidine (35 mg twice daily) for 72 hours, starting 48 hours before PCI. Prior, during and after Cm administration. | Also given IV 0.9% normal saline (1 ml/kg/hour) starting 12 hours before PCI and up to 24 hours thereafter plus oral NAC (1,200 mg) was administered to patients in both groups, 24 hours before and after the procedure. Prior, during and after CM administration |
| Shemirani, 2012 [71](#_ENREF_71) | Other description, meglumine | IA  | Not specified, Define, 120 ± 40 group a; 115 ± 57 group b; 133 ± 70 group c; 119 ± 42 group d | 1 | 0 |  |  |  All patients received normal saline (0/9%) in a dose of 1 ml/kg/h 12 h before and 24 h after PCI |
|  |  |  |  | 2 | Prior use of captopril then discontinued 36h before procedure | Oral  | Not specified. About 36h before PCI, drug discontinued, 36h before PCI, drug discontinued, Prior to CM administration  |  |
|  |  |  |  | 3 | Prior use of captopril continued during procedure | Oral  | Not specified, Continued during procedure, Prior to CM administration During CM administration  |  |
|  |  |  |  | 4 | Prior use of furosemide then discontinued 36h before procedure | Oral  | Not specified. About 36h before PCI, drug discontinued, 3 h before PCI, drug discontinued, Prior to CM administration  |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Shemirani, 2012 [71](#_ENREF_71) (continued) |  |  |  | 5 | Prior use of furosemide continued during procedure | Oral  | Not specified, Continued during procedure, Prior to CM administration During CM administration  |  |
| Solomon, 1994[60](#_ENREF_60) | 32% ionic high osm /32% ioinic low osm / 35% non ionic low osm | IA | Not specified | 1 | Saline | IV | 1/ml/kg, 24h. Prior, during and after cm administration | Saline 0.45% |
|  |  |  |  | 2 | Mannitol + saline | IV | 25 mg, 60 min. Prior to cm administration | Saline 0.45% |
|  |  |  |  | 3 | Furosemide + saline | IV | 80 mg, 30 min. Prior to cm administration | Saline 0.45% |
| Stevens, 1999[61](#_ENREF_61) | LOCM, HOCM (decision was made by operating physician) | IA | Not specified | 1 | IVF alone | IV | 150ml/h of 0.45 NS before and during procedure then 6h after followed by hourly adjustment to match prior hour's urine output, before procedure, during procedure, and for at least 6 h after the procedure | Randomized to control or experimental arm, then the decision re: mannitol depended on the pulmonary capillary wedge pressure. All arms given 0.45 saline |
|  |  |  |  | 2 | IVF + furosemide + dopamine + mannitol | IV | Furosemide 1mg/kg to max of 100mg single dose+ dopamine 3mcg/kg/min upon arrival to the catheterization lab and continued during the procedure + mannitol 12.5g in 250ml 5%dextrose (if PCWP < 20)+ control arm treatment, Before, during and at least 6 h after procedure |  |
|  |  |  |  | 3 | IVF + furosemide + dopamine | IV | Furosemide 1mg/kg to max of 100mg single dose+ dopamine 3mcg/kg/min upon arrival to the catheterization lab and during procedure (no mannitol if PCWP was at least 20)+ control arm treatment, Before, during and at least 6h after procedure |  |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Talati, 2012 [62](#_ENREF_62) | Iodixanol | NR | Not specified | 1 | No fenoldapam | NR  | NR, NR, Not stated | All participants received hydration, not specified |
|  |  |  |  | 2 | Fenoldopam | Other, intrarenal | Range: 0.1 - 0.4 ug/kg per min, Mean: 46.5 (SD: 5.5) min, Not stated,  |  |
| Tamura, 2009 [62](#_ENREF_62) | Iohexol | IA | Not specified | 1 | Normal Saline | IV | Standard hydration with sodium chloride was intravenous administration with isotonic saline (0.9%) at a rate of 1 ml/kg/hour (0.5 ml/kg/hour for patients with left ventricular ejection fraction < 40%) for 12 hours before and 12 hours after an elective coronary procedure. For patients weighing >80 kg, infusion rate was limited to 80 ml/hour (40 ml/hour for patients with left ventricular ejection fraction < 40%). |  |
|  |  |  |  | 2 | Normal Saline + Bicarbonate | IV | Standard hydration with sodium chloride was intravenous administration with isotonic saline (0.9%) at a rate of 1 ml/kg/hour (0.5 ml/kg/hour for patients with left ventricular ejection fraction <40%) for 12 hours before and 12 hours after an elective coronary procedure. For patients weighing >80 kg, infusion rate was limited to 80 ml/hour (40 ml/hour for patients with left ventricular ejection fraction <40%). |  |
| Thiele, 2010[77](#_ENREF_77) | Iopromide  | IA  | Not specified, Define, median=180 ml | 1 | Placebo | IV  | 10ml of NaCl 0.9% before angio, 10 mls twice daily for 48h after PCI, 48 hours, Prior to CM administration After CM administration  | After PCI, all treated and control patients underwent hydration with intravenous NaCl (0.9%) infusion at a rate of 1ml/kg of body weight per h for 12 h (or 0.5ml/kg/h in overt heart failure) |
|  |  |  |  | 2 | NAC | IV  | 1,200mg twice daily, 6000mg, 48 hours, Prior to CM administration After CM administration  | IV bolus of 1,200 mg before angioplasty and 1,200 mg intravenously twice daily for the 48 h after PCI (total dose 6,000 mg |
|  Trivedi,2003 [63](#_ENREF_63) | LOCM | IA  | Dose and duration not specified. Mean Volume: Arm 1 mean=187.3 ml; Arm 2 mean=201.3 | 1 | Oral hydration | Oral  | Unrestricted fluids, Not stated | After catheterization, all subjects were routinely encouraged to partake oral fluids. |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Trivedi,2003 [63](#_ENREF_63) (continued) |  |  |  | 2 | IV hydration(0.9% saline | IV  | 0.9% saline for 24 h at a rate of 1 ml/kg/h beginning 12 h prior to scheduled catheterization, 24h, Prior to CM administration During CM administration After CM administration  | After catheterization, all subjects were routinely encouraged to partake oral fluids. |
| Weisberg, 1994 [64](#_ENREF_64) | Other description, MD76 (66% diatrizoate meglumine, 10% diatrizoate sodium); it is an ionic, high-osmolality medium | IA  | Not specified | 1 | Saline | IV  | Saline 0.45% 100ml/h, 2h (not counting > 12 h of hydration pre-procedure; see below), During CM administration After CM administration Other, as below, all patients received IVF starting 1h pre-procedure | All patients received IV infusion of 0.45% NaCl at 100 cc/h beginning 12 hours before, and continuing throughout cardiac catheterization. Patients were randomly assigned to receive either saline or one of 3 drugs by IV infusion. The infusions began immediately after full instrumentation for cardiac catheterization and continued for a total of two hours (~ 2x the duration of the procedure). |
|  |  |  |  | 2 | Dopamine | IV  | Dopamine 2ug/kg/min in 0.45% NS at 100 ml/h, 2h, During CM administration After CM administration Other, as below, all patients received IVF starting 12 hours pre-procedure | All patients received IV infusion of 0.45% NaCl at 100 ml/h beginning 12 hours before, and continuing through the cardiac catheterization |
|  |  |  |  | 3 | Anp | IV  | ANP 50ug bolus then infusion 1ug/min in 0.45% NaCl at 100 ml/h, 2h, During CM administration After CM administration Other, as below, all patients received IVF starting 12 hours pre-procedure | All patients received IV infusion of 0.45% NaCl at 100 ml/h beginning 12 hours before, and continuing through the cardiac catheterization |
|  |  |  |  | 4 | Mannitol | IV  | Mannitol 15g/dl in 0.45 NaCl at 100 ml/h, 2h, During CM administration After CM administration Other, as below, all patients received IVF starting 12 hours pre-procedure | All patients received IV infusion of 0.45% NaCl at 100 ml/h beginning 12 hours before, and continuing through the cardiac catheterization |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Wolak, 2013[65](#_ENREF_65) | NR | IA | Mean volume:Arm1: 115.5 mlArm2: 119.0 mlArm3: 105.7 ml | 1 | Continued ACE/ARB  | NR | ACE and/or ARB treatment continued throughout study period. ACE/ARB dose determined by patient physician. Administration route not reported. | All patients given saline hydration for 12 hours before and 12 hours after image study, plus 600mg NAC twice daily 24 hours before and 24 hours after image study. Not reported whether oral or intravenous for saline or NAC. |
|  |  |  |  | 2 | Short delay of ACE/ARB | NR | ACE and/or ARB stopped 24 hours prior to procedure and re-started immediately after. ACE/ARB dose determined by patient physician. Administration route not reported. | All patients given saline hydration for 12 hours before and 12 hours after image study, plus 600mg NAC twice daily 24 hours before and 24 hours after image study. Not reported whether oral or intravenous for saline or NAC. |
|  |  |  |  | 3 | Long delay of ACE/ARB | NR | ACE and/or ARB stopped 24 hours prior to procedure and re-started 24 hours after. ACE/ARB dose determined by patient physician. Administration route not reported. | All patients given saline hydration for 12 hours before and 12 hours after image study, plus 600mg NAC twice daily 24 hours before and 24 hours after image study. Not reported whether oral or intravenous for saline or NAC. |
| XinWei, 2009[66](#_ENREF_66) | Iodixanol, Iohexol | IA | Body weight (kg) x 5ml/serum creatinine. | 1 | Simvastatin 20 | Oral | 20mg/day from admission to the day before PCI, and then resumed simvastatin 20 mg/day for the following days, Up to 48h after procedure. Prior and After CM administration | All patients were hydrated with intravenous isotonic saline (0.9%) at a rate of 1 ml/kg body weight per hour for 6 to 12 hours before and 12 hours after coronary catheterization to achieve a urinary flow rate of |
|  |  |  |  | 2 | Simvastatin 80 | Oral | 80mg/day from admission to the day before PCI, and then resumed simvastatin 20 mg/day for the following days. Up to 48h after procedure. Prior and After CM administration |  |
| Yavari, 2014[67](#_ENREF_67) | Iodixanol | IA | Mean Volume: Arm1: 185.88 ml, Arm2: 191.96 ml | 1 | 0.9% IV Normal Saline | IV | 0.9% Normal Saline, 1 ml/kg/h, 6 hour prior, during and up to 6 hour after procedure |  |
|  |  |  |  | 2 | 0.9% IV Normal Saline + Oral Pentoxifyllline | Oral, IV | 400 mg PO x 3 day Pentoxifylline., Day of procedure and Day after procedure | Also given 0.9% IV Normal Saline, 1 ml/kg/h at 6 hour prior, during and up to 6 hour after procedure |

**Evidence Table I-3. Interventions for studies comparing interventions to prevent development of CIN (continued)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Contrast Medium** | **Contrast Administration** | **Dose, Duration, Volume** | **Arm** | **Intervention** | **Administration** | **Intervention: dose, duration temporal association to contrast** | **Other intervention details** |
| Yin, 2013 [68](#_ENREF_68) | Other description, Ultravist-nonionic, low-osmolality contrast medium | IA  | Not specified, Not specified | 1 | No probucol | IV  | 0.9% isotonic saline(1ml/kg/h), 24 hours, After CM administration  | After coronary intervention, all patients underwent hydration with intravenous isotonic saline (0.9%) at a rate of 1 ml per kilogram of body weight per hour (or 0.5 ml per kilogramAfter coronary intervention, all patients underwent hydration with intravenous isotonic saline (0.9%) at a rate of 1 ml per kilogram of body weight per hour (or 0.5 ml per kilogram per hour in the cases of overt heart failure) for 24 h. |
|  |  |  |  | 2 | Probucol | Oral, IV  | 1000mg before procedure and 500mg twice daily after, before procedure and 3 days after procedure, Prior to CM administration After CM administration  | After coronary intervention, all patients underwent hydration with intravenous isotonic saline (0.9%) at a rate of 1 ml per kilogram of body weight per hour (or 0.5 ml per kilogram |

ACEI= Angiotensin Converting Enzyme Inhibitor, ANP=Atrial Natriuretic Peptide, AVH= Amlodipine Valsartan Hydration, b.i.d=Bi-daily, Bev=Beverage, CAG=Coronary Angiogram, Cc/hr= cubic centimeter per kilogram, CECT=Contrast Enhanced Computed Tomography, CM=Contrast Media, H=Hour, HD=Hemodialysis, hrs=hours, IA=Intrarterial, IOCM=Iso-Osmolar Contrast Media, IQR=Interquartile Range, IV=Intravenous, IVF=Intrvenous Fluid, LCA=Left Coronary Artery, LOCM=Low-Osmolar Contrast Media, Mcg/kg/min=microgram per kilogram per min, MD= Doctor of Medicine, mEq/l= milliequivalents per liter, Mg/dl=milligram per deciliter, Mg/kg/hour=milligram per kilogram per hour, Mg/kg=milligram per kilogram, Mg=milligram, mls=milliliters, mOsm/kg= milliosmoles per kilogram, N/A=Not Applicable, NAC=N-acetylcysteine, NaCl=Sodium Chloride, NaHCO3=Sodium Bicarbonate, NR=Not Reported, Osm=Omsolarity, p.o.=By Mouth, PCI=Percutaneous Coronary Intervention, PCWP=Pulmonary Capillary Wedge Pressure, POBID=By mouth twice daily, RCA=Right Coronary Artery, SB=Sodium Bicarbonate, SD=Standard Deviation, Ug/kg/min=microgram per kilogram per minute, VO=Vocal Order